Graven Hill, D1 Site, Bicester

Environmental Statement

Volume 1: Main Report

On behalf of **Graven Hill Purchaser Ltd**

Project Ref: 332510846 | Rev: 01 | Date: June 2022

Registered Office: Buckingham Court Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire, HP11 1JU
Office Address: 10 Queen Square, Bristol, BS1 4NT
T: +44 (0)117 332 7840 E: Bristol@stantec.com

Document Control Sheet

Project Name: **Graven Hill, D1 Site, Bicester**

Project Ref: **332510846**

Report Title: **Environmental Statement – Volume 1: Main Report**

Doc Ref: **332510846/100.101**

Date: **June 2022**

	Name	Position	Signature	Date
Prepared by:	Nicole Beckett /Various Technical Consultants	Environmental Planner/ Various Technical Consultants	*Various*	June 2022
Reviewed By	Neil Young	Senior Associate Environmental Planner	*NY*	June 2022
Approved by:	Stefan Boss	Director Environmental Planning	*SB*	June 2022
For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved
01	17th June	Final Submission	Various	NY	SB

Contents

Figures

Tables

Appendices

1. Introduction

1.1 Introduction

1.1.1 An Environmental Impact Assessment (EIA) has been managed by Stantec UK Ltd (Stantec) on behalf of Graven Hill Purchaser Ltd (hereafter referred to as 'the Applicant') in relation to an outline planning application for the redevelopment of the Graven Hill, D1 Site (which includes Sites D1 & EL1 of Policy Bicester 2: Graven Hill – in the adopted Cherwell District Council Local Plan (July 2015).), Bicester, OX26 6HF (hereafter referred to as 'the Site') for employment use under Use Class B8 (Storage and Distribution) (hereafter referred to as 'the Proposed Development). The Site is located within the Cherwell District Council (CDC) local planning authority area and forms part of the wider site allocated for development – Policy Bicester 2: Graven Hill – in the adopted Local Plan (July 2015).

1.1.2 This Environmental Statement (ES) presents the findings of the EIA and identifies the likely significant environmental effects of the Proposed Development during demolition, construction and operation stages.

1.2 The Proposed Development

1.2.1 The Proposed Development is for employment use under Use Class B8 (Storage and Distribution) of the Town and Country Planning (Use Classes) Order 1987 (as amended).

1.2.2 The more detailed description of the Proposed Development in the outline planning application is as follows:

"Outline (fixing 'Access' only) – redevelopment of Graven Hill D1 Site, including demolition of existing buildings, development of B8 'Storage or Distribution' use comprising up to 104,008 sq. m (GIA), creation of open space and associated highway works, ground works, sustainable drainage systems, site infrastructure and associated works".

1.2.3 The outline planning application seeks to fix 'access' only, leaving matters of *'Scale'*, *'Layout'*, *'Appearance'*, and *'Landscape'*, to the 'Reserved Matters' Stage.

1.3 Project History

1.3.1 In relation to the Site there is an existing Outline Planning Permission (ref: 11/0194/OUT) which was Granted on the 8th of August 2014 for:

"Outline - Redevelopment of former MOD sites including demolition of existing buildings, development of 1900 homes; local centre to include a 2 form entry primary school (class D1), a community hall of 660sqm, five local shops or facilities to include A1, A2, A3, A5 and D1 uses totalling 1358sqm, 1000sqm gross A1 uses, a pub/restaurant/hotel (class A4/A3/C1) 1000sqm and parking areas; employment floorspace comprising B1(a) 2160sqm, B1(b) 2400sqm, B1(c) and B2 20520sqm and B8 uses up to 66960sqm; creation of public open space and associated highway improvement works, sustainable urban drainage systems, biodiversity improvements, public transport improvements and services infrastructure. Erection of a 70400sqm fulfilment centre on 'C' site and associated on site access improvement works, hardstanding, parking and circulation areas." ("2014 Planning Permission")

- the above development encompassed the Site and a wider area referred to, in that permission as '*Site C Ploughley Road & Site D & E Ambrosden Road MOD Bicester Upper Arncott Oxfordshire'*. The decision to grant the 2014 Planning Permission was supported by an Environmental Statement prepared in 2011 and submitted by Defence Infrastructure Organisation (DIO) on behalf of the Secretary of State for Defence ('2011 ES') to support the planning application ('2011 planning application').

1.3.2 It should be noted that the Site falls within Sites D1 & EL1 '*Site D & E Ambrosden Road, MOD* Bicester' of the local plan allocation, however for simplicity, it is referred to only as the D1 site.

1.3.3 The 2011 ES related to a mixed-use development scheme, comprising employment and residential uses (as specified above). The residential element were located to the north of Graven Hill and the employment uses located to the south of Graven Hill (which coincides with the D1 Site). The Design and Access Statement (DAS) submitted with the 2011 Planning Application indicated that the area of that proposal equivalent to the Site was to be designated for predominantly 'B8 storage use' (approx. 74% of built floorspace); with 'mixed employment', comprising B1(c) and B2 use (approx. 22% of built floorspace) and a 'potential energy use' (approx. 4% of built floorspace).

1.3.4 Given the scale of the scheme and the separate land uses within the 2014 Planning Permission, there have been several follow up applications which have both varied the development and the associated planning conditions. In addition, some planning applications have been made and withdrawn.

1.3.5 Specifically, variation of planning conditions and amendment applications (via S.73 Minor Material Amendments & S.96 Non-Material Amendment) have been made to the 2014 Planning Permission and subsequent consents over the years. However, these focussed upon amendments to the residential area to the north of Graven Hill (e.g., ref: 15/02159/OUT; 16/01802/OUT & 19/00937/OUT).

1.3.6 Planning Permission (ref: 20/02415/F) to provide a new dedicated Employment Access Road (EAR) adjacent the northern boundary of the Site was permitted in April 2021 with the aim to be completed in July 2022. At the time of writing, the road is currently under construction but is not operational.

1.3.7 This ES supports a new outline planning application for the Proposed Development (B8 floorspace at the D1 Site, South of Graven Hill as set out in **Paragraph 1.1.2** and **Paragraph 1.1.3**. The 2014 Planning Permission allows for approximately 92,040m^2 of commercial floorspace at the Site and 66,960m2 of this was permitted as B8 use. 20,520m^2 was allowed as B2 use; 2,160m^2 as B1(a) use and 2,400m^2 as B1(b). The Proposed Development seeks to provide a greater height for the logistics units; maximum 20m ridge height instead of approximately 15 metres which was approved in the 2014 Planning Permission. This is in response to occupier requirements and feedback from the Applicant's commercial agents.

1.3.8 The key principle that has driven the update to the development proposals for the Site is recent changes in the market which means that there is significant demand for high quality B8 units in locations that have good road transport links, such as the proposed Site. An Economic Impact Assessment has been submitted with the outline planning application which provides detailed information regarding the need for B8 units in Bicester and notes the various economic benefits. The report notes the growth of the sector and states:

"'The logistics sector in Bicester and Cherwell has seen a lot of growth in the recent past. Over the latest economic cycle (2009 to 2020), jobs in transportation and storage sectors have increased in Cherwell by 50%, against an all-sector increase of 20% over the same period."

1.3.9 It also provides further evidence of the strong demand for storage and distribution stating:

"'The evidence of logistics market strength is strong. The Covid-19 pandemic and the agreements of the final Brexit deal have applied additional strain to supply chains, with the logistics sector growing and evolving to deliver against customer demand for online shopping, as well as to hold more inventory in the UK to protect against potential delays at the UK border. As a result of these factors, take up nationally hit an all-time annual record of over 5 million sqm in 2021.'"

1.4 Terms and Definitions

1.4.1 For ease of reference the following terms have been used throughout the ES (unless the context dictates otherwise):

- Parameter Plans – plans for approval that establish parameters for the Proposed Development. These plans form the basis of the assessment in this ES. These are included in **Appendix 1.2;**
- 'Proposed Development' – the application for which planning permission is being sought, as described in **Chapter 3**;
- 'the Proposed Development Site' / 'the Site' – the area being developed (D1 Site), as per **Appendix 1.1** and described in **Chapter 2;**
- 'CDC' – Cherwell District Council (the determining authority);
- 'OCC' – Oxfordshire County Council, county authority and a statutory consultee for this application;
- 'the Applicant' – Graven Hill Purchaser Ltd;
- "2011 ES" – an Environmental Statement prepared in 2011 to support the '2011 planning application'.
- '2011 Planning Application' – The Planning Application submitted in 2011 by DIO (Planning Application Reference 11/01494/OUT);
- 2014 Planning Permission– outline planning permission for 1,900 homes, employment space and associated development at Gravel Hill, granted in August 2014. Planning Application Reference 11/01494/OUT, as amended by 15/02159/OUT, 16/01802/OUT and 19/00937/OUT;
- Employment Access Road (EAR) - Planning Permission (ref: 20/02415/F) to provide a new dedicated Employment Access adjacent the northern boundary of the Site was permitted in April 2021.

1.5 The Environmental Statement and Other Documents

1.5.1 This ES presents the findings of an EIA undertaken in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended), referred to as the 'EIA Regulations'.

1.5.2 The Proposed Development is an urban development project with an overall area of 75.4 acres (30.5 hectares (ha)). It is therefore considered to be EIA development, falling within paragraph 10 (a) and 10(b) of Schedule 2 of the EIA Regulations and exceeding two of the thresholds / criteria outlined in Column 2, Schedule 2 of the EIA Regulations:

10(a) Industrial estate development projects, the area of the development exceeds 5 hectares.

10(b) Urban development projects, including the construction of shopping centres and car parks, sports stadiums, leisure centres and multiplex cinemas

- The development includes more than 1 hectare of urban development which is not dwellinghouse development; and
- The overall area of development exceeds 5 hectares.

1.5.3 As the Proposed Development is considered to be EIA development, the Applicant has voluntarily undertaken an EIA in accordance with the EIA Regulations.

1.5.4 Running concurrently with the design process, the EIA has sought to identify any likely significant environmental effects arising as a result of the Proposed Development, to identify appropriate design and construction measures and apply good practice both to mitigate any likely significant adverse environmental effects and to maximise the environmental opportunities which might arise as a consequence of the demolition, construction and operation of the Proposed Development. The EIA has also sought to determine the residual beneficial and adverse environmental effects remaining after mitigation measures have been incorporated.

1.5.5 The other documents submitted with this planning application include:

- Supporting Town Planning Statement (H Planning Ltd)
- Design and Access Statement (Atelier Gooch Ltd)
- Statement of Community Involvement (H Planning Ltd)
- Outline Construction Environmental Management Plan (OCEMP) (RPS)
- Area Schedule and Plans including Site Location Plan, Existing Site Plans, Demolition and Enabling Plans and Proposed Parameter Site Plans (Atelier Gooch Ltd)
- Indicative Masterplan for Illustration Purposes Only (Atelier Gooch Ltd)
- Detailed Access Plans to fix 'Access' (Alan Baxter Associates)
- Buildings Demolition Report (Resolute Property Consultancy)
- Economic Impact Statement (Quod)
- Energy and Sustainability Statement (BWB Consulting)
- BREEAM Pre-Assessment (BWB Consulting)
- Transport Assessment (Alan Baxter Associates)
- Interim Travel Plan (Alan Baxter Associates)
- Rapid Health Impact Assessment (Stantec)
- Review of Geotechnical Investigation Report (Alan Baxter Associates)
- Lighting Impact Assessment (BWB Consulting)
- Ecological Assessment (RPS)
- Biodiversity Net Gain Assessment (RPS)
- Arboricultural Impact Assessment (Watermans)

1.6 Report Structure

1.6.1 The ES comprises the following volumes:

- **Volume 1: Main Report (this document)**

- **Chapter 2**: description of the Site and surrounding area
- **Chapter 3**: description of the Proposed Development
- **Chapter 4**: summary of demolition, construction and site management
- **Chapter 5**: the need for the development and alternatives considered
- **Chapter 6**: methodology adopted to undertake the EIA
- **Chapter 7**: summary of the planning and policy context
- **Chapters 8-17**: technical chapters which document the assessments of likely significant effects of the Proposed Development
- **Chapter 18**: assessment of impact interactions
- **Chapter 19**: schedule of mitigation and monitoring
- **Chapter 20**: glossary of abbreviations used in the ES

- **Volume 2: Appendices**
- **Non-Technical Summary**

1.7 Project Team

1.7.1 The project team for this EIA is shown in **Table 1.2.**

1.7.2 In accordance with Regulation 18(5)(b) of the EIA Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare the ES is provided in **Appendix 1.4.**

Table 1.2: EIA Project Team

Project Team	Team Position
Stantec	EIA Coordination and ES Production Assessment of Impact Interactions Schedule of Mitigation and Monitoring
H Planning	Planning Policy and Context
Waterman Infrastructure & Environment Ltd	Air Quality Historic Environment Noise and Vibration
RPS Group	Ecology and Nature Conservation Landscape and Visual Hydrology and Flood Risk Hydrogeology, Geology and Ground Conditions
Alan Baxter Associates (ABA)	Hydrology and Flood Risk Traffic and Transport
Quod	Socioeconomics

2 Site and Surrounding Area

2.1 Introduction

2.1.1 This Section provides a description of the existing the Site. A Plan of the Site is included in **Appendix 1.1.** The Site area remains materially unchanged since the 2011 ES and environmental conditions at the site remain broadly as set out in the 2011 ES, however a review of baseline conditions, in relation to the Site has been undertaken and any changes are set out in the technical chapters of this ES.

2.2 The Site

Site Location

2.2.1 The Site is located within the administrative boundary of CDC and the OCC and is centred approximately on Ordnance Survey Grid Reference (OSGR) SP 591 197. It is located approximately 2.8 km to the south-east of Bicester Town Centre and is in close proximity to a number of villages including Ambrosden located approximately 720 m east; Merton, located approximately 2 km south and Wendlebury, located approximately 2.6 km south-west.

2.2.2 An unnamed road bounds the northern edge of the Site, with St Davids Barracks beyond and Graven Hill Wood beyond that, approximately 120 m north. The southern, eastern and western boundaries comprise adjoining agricultural fields, with a freight railway line (Bicester Military Railway) denoting the edge of the Site to the south. Beyond the railway line to the south is Bicester Solar Farm.

2.2.3 Current direct access to the Site is via the A41/A4421/B4100 roundabout to Anniversary Avenue / Pioneer Road to the north of the Site. Junction 9 of the M40, which links London, Oxford and Birmingham, is located a short distance to the southwest. As noted in the supporting text to Policy Bicester 2 (Paragraph C.57), the Site 'benefits from excellent transport connections'. On this basis, the Site is considered ideally located for storage and logistic type uses.

Site Description

2.2.4 The Site comprises 75 acres (30.35 Ha) of land, and is vacant brownfield site comprising warehouses, areas of hardstanding used for parking and storage and open spaces. The site was previously used as part of the Ministry of Defence Logistics, Commodities and Services (LCS) logistics hub, formerly known as Defence Storage and Distribution Agency . This function dates back to September 1942 when a depot was constructed to provide logistical support for operations in Europe during World War II.

2.2.5 The LCS operation has been rationalised and moved to 'C' Site (another area of the allocation in the local plan) at Upper Arncott, meaning that 'D' Site is surplus to requirements. It is understood that the D1 site has been vacant since 2009 (approx.).

2.2.6 Adjoining uses include the new residential uses to the north of Graven Hill; Wretchwick Farm to the east and a sewage treatment works to the northwest on the opposite side of the Chiltern railway line. Symmetry Park, a newly constructed logistics park, is located to the east of the site off the A41.

2.2.7 There are five large vacant warehouses (Unit D1, Unit D2, Unit D4, Unit D7, Unit D10 & D20, the latter being the sub-station) on Site, totalling approximately 41,831m2. This figure excludes the buildings removed as part of the Employment Access Road (EAR) which is to be completed in 2022 (e.g., Units D05, D03 & D12).

2.2.8 The Site includes areas of vegetation both within and along its boundaries including natural scrub land, open grass areas that are regularly managed and cut back and semi-natural

woodland edges to the east, south and north-west. These woodlands consist of predominantly broad leaf species such as Oak, Common Beech and Alder with smaller areas of Pine.

2.2.9 The scrub, trees and woodland within and on the boundary of the Site have value for fauna including breeding birds, roosting bats and badger. Survey work on site in 2020 and 2021 noted the presence of swallows' nest (and mature chicks), bats and two badger setts were present on the south-western boundary.

2.2.10 Using the [British Standard BS5837 cascade chart for Tree Quality Assessment most of the trees within the Site are Category U (deemed to be of no value within 10 years of the assessment and should be removed) and Category C (trees of low quality, adequate for retention for a minimum of 10 years expecting new planting to take place or young trees that are less than 150mm in diameter which should be considered for re-planting where they impinge significantly on a proposed development). There is only one tree adjacent to the existing [Unit] D12 identified as Category A (Trees of high quality and value capable of making a significant contribution to the area for 40 or more years). However, this tree was approved to be removed for the new employment area development pursuant to Discharge of Conditions Application ref. 19/00245/DISC. The woodlands to south of Unit D7 and east of Unit D2 are in Category B (Trees of moderate quality or value capable of making a significant contribution to the area for 20 or more years). As part of the Discharge of Conditions Application ref. 19/00245/DISC a minor modification/ reduction of the woodland adjacent to Unit D7 was approved.

2.2.11 Although there are no Public Rights of Way (PROW) within the Site, there are a number of footpaths and bridleways in close proximity to the Site connecting the nearby villages of Merton and Ambrosden to Bicester.

2.2.12 The Site lies on a gentle slope south to north, towards Graven Hill (115m Above Ordnance Datum (AOD)), rising from 61.5m AOD along the southern boundary to 71m AOD at its highest point on the northern boundary. The slope across the Site east to west is gentle and generally appears flat. There are some local variations, mostly forming the banks around the railway tracks to the south, which will be removed and levelled in preparation for the Proposed Development.

2.3 Environmental Context

2.3.1 There are no sites designated for their natural or cultural heritage interests within the Site, however there are several within the surrounding area.

2.3.2 There are no sites of international nature conservation interest located within 10km of the Site, however there are two Sites of Special Scientific Interest (SSSI) within 5 km. The Arncott Bridge Meadows SSSI lies on the floodplain of the River Ray and is located approximately 1.8 km south-east of the Site. The meadows exhibit medieval ridge-and-furrow features indicating that parts, at least, have remained unploughed for many centuries. They are managed as hay meadow and pasture and accordingly support a wide range of plant species which are largely confined to such old, unimproved, neutral grassland.

2.3.3 There are no non-statutory designations of conservation value within the Site. The nearest non-statutory designated site was Graven Hill Local Wildlife Site (LWS), which lies approximately 380 m north-west of the Site and is designated as ancient woodland.

2.3.4 The Site includes extensive areas of vegetation both within and along the boundaries. These include plantation and semi-natural woodland, predominantly broad leaf species containing Oaks, Common Beech and Alder with smaller areas of Pines. They provide a key role in providing visual screening and habitat links around the perimeter of the Site. Other habitats include semi-improved neutral grassland, dense and scattered scrub, scattered trees and standing water.

2.3.5 There are several listed buildings, predominantly Grade II listed, within the vicinity of the Site, particularly within the nearby villages of Ambrosden, Merton and the town of Bicester to the

north. The nearest listed building to the Site is a Grade II barn approximately 50m south of Wretchwick Farmhouse (LB 243386), located 280m north-east at its closest point. Two Scheduled Monuments lie within 1km of the Site, these being the Alchester Roman Town (SM OX18), located approximately 790m north-west at its nearest point; and the Wretchwick deserted medieval settlement (SM 28148), located approximately 910m north-east at its closest point.

2.3.6 There are no World Heritage Sites, Registered Parks and Gardens or Registered Battlefields within 5km of the Site.

2.3.7 The Site is not located within an Air Quality Management Area (AQMA). The nearest AQMA declared by CDC is AQMA No. 4 located approximately 3.1km north-west of the Site and declared for exceedances of the annual mean NO2 objective.

2.3.8 The Site lies in Flood Risk Zone 1; identified as having low risk from fluvial or tidal flooding. There are no artificial structures such as embankment waterbodies near the Site that could cause flooding, although flood maps do indicate some small areas at risk of flooding from surface water. For further information see **Chapter 11**.

2.3.9 The nearest surface water feature is reported to be the Langford Brook situated 1.5 km north of the Site. A series of field drains are also recorded to be present approximately 1 km to the west of the Site, with surface water drains reported to be present along the southern boundary and lying close to the south-eastern boundary. Furthermore, additional surface water drains are recorded approximately 1 km to the south-west of the Site and Gagle Brook is recorded approximately 1 km to the west.

3 The Proposed Development

3.1 Introduction

3.1.1 This chapter sets out a description of the Proposed Development for which outline planning permission is sought which has been assessed as part of the EIA.

3.2 Local Policy Allocation and 2014 Planning Permission

3.2.1 The Site is allocated in the Cherwell District Council Local Plan 2011 – 2031 (adopted 2015) under Policy Bicester 2: Graven Hill, which states the following:

"This predominantly brownfield site to the south of Bicester is proposed for a mixed use development of 2,100 dwellings, significant employment land providing for high quality job opportunities, associated services, facilities and other infrastructure including the potential for the incorporation of a rail freight interchange."

3.2.2 In regard to employment, it states that use classes may include B1, B2 and B8 uses.

3.2.3 The Site also forms part of the wider Graven Hill development site, of which development was Granted permission in August 2014 (ref: 11/01494/OUT). The wider site was granted permission for the provision of 1,900 homes; retail and community facilities, and employment floorspace comprising up to 2,160 sq. m of B1(a) use, 2,400 sq. m of B1(c) use, 20,520 sq. m of B2 use and up to 66,960 sq. m of B8 use (a total of approx. 92,040 sq. m of employment floorspace). The majority of this employment floorspace is provided at D1 Site.

3.2.4 The key principle that has driven the update to the development proposals ('B8' land use only) is recent structural changes in the market which means that there is significant demand for high quality Use Class B8 units in locations that have good road transport links, such as the proposed Site. An Economic Impact Assessment (Quod, 2022) has been submitted with the outline planning application which provides detailed information regarding the need for B8 in Bicester and notes the various economic benefits

3.2.5 The Proposed Development seeks to provide a greater height for the already approved units; maximum 20m ridge height) instead of approximately 15 metres which was approved in the 2014 Planning Permission).

3.3 Description of the Proposed Development

3.3.1 The description of the Proposed Development is:

"Outline (fixing 'Access' only) – redevelopment of Graven Hill D1 Site, including demolition of existing buildings, development of B8 'Storage or Distribution' use comprising up to 104,008 sq. m (GIA), creation of open space and associated highway works, ground works, sustainable drainage systems, site infrastructure and associated works".

3.3.2 This Proposed Development description should be read in conjunction with the area schedule and Plans including the Parameter Plans and Detailed Access Drawings which are provided at **Appendix 1.1 to 1.2** and are as follows:

- Site Location Plan (Drawing no. 410_S-00)
- Existing Plan (Drawing no. 410_S-10)
- Parameter Plan: Proposed Demolition and Enabling Works Plan (Drawing no. 410_S-12);
- Parameter Plan: Indicative Proposed Plan (Drawing no. 410_S-50);

- Parameter Plan: Proposed Layout (Drawing no. 410_S-51); and
- Detailed Access Plans (Drawing no. 1923-050-010, 1923-050-011 and 1923-050-012).

3.3.3 The Parameter Plans and Detailed Access Drawings set out the proposals for approval and include a description of the proposed height, land use quantum and structural landscaping of the Proposed Development that will be accommodated within the Site.

3.3.4 An Illustrative Masterplan has been provided in **Appendix 3.1** to demonstrates one way in which the Proposed Development would be built out. It does not form the basis for the assessment for the EIA but is provided for context only.

3.4 Quantum of Development

3.4.1 The Proposed Development seeks to demolish existing buildings which comprise 42,074 sqm of Class B8 use. These are shown in **Table 3.1**.

Table 3.1: Buildings proposed for demolition

Building	Area (sqm)
Unit D1	10,200
Unit D2	10,300
Unit D4	10,200
Unit D7	10,225
Unit D10	868
Unit D20	38
9no. of Munition Stores	243

3.4.2 The Proposed Development includes provision for 104,008 m^2 of B8 logistics floorspace as shown in **Table 3.2**. The Indicative Masterplan demonstrates how this floorspace could be provided across 9 separate units (Units 1-9). However, it is important to note that the Masterplan is **indicative** or **illustrative only** at this stage and does not form the basis of assessment. The floorspace will deliver an approximately 15% increase in commercial space when compared with the 2014 Planning Permission (92,040m^2). Parking will also be provided as part of the Proposed Development, with a maximum of 902 spaces proposed in total.

3.4.3 A Bat Barn is proposed to be constructed in the south-east corner of the Site prior to the demolition of the existing units to provide primary mitigation for biodiversity.

Table 3.2 Maximum development and Site Area (Indicative only)

	Total	
	GIA	
	Sq.m	Sq.ft
Maximum Development	104,008	1,119,529

	Sq.m	Acres
Total Site Area	305,153	75.4

Building Heights

3.4.4 The Proposed Layout Parameter Plan **(Appendix 1.2)** shows an increase in building heights from the 2014 Planning Permission. Buildings are proposed to have a maximum ridge height of 20 m, as opposed to a maximum of 15 m ridge height outlined in the 2011 planning application.

Green Space

3.4.5 Landscape is an integral part of the Proposed Development, with 47% of the Site proposed to comprise Green Infrastructure.

3.4.6 The Proposed Layout Parameter Plan **(Appendix 1.2)** shows a network of green fingers / wildlife corridors to provide links through the Proposed Development to Graven Hill Wood. The final location of these green fingers / wildlife corridors will be determined at Reserved Matters Stage but will be positioned within the parameters identified on the parameter plan. These green fingers / wildlife corridors will comprise Sustainable Drainage (SuDs), informal recreation, pathways for pedestrians and cyclists and habitat corridors; and also provide vistas through the Site which will accentuate the significant aesthetic value.

3.4.7 The Proposed Layout Parameter Plan also shows structural landscape planting including the retention of existing woodland.

Access and Movement

3.4.8 As shown on the Detailed Access Drawings **(Appendix 1.2)**, the proposed vehicular access will be from the EAR, which will form the northern boundary of the Site. This is currently under construction and is due to be completed in 2022. For clarity, it should be noted that the EAR does not form part of this planning application.

3.4.9 In order to enable vehicular access to the Site, as well as provide cycle and pedestrian access, modifications will be required to the EAR. This includes the four bell mouth entrances shown coming off of the EAR to the north of the Site on the Detailed Access Drawings in **Appendix 1.2**.

3.4.10 Whilst the office provisions are ancillary to the main B8 use class, an allowance for additional car parking more akin to the requirement for the office use elements has currently been allowed in the proposals. Following discussions with OCC during the pre-application process, it was agreed that the parking standards as set out in the 2014 Planning Permission would be followed, albeit with the electric vehicle charging requirements outlined in the Oxfordshire Electric Vehicle Infrastructure Strategy (2021). On this basis, maximum parking to be provided it outlined below.

- Warehouse – 1 space per 200 sqm.
- Office – 1 space per 30 sqm of which 6% will be disabled parking and 25% will have electric car charging available.

3.4.11 HGV parking is provided along the outside edge of the service yard with drop-off / docklevellers along the building elevation. There are no Oxfordshire parking standards for HGV's.

3.4.12 The cycle store provision has been calculated based on Oxfordshire's policy of:

- Warehouse - 1 space per 500 sqm + 50% additional for visitors.

- Office - 1 space per 30 sqm + 50% additional for visitors.

4 Demolition, Construction and Site Management

4.1 Introduction

4.1.1 This chapter provides information on the anticipated construction of the Proposed Development and the management of the demolition and construction phase on Site.

4.1.2 As part of the construction of the Proposed Development, the five large vacant warehouses (Unit D1, Unit D2, Unit D4, Unit D7, Unit D10 & D20, the latter being the sub-station) on the Site will be demolished. These existing buildings total approximately 41,831m2. Refer to the Proposed Demolition and Enabling Works Parameter Plan (Drawing no. 410_S-12). This figure excludes the buildings removed as part of the Employment Access Road (EAR) Planning Permission construction of which is due to be completed in 2022 (e.g., Units D05, D03 & D12).

4.1.3 Construction will be managed through the implementation of a Construction Environmental Mana genet Plan. An Outline CEMP has been submitted alongside this ES (RPS, 2022) and will form the basis of the more detailed CEMP, plans and method statements, to be prepared during the pre-construction period once a Principal Contractor is appointed. The Outline CEMP identifies a range of measures, in relation to aspects such as noise and vibration, dust and air pollution, ecology, and water resources, which will be utilised during the construction of the Proposed Development to manage construction and environmental impacts. Although this will ultimately be controlled the final CEMP, which will be agreed with CDC prior to the commencement of construction, the ES has been based on the Outline CEMP being inherent to the Proposed Development as a primary mitigation.

4.1.4 The Principal Contractor will be responsible for preparing and implementing the detailed CEMP, which will be agreed with the CDC in advance of the commencement of demolition and construction. The CEMP will be a live document throughout the construction period and will be updated to respond to changes to legislation, standards, available techniques, etc. as well as any changes to construction techniques.

4.2 Construction Works and Programme

4.2.1 It is anticipated that the development will be delivered in phases, with demolition commencing in 2022 and construction beginning in quarter 1 (Q1: Jan – April) 2023. The development is anticipated to be complete and occupied by 2024.

4.2.2 Given the planning stage of the development, a contractor(s) is yet to be appointed and therefore, there is a degree of uncertainty as to the length of the construction phase and the approach to activities to be undertaken so a reasonable estimate has been made based on experience from the Applicant. It is anticipated however that the key construction activities are likely to include:

- Establishment of construction compound(s) and welfare facilities;
- Demolition;
- Vegetation clearance, earthworks and soil preparation to prepare the Site for construction activities;
- Site remediation with respect to PAHs and asbestos, which could include source removal or capping and inclusion of basic ground gas protection measures;
- Construction of infrastructure including internal access routes, highway improvements, access works and drainage;

- Construction of building foundations, structure, cladding and glazing and internal walls and partitions;
- Installation of fixtures, fitting and building services; and
- Formation of open space, with associated soft landscaping.

4.2.3 The contractor(s), once appointed, will identify the location of the construction compound(s) within the Site.

4.2.4 The phased nature of the construction of the Proposed Development means that environmental effects during construction will vary temporally and geographically through the construction period. Therefore, while construction is anticipated to last for approximately one year, it is not anticipated that any one area of the Site or surrounding area will experience construction effects during all, or even the majority, of that time. Construction effects also typically vary in magnitude depending on the processes occurring at any one time (e.g. earth movements are more likely to lead to significant environmental effects than internal fit out of a building).

4.2.5 This ES has sought to address this variation on construction effects when assessing the likely significant effects during construction.

4.2.6 It is anticipated that the standard working hours for all construction activities will be from 07:30 to 18:00 Mondays to Fridays and 08:00 to 12:30 on Saturdays. No noisy work will be undertaken on Sundays. No continuous 24- hour activities are envisaged at this stage and neither is Bank Holiday working. This is set out in the Outline CEMP (see **Appendix 4.1**) which will be secured in its final form by planning condition.

4.3 Construction Management

4.3.1 All of the construction operations carry with them a range of issues to be dealt with in their design, preparation and execution. Best practice in construction management will be required to minimise the potential environmental effects and disruption that could be caused by the construction works.

4.3.2 As noted earlier, construction will be managed through the implementation of a CEMP, to be agreed with CDC prior to the commencement of works. The detailed CEMP will be a 'living document' and will be reviewed once the construction techniques and methodologies to be employed in the various stages of the project are confirmed. The CEMP will identify the responsibilities of all parties involved in the design, management and construction of the development.

4.3.3 Matters addressed in the Outline CEMP include aspects set out in the following bullet points, as well as the construction mitigation and enhancement measures identified in each of the topic chapters of this ES. Measures include:

- Health and Safety: contractor's competence, risk method statements, contractor communication, welfare facilities, accident reporting, standards on personal protective equipment, display of safety notices etc.
- Contaminated land: compliance with the Environment Agency Pollution Prevention Guidance, method statements for storage;
- Noise and vibration: selection of appropriate plant, site operation hours, monitoring, complaints procedure;
- Dust and air: prevention and mitigation measures, complaints procedure, wheel washing;

- Waste minimisation and management: reduction, re-use, recovery, disposal (including Duty of Care), should include details of waste management and procurement policy;
- Ecology: timing of site clearance, tree protection (as necessary);
- Water resources: storage of materials, protocol for spillages; Emergency planning & incident control: incident recognition training, emergency planning, incident reporting and control;
- Site logistics & operations: safety and security; working hours; maintaining access, general site layout including compound location, construction traffic, access routes;
- Community liaison: meetings and community contact, telephone helpline, designated point of contact.

4.4 Construction Traffic

4.4.1 Traffic will be generated during the construction of the Proposed Development as a result of bringing plant and materials to the Site, transporting demolition material offsite and due to construction personnel accessing the Site.

4.4.2 The Site is in proximity to key strategic highways, with the A41 in particular running close to the Site. Connections are available to the M40 and the A34, with convenient journeys available to London, Birmingham, and Oxford. In terms of local provision, there are various private roads through the Site, which would have served the various MOD buildings. The Employment Access Road (EAR) will run along the northern perimeter of the Site, and connecting north to the A41, with a new roundabout.

4.4.3 An assessment of construction traffic is provided in **Chapter 13** (Traffic and Transport).

4.5 Construction Materials

4.5.1 The construction materials required will be those normally associated with a development of this nature, including for example bricks, windows, roof tiles, block work, bulk timber, timber trusses, ready mixed concrete, plasterboard, dense bitumen / stone macadam, concrete kerbing and sub-base crushed concrete.

4.6 Construction Waste

4.6.1 The construction process needs to be managed to accommodate the peak periods of waste generation. Where possible waste reduction strategies and practices will be formulated in advance. In order to embed the principles of the circular economy, the Proposed Development, throughout the construction phase, will develop and adhere to a CL:AIRE Materials Management Plan (MMP) which be prepared prior to construction. This will document the management of soils on Site. Excavation works will be carried out in such a way to enable effective segregation of suitable materials for reuse on Site wherever practicable.

4.6.2 During construction, materials recovered from on-site works may be suitable for reuse on Site, reducing the costs of transportation and procurement of virgin materials. This, combined with considerate design practice, will help to minimise construction waste in line with the Waste Hierarchy i.e.;

- Reduction;
- Re-use;
- Recovery (i.e recycling); and

- Disposal i.e. landfill / incineration).

4.6.3 Topsoil will be stripped and stored separately for later re-use within the Proposed Development and landscaped areas.

4.6.4 The aspiration for the Site is to avoid surplus cut material and minimise volumes of materials to be removed for off-site disposal. The aim is to achieve a material balance on-site to remove the need to import or export material. However, where export of material is required it will be managed in accordance with the Waste Duty of Care Code of Practice, and the excavation and re-use of materials would be undertaken in accordance with a Materials Management Plan.

5 Consideration of Alternatives

5.1.1 Regulation 18(3)(d) of the EIA Regulations requires an ES to include "a statement of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the options chosen, taking into account the effects of the development of the environment". This is expanded upon at paragraph 2 of Schedule 4 to the EIA Regulations, which requires an ES to include "a description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects".

5.1.2 Although a full description of all possible alternatives and a full assessment of their likely environmental effects is not required, sufficient detail should be provided to allow for a meaningful comparison between the alternatives and the Proposed Development.

5.1.3 The consideration of alternatives in this ES complies with the requirement for the inclusion of reasonable alternatives and has regard to the guidance in the PPG on EIA which states (similarly to the EIA Regulations) "Where alternative approaches to development have been considered, the Environmental Statement should include a description of the reasonable alternatives studied which are relevant to the Proposed Development and its specific characteristics and provide an indication of the main reasons for the choice made, including a comparison of environmental effects".

5.1.4 Alternatives should only be considered where they are feasible, realistic and genuine. This may depend on various factors, including planning policy, land ownership, financial viability, technical feasibility and design quality. Options which are unlikely to be acceptable or deliverable are not realistic alternatives and so do not need to be considered.

5.1.5 Whilst environmental effects are relevant when choosing between alternatives, other factors are also relevant. The main selection criteria which the Applicant has used when choosing between the alternatives which it has considered include planning policy, viability, deliverability design quality, market requirements, site constraints and opportunities and environmental effects.

5.1.6 The following provides an outline of the reasonable alternatives considered in relation to the Proposed Development and the main reasons for choosing the Proposed Development in preference to them.

No Development

5.1.7 The Site comprises part of the wider allocated brownfield site under Policy Bicester 2: Graven Hill within the Cherwell Local Plan. Therefore, the principle of development at the Site is being established through planning policy.

5.1.8 The key strategic planning objectives include the provision of 26 ha of employment land and provide 2,000 high quality job opportunities. Paragraph C.54 of the CLP outlines the aim of Policy Bicester 2, noting that "Development of the site will identify Bicester as a prime location for investment through the creation of significant jobs-led economic growth to address the town's historic housing/jobs imbalance". Paragraph C.58 states that "The proposal will also support local economic growth including the warehousing and logistics sector in a location that lends itself to both national and regional distribution. This sector is well placed to maximise the strategic accessibility from which Bicester benefits."

5.1.9 As such, no development is not a reasonable alternative that has been considered as it does not accord with policy and would not help to meet the employment needs of the area.

5.1.10 The ES also provides an assessment of the effects of the Proposed Development in comparison to the 'no development' scenario.

Alternative Sites

5.1.11 The nature of the Proposed Development is such that the objective is to redevelop the Site as part of the wider Graven Hill allocation and, as a result, no alternative sites have been considered by the Applicant. This is because the principle of development at the Site has already been established through planning policy and the environmental effects of the site selection tested through the local plan process to seek development on an alternative unallocated site would not be a reasonable alternative to the Proposed Development.

Alternative Forms of Development

Local Policy Allocation

5.1.12 As outlined above, Cherwell District Council allocated the wider Graven Hill Site for a mixed-use development including for the provision of 1,200 homes and 26 ha of employment land in their Cherwell Local Plan 2011-2031 (adopted 2015). The residential element is located to the north of Graven Hill and the employment uses are located to the south of Graven Hill (D1 Site).

5.1.13 In accordance with the Strategic Environmental Assessment (SEA) Regulations and the Town and Country Planning (Local Planning) (England) Regulations (2012), CDC was required to carry out a Sustainability Appraisal (SA) and an SEA of the Local Plan as it developed and make it available for review.

5.1.14 The role of these documents is to promote sustainable development by assessing the extent to which the emerging plan, when judged against reasonable alternatives, will help to achieve relevant environmental, economic and social objectives.

5.1.15 The SA / SEA Adoption Statement, published by CDC in July 2015 outlines how environmental and sustainability considerations have been integrated into the Local Plan, with CDC resolving to approve for the proposed Site to remain allocated for employment use following this review. The application proposals comprise the south part of the allocation (D1 Site). As a result of this policy context and the Site's ability to support a significant amount of employment development, no other main alternative forms of development have been considered for the Site, however the 2014 Planning Permission is considered as an alternative form of development below.

5.1.16 Specific changes have occurred since the 21011 Planning Application was submitted; these are summarised below.

Extant Planning Consent (2014 Planning Permission)

5.1.17 An ES was prepared for the wider allocated Graven Hill site in 2011 (as part of the 2011 Planning Application) for a mixed-use development including up to 1,900 homes and 92,040m2 of commercial floorspace, of which 66,920m2 was permitted as B8 use, 20,520m2 was allowed as B2 use; 2,160m2 as B1(a) use and 2,400m2 as B1(b).

5.1.18 A potential alternative was to not make any changes and adhere to the consented development, however, the key principle that has driven the update to the development proposals is that recent structural changes in this market mean that there is significant demand for high quality B8 units in locations that have good road transport links, such as the proposed Site, meaning that the demand will be addressed more satisfactorily than if the consented development was built out. For further information, see **Chapter 17**: Socioeconomics.

5.1.19 It should be noted that the Proposed Development does not result in any additional significant adverse environmental impacts when compared with the 2011 ES. No significant (moderate adverse or above) have been identified for the Proposed Development.

Evolution of the Proposed Development

5.1.20 The Proposed Development has evolved over the past six to nine months, primarily in response to detailed pre-application consultation with CDC and Oxfordshire County Council (OCC), as well as infrastructure providers and other stakeholder consultation.

5.1.21 The different versions of the Proposed Development are detailed in the Statement of Community Involvement (H Planning, 2022) submitted with the planning application and are summarised below.

Pre-application Scheme Version (January 2022)

5.1.22 This version of the proposal comprised a logistics scheme totalling approx. 117,348 sqm (GIA) of floorspace to be provided across 9 units. Approximately 1,222 parking spaces were proposed, including HGV parking yards associated with the Logistics Units as well as disabled parking. Due to a number of constraints outside the control of the Applicant, amendments were made to the scheme in March 2022.

Post Pre-application Scheme Amendments (March 2022)

5.1.23 The Post Pre-Application Scheme Amendments (March 2022) version of the scheme comprised development totalling a maximum of 109,725 sqm (GIA) of B8 'Storage or Distribution' floorspace, spread over 10 units. This included ancillary office use within the B8 units. This represented a reduction of 7,623 sqm compared to the Pre-Application version of the scheme.

5.1.24 Approximately 1,050 parking spaces were proposed, including HGV parking yards associated with the Logistics Units as well as disabled parking.

5.1.25 Unit 6 was removed from this masterplan due to the need to increase the area required for Sustainable Drainage Systems (SuDS). Furthermore, the Project Team were also keen to enhance and maintain the existing tree cover, where feasible, at this location (and more generally at the boundaries of the Site) to help mitigate the visual impact of the proposal. The removal of Unit 6 led to the Proposed Development, which is summarised below.

Proposed Development (June 2022)

5.1.26 The Proposed Development comprises 104,008 sqm (GIA) of B8 'Storage and Distribution' floorspace, over 9 units. This includes ancillary office use within the B8 units and represents a reduction of 13,340 sqm or 12% from the Pre-application Scheme Version. The maximum of. 902 parking spaces will be set around areas of open space and landscaping, details of which will be confirmed at the 'Reserved Matters' stage.

5.1.27 The proposed parameters for development on the Site reflect the most suitable form of development to respond to a constraints and opportunities exercise that was completed for the Site. The developers considered safe access, drainage, visual effects and the need for the development. The location, within the larger allocated site, is well suited to B8 uses as this area meets the operational requirements of occupiers, and a safe access can be provided.

Conclusion

5.1.28 The design of the development has been based on the requirements of national and local policy to meet the market demand for B8 floorspace, taking into account environmental conditions and public consultation, and responding to the constraints and opportunities of the Site.

6 Assessment Method

6.1 Introduction

6.1.1 This chapter describes the scope and approach that has been taken for this ES, as well as the process by which the EIA has been carried out. It outlines the matters that have been considered to support the ES and includes a discussion of the relevant regulations, the EIA process, consultations and the over-arching assessment methods applied. Details of the technical method followed for each topic are presented in each of the **Chapters (8-17)** as appropriate.

6.2 Assessment Method

EIA Regulations

6.2.1 The Town and County Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the EIA Regulations) implement EC Directive 85/337/EEC, as amended, into domestic legislation. The initial Directive and its three amendments have been codified by Directive 2011/92/EU. A new Directive 2014/52/EU was implemented in 2014 and the provisions and requirements were enacted in the UK on 16 May 2017 to form the EIA Regulations.

6.2.2 To ensure that the provisions of the EIA Regulations continue to be implemented in the same way or an equivalent way following the exit of the United Kingdom from the EU at the end of the transition period, appropriate amendments were made by The Environmental Assessments and Miscellaneous Planning (Amendment) (EU Exit) Regulations 2018. There has been no substantive change to EIA requirements as a result of the departure of the UK from the European Union.

6.2.3 The EIA Regulations set out the procedures for undertaking an EIA and the information which is required in an ES and such procedure has been followed in this assessment.

EIA Process

6.2.4 In general terms the main stages in the EIA are as follows:

- Screening – determining whether a proposed project falls within the remit of the EIA Regulations;
- Scoping – determining the extent of issues to be considered in the assessment and reported in the ES;
- Establishing Baseline – drawing together and reviewing existing available data and undertaking surveys to determine the existing and future baseline conditions;
- Assessment and Iteration – assess likely significant effects of development, evaluate alternatives, provide feedback to design team on potential adverse impacts, modify development or impose parameters, incorporate mitigation, assess effects of mitigated development;
- Preparation of the ES; and
- Consultation and Decision Making.

Screening and Scoping

6.2.5 As the 2014 Planning Permission (Planning Application Reference: 11/01494/OUT) required an EIA, the Applicant has voluntarily undertaken an EIA for the Proposed Development. Therefore, no EIA screening request was prepared for the Proposed Development.

6.2.6 No formal EIA Scoping was undertaken in regard to the Proposed Development, however, the structure of the EIA has been informally agreed with CDC and forms the basis of the ES.

Consultation

6.2.7 A comprehensive programme of consultations has been undertaken with statutory and non-statutory organisations as well as a community engagement event with the local community. Such consultations have been to undertaken to inform the emerging design and EIA

6.2.8 As part of the EIA process, the following bodies have been consulted to agree the detailed scope of the assessment, to provide information, to discuss assessment methods and findings, and/or agree mitigation measures and design responses.

- Cherwell District Council (Tree Officer, Planning Policy Team, Land Drainage Team, Landscape Officer, Ecology Officer, Environmental Health Officer, Economic Development Officer, Conservation Team and Planning Officer);
- Oxfordshire County Council (in relation to matters relating to Highways, Flood Risk and Archaeology);
- Local Ward Councillors (Cllr Lucinda Wing; Cllr Nick Cotter; Cllr Dan Sames)
- The Town Council of Bicester
- The Parish of Ambrosden
- The Parish of Launton
- Bicester Chamber of Commerce
- Bicester Bike Users Group (BICESTERBUG)
- Bicester Vision
- Oxfordshire Local Enterprise Partnership (OxLEP)
- Graven Hill Residents Association
- Natural England

6.2.9 The EIA has given due regard to the requirements of the consultees and the assistance of these consultees is gratefully acknowledged. For further information regarding consultation, please refer to the Statement of Community Involvement (H Planning Ltd, 2022) submitted with the planning application.

6.2.10 Each of the technical discipline chapters (**Chapter 8-17**) provides a summary of consultation undertaken in relation to that discipline.

6.3 Assessing Effects

6.3.1 The EIA has assessed the likely significant effects of the proposed development against baseline conditions in the same year (i.e. providing an assessment of 'do something' and 'do nothing').

Establishing Baseline Conditions

6.3.2 A range of Site surveys and data collection exercises have been used to identify existing environmental conditions at the Site and in the surrounding area to provide a basis for the subsequent assessment work. The surveys undertaken are reported in each of the technical chapters.

6.3.3 Some of the technical surveys and assessments on which the EIA is based are too detailed and lengthy for incorporation into Volume 1 of this ES (e.g. ecology survey reports). In such instances, the technical survey and assessment reports are provided in full as an appendix to this ES (Volume 2), with a relevant summary and the reference for the full survey or assessment provided in the ES.

6.3.4 The geographical scope of these appended surveys and assessments has been based on the likelihood for significant effects. It should be noted that baseline data has not been collated in the area of the new EAR from the D1 site to the Pioneer / A41 roundabout because no works are planned and therefore there are not likely to be significant environmental effects.

6.3.5 Due to the limited potential for conditions at the Site to alter, without development proceeding, between now and the completion of the Proposed Development current conditions have been used to define baseline conditions, although the committed developments have been included in the future baseline where appropriate as defined by each technical chapter. The exception to this is where there are potentially significant changes anticipated (e.g. in traffic levels), in which case future conditions have been used that are explained in the relevant topic chapter.

6.3.6 To fulfil the requirements of the EIA Regulations, the ES documents both the current state of the environment and provides assessment of the likely significant effects of the Proposed Development during construction and operation as set out below.

Assessing Demolition and Construction Effects

6.3.7 The EIA has assessed the likely significant environmental effects that could occur during demolition and construction against the current state of the environment. Therefore, the assessment of likely environmental effects during the demolition and construction phases has been based on available information and reasoned judgements based on professional experience to enable the likely environmental effects to be identified.

6.3.8 Demolition and construction effects will be temporary and intermittent, i.e. works will not occur in one location throughout the entire duration of the construction works. The potential duration and intermittency of effects is identified where appropriate in **Chapters 8-17** based on the information provided in **Chapter 3**.

6.3.9 In judging the significance of construction effects of the Proposed Development, it has been assumed that an Outline CEMP will identify mitigation measures in relation to demolition and construction effects identified within **Chapters 8-17**. This CEMP will take forward measures set out in the Outline CEMP that has been prepared for this planning application (RPS, 2022) to the construction stage where a detailed CEMP will be prepared.

Assessing Operational Effects

6.3.10 To provide a robust assessment that is generally consistent between topic chapters, the EIA has focused on assessing the likely significant environmental effects of the completed

development (anticipated to be in 2024) based on the maximum parameters defined for the planning application. This approach ensures that the full environmental effects of the outline planning application have been considered. Where worst case effects could occur during an earlier or later year then such an assessment has been undertaken and this is reported in the relevant topic chapter.

Mitigation and Enhancement

Overview

6.3.11 The incorporation of mitigation measures, which are measures to avoid, minimise or compensate for adverse effects, is an integral part of the design and EIA processes.

6.3.12 The EIA Regulations require an ES to contain: *"A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment".*

Embedded Mitigation

6.3.13 As part of the design process suitable mitigation measures have been incorporated into the Proposed Development to mitigate potentially significant environmental effects. This mitigation is termed "primary mitigation" and has been considered within each of the topic chapters in this ES.

6.3.14 Measures to retain and enhance biodiversity on the Site have also been included within the design of the Proposed Development such as the proposed green fingers / wildlife corridors as shown on the Proposed Layout Parameter Plan (Drawing no. 410_S-51) and the maintenance of existing structural landscape planting where appropriate.

6.3.15 In accordance with Reg 18(3(c) of the EIA Regulations and guidance from the Institute for Environmental Management and Assessment (IEMA), assessments within each topic section have taken account of primary mitigation which is inherent in the scheme design. Each topic chapter (**Chapter 8-17**) will include details of primary mitigation relevant to that topic.

6.3.16 The primary mitigation which forms part of the Proposed Development includes:

- Provision of an Outline CEMP that sets out measures to minimise construction phase impacts (**Appendix 4.1**);
- Implementation of a Conceptual Surface Water Management Strategy, incorporating SuDS, to reduce flood risk and help control the quality and quantity of surface water runoff conveyed to the local watercourses. It has been designed to manage runoff up to a 1 in 100 year storm event, plus a 40% increase in peak rainfall intensity to account for the likely effects of climate change;
- Retention of existing green infrastructure (where possible) and incorporation of areas of new planting, contributing to the visual amenity of the Site, and the landscape context as trees and hedgerows contribute to the green corridors network across the Site.

6.3.17 Further mitigation measures, compensation and opportunities for environmental enhancement have also been identified through the EIA process. Where applicable, such mitigation, compensation and enhancement measures are identified in the technical chapters of this ES, along with how it is proposed that they be secured.

6.3.18 A hierarchy of methods for mitigating significant adverse effects will be followed; these are, in order of preference:

- Avoidance – designing a development in such a way that avoids effects on the environment (e.g. avoiding siting residents in areas that could be affected by flood risk)
- Reduction – design the Proposed Development or employ construction methodologies such that significant effects identified are reduced (e.g. employment of sustainable drainage to mitigate the effects of development on surface water run-off)
- Compensation – providing off-site enhancement in order to compensate for where onsite mitigation has not been possible (e.g. financial contributions towards local infrastructure).

Residual Effects

6.3.19 Environmental effects remaining after mitigation measures have been incorporated are termed "residual effects".

6.3.20 It is these residual effects which should be considered when assessing the likely significance of the effects of the Proposed Development, not the unmitigated effects. This is because the mitigation proposed by the development will ensure that the identified unmitigated effects will not occur in practice. For example, a development may have localised issues of surface water drainage, but appropriate mitigation may have been incorporated into the proposed development to ensure that significant adverse effects in respect of local flood risk do not occur.

6.3.21 To provide an objective assessment, the significance of residual effects has been determined and is identified in the ES. This allows for comparison of effects between topics and also strengthens the assessment of impact interactions.

6.4 Significance Criteria

6.4.1 The two principal criteria for determining significance of an environmental effect are the magnitude of the effect and the sensitivity of the receptor, in addition the likelihood of the effect occurring is also considered as appropriate.

6.4.2 The approach to assessing and assigning significance to an environmental effect has relied upon such factors as consideration of the EIA Regulations, guidelines, standards or codes of practice, the advice and views of statutory consultees and other interested parties, and professional judgement.

6.4.3 The following questions are relevant in evaluating the significance of likely environmental effects:

- Is the effect direct, indirect or cumulative?
- Does the effect occur over the short, medium or long term?
- Is the effect permanent or temporary?
- Is it a positive, neutral or adverse effect?
- Is the effect reversible or irreversible?
- Does the effect increase or decrease with time?
- Is the effect of local, regional, national or international importance?
- Are health standards or environmental objectives threatened?
- Are mitigating measures available and is it reasonable to require these?

6.4.4 Specific significance criteria have been prepared for each specialist topic, based on the generic criteria, for adverse and beneficial effects, set out in **Table 6.2.**

Table 6.2: Significance criteria

Significance Level	Criteria
Major	These effects are likely to be important considerations at a district scale but, if adverse, are potential concerns to the project and may become key factors in the decision-making process.
Moderate	These effects, if adverse, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.
Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in enhancing the subsequent design of the project and consideration of mitigation or compensation measures.
Negligible or No Effect	Either no effect or effect which is negligible or beneath the level of perception, within normal bounds of variation or within the margin of forecasting error. Such effects should not be considered by the decision-maker.

6.4.5 Effects that are described as 'major' or 'moderate' are determined to be *significant*; and effects that are described as 'minor' or 'negligible' are determined to be *not significant* in the context of the EIA Regulations.

6.5 Assessment of Cumulative Effects

6.5.1 The EIA Regulations require the assessment to consider the environmental effects of a project in the context of other "existing and approved developments" in order to identify likely significant cumulative effects.

6.5.2 'Committed developments' are considered to be planning permissions that are partially built out and/or approved planning permissions. Planning applications that have been submitted but not yet determined have also been considered where there is a likelihood that the application may be granted planning permission before this application is determined.

6.5.3 A review of extant and approved planning applications was undertaken to identify any developments that have been approved or are considered likely to be approved before determination of this application.

6.5.4 The search was based on identifying those developments likely to lead to significant cumulative effects with the Proposed Development and has therefore focused on major development within 2.5 km of the Site as, based on professional experience, it was considered that significant cumulative effects are unlikely with developments outside of these areas. The committed developments that have been considered are set out in **Table 6.3**. The list of committed developments was agreed in conjunction with CDC.

6.5.5 It should be noted that the approach to the cumulative assessment of committed development for the Transport Assessment has been agreed separately with OCC. To ensure consistency across the application documents the assessment of transport related cumulative effects within this ES (i.e. relevant transport, noise and air quality effects) has been based on those reported in the Transport Assessment. The transport, noise and air quality assessment also assumes that the EAR will be constructed and operational before the Proposed Development is operational, and therefore forms part of the future baseline.

Table 6.3: Committed Developments

Application	Planning Status	Application Details
Demolition of D1 Site	Validated 21/03/2022. Target decision date 20/06/2022	**22/00835/F** Demolition of existing buildings and structures at the site and provision of a bat barn.
Graven Hill Site C, D and E including subsequent reserved matters applications and amendments, excluding the employment element which forms the basis of the Site.		The residential element is located to the north of Graven Hill and the employment uses are located to the south of Graven Hill. Variation of conditions and amending applications, (via S.73 MMA & S.96 NMA) have been made to the original planning application. However, these are generally focussed upon amendments to the residential area to the north of Graven Hill.
	Permitted 08/08/2014	**11/01494/OUT** Outline - Redevelopment of former MOD sites including demolition of existing buildings, development of 1900 homes; local centre to include a 2 form entry primary school (class D1), a community hall of 660sqm, five local shops or facilities to include A1, A2, A3, A5 and D1 uses totalling up to 1358sqm, up to 1000sqm gross A1 uses, a pub/restaurant/hotel (class A4/A3/C1) up to 1000sqm and parking areas; employment floorspace comprising up to B1(a) 2160sqm, B1(b) 2400sqm, B1(c) and B2 20520sqm and B8 uses up to 66960sqm; creation of public open space and associated highway improvement works, sustainable urban drainage systems, biodiversity improvements, public transport improvements and services infrastructure. Erection of a 70400sqm fulfilment centre on 'C' site and associated on site access improvement works, hardstanding, parking and circulation areas.
	Permitted 03/06/2016	**15/02159/OUT** Variation of Conditions 2 (approved plans), 26 (masterplan and design code), 27 (reserved matters first phase), 32, 33 (building heights), 39, 40 (construction standards), 41, 42 (housing mix), 51, 52 (highways works), 56 (lighting scheme), 58 (internal access), 68 (approved drainage strategy) of 11/01494/OUT.
	Permitted 21/06/2017	**16/01802/OUT** Variation of Condition 30 of 15/02159/OUT - Revised Design Code and Master Plan, and Removal of Condition 35 - Housing Mix.
	Permitted 03/01/2020	**19/00937/OUT** Variation of Conditions 2 (plans), 28 (Phasing) and 29 (Masterplan and design code) of 18/00325/OUT - to amend the site wide phasing plan and to include proposed earlier phasing for the employment land. (Original outline reference 11/01494/OUT, amended by 15/02159/OUT, 16/01802/OUT. Outline - Redevelopment of former MOD sites including demolition of existing buildings, development of 1900 homes; local centre to include a 2 form entry primary school (class D1), a community hall of 660sqm, five local shops or facilities to include A1, A2, A3, A5 and D1 uses totalling up to 1358sqm, up to 1000sqm

Application	Planning Status	Application Details
		gross A1 uses, a pub/restaurant/hotel (class A4/A3/C1) up to 1000sqm and parking areas; employment floor space comprising up to B1(a) 2160sqm, B1(b) 2400sqm, B1(c) and B2 20520spm and B8 uses up to 66960sqm; creation of public open space and associated highway improvement works, sustainable urban drainage systems, biodiversity improvements, public transport improvements and services infrastructure. Erection of a 70400sqm fulfilment centre on 'C' site and associated on site access improvement works, hardstanding, parking and circulation areas).
New dedicated Employment Access Road (EAR) adjacent the northern boundary of the site.	Permitted 16/04/2021	**20/02415/F** Proposed employment access road
Wretchwick Way, Bicester	Validated 29/06/2016. Under consultation. Target decision date 29/04/2022	**16/01268/OUT** Outline application with all matters reserved apart from access for residential development including up to 1,500 dwellings, up to 7ha of employment land for B1 and/ or B8 uses, a local centre with retail and community use to include A1 and/ or A2 and/ or A3 and/ or A4 and/ or A5 and/ or D1 and/ or D2 and/ or B1, up to a 3 Form Entry Primary School, drainage works including engineering operations to re-profile the land and primary access points from the A41 and A4421, pedestrian and cycle access, circulation routes, related highway works; car parking; public open space and green infrastructure and sustainable drainage systems.
Symmetry Park, Morrell Way, Bicester, Units A1, A2 and B	Hybrid application for Units A1, A2, B, C1 and C2. Permitted – 08/11/2016	**16/00861/HYBRID** Full planning permission for 18,394 SQM (198,000 SQ FT) of logistics floor space, within class B8 of the town and country planning use classes order 1987, with ancillary class B1 (A) offices, together with access from A41 Aylesbury Road, associated site infrastructure including lorry parking, landscaping, amenity open space and sustainable drainage and private sewage treatment plant. Outline planning permission for up to 44,314 SQM (477,000 SQ FT) of logistics floor space, within class B8 of the town and country planning use classes order 1987, with ancillary class B1 (A) offices, together with associated site infrastructure including lorry parking, landscaping, amenity open space, sustainable drainage and private sewage treatment plant. Details of means of access from Aylesbury Road are included for approval.
Symmetry Park, Morrell Way, Bicester, Unit C	Full application for development outside the approved parameters under the 2016 hybrid application for Units C1 and C2 in which an	**19/00388/F** Full Planning Permission for 29,350 sqm of logistics floor space, within class B8 of the Town and Country Planning Use Classes Order 1987, including ancillary class B1 (a) offices (1,688 sqm), erection of security gatehouse (26 sqm), security fence, sprinkler tank and pump house, accessed from the existing Symmetry Park estate road, associated site infrastructure including external service

Application	Planning Status	Application Details
	application is made for a single Unit C. Permitted – 06/09/2019.	yard, lorry parking, landscaping, amenity open space including 10m green corridor with 3m foot path and cycle link to wider Bicester 12 and storm water drainage infrastructure and private sewage treatment plant.

6.6 Impact Interactions

6.6.1 **Chapter 18** provides the assessment of impact interactions, i.e., receptors being affected by more than one environmental effect and therefore potentially being subject to a more significant combined effect than the individual effects reported in each of the topic chapters.

6.6.2 The approach adopted for the assessment is in accordance with the methodology set out above, with further details provided in **Chapter 18**.

6.7 Monitoring

6.7.1 The EIA Regulations introduce the requirement for the monitoring of significant adverse environmental effects where appropriate and that a schedule of proposed monitoring should be set out in an ES.

6.7.2 Each chapter of the ES therefore identifies the proposed monitoring arrangements for that topic. As stated in the EIA Regulations effort should be made to ensure that "the type of parameters to be monitored and the duration of the monitoring are proportionate to the nature, location and size of the development and the significance of its effects on the environment."

6.7.3 A summary of mitigation and monitoring requirements identified in each topic chapter is provided in **Chapter 19**.

6.8 Assessment Assumptions

6.8.1 The following assumptions have been used to ensure that the EIA provides a robust assessment of likely significant effects of the Proposed Development:

- The Proposed Development will be delivered in accordance with the maximum parameters documented in **Chapter 3.** The assessment recognises the flexibility in how the Proposed Development could be delivered within these parameters and each technical assessment has identified how it has assessed a reasonable worst case within the parameters.
- Suitable planning conditions will be imposed as identified in this ES to secure appropriate mitigation measures, noting the suite of planning conditions which applied to the 2014 Planning Permission.
- The assessment of likely significant cumulative effects has assumed that the committed developments identified in **Appendix A.6** will be built out as set out in the documents supporting these applications.
- Baseline conditions are generally considered to be current conditions. Likely changes to the current situation (the baseline evolution) have been considered as appropriate in each technical chapter.
- Baseline data has not been collated in the area of the new EAR from the D1 site to the Pioneer / A41 roundabout because no works are planned and therefore there are not likely to be significant environmental effects.

- The transport, noise and air quality assessment also assumes that the EAR will be constructed and operational before the Proposed Development is operational, and therefore forms part of the future baseline for these topics.

- The assessment of transport related effects, including noise and air quality, assumes that development and infrastructure will come forward as agreed with CDC; and

- The Proposed Development will be complete and implemented in accordance with the indicative programme set out in **Chapter 4**. Construction beginning in quarter 1 2023 with the development anticipated to be complete and occupied by 2024.

6.9 Uncertainty and Limitations

6.9.1 The prediction of future effects inevitably involves a degree of uncertainty. Where necessary, the technical chapters describe the principal factors giving rise to uncertainty in the prediction of likely environmental effects and the degree of the uncertainty.

6.9.2 Confidence in the predictions has been achieved by employing accepted assessment methodologies, e.g. Guidelines for Ecological Impact Assessment in the UK. Uncertainty inherent within the prediction has been described. The ES has sought to provide a robust assessment of the likely significant effects of the Proposed Development.

6.9.3 Further limitations in preparing this ES are noted in each of the technical chapters (**Chapters 8-17**).

7 Planning Policy and Context

7.1 Introduction

7.1.1 This chapter has been prepared as part of the Environmental Impact Assessment process, which aims to protect the environment and ensure the public are given early and effective opportunities to participate in the decision-making procedures (PPG Paragraph: 002 Reference ID: 4-002-20140306). Minimising the impact of the development of the environment has been at the forefront of the Applicant's mind since the beginning of the project, more details of which are set out below and in the supporting Planning Statement. Furthermore, extensive consultation has taken place throughout the EIA and design process, more detail of which is set out in other chapters of this ES and in the Statement of Community Involvement. An overview of the relevant Environmental Statement legislation and policy guidance is set out in **Chapter 6** of this statement and each chapter of the statement will detail specific policies, legislation and guidance that is relevant for that chapter.

7.1.2 The purpose of this planning policy chapter is to set out the relevant policies, at both a national and local level, that are considered as part of the assessment. On a local level, emerging policies are also considered.

7.1.3 The Statutory Development Plan for Cherwell District includes the:

- Adopted Cherwell Local Plan 2011 – 2031 (Part 1) (July, 2015) Policy Bicester 13 was re-adopted on 19 December 2016;
- Adopted Cherwell Local Plan 2011 – 2031 (Part 1) Partial Review – 'Oxford's Unmet Housing Need' (September 2020)
- The 'Saved' Policies of the Adopted Cherwell Local Plan (November 1996)

7.1.4 Material planning considerations for the site include:

- National Planning Policy Framework (July 2021)
- Planning Practice Guidance (PPG)
- Developer Contributions Supplementary Planning Document (SPD) Adopted by Cherwell District Council on 26th February 2018

7.1.5 A Planning Statement is also provided with the application and provides further information on the planning context for the development.

7.2 National Planning Policy Context

National Planning Policy Framework

7.2.1 At a national level planning policy is set out within the National Planning Policy Framework (NPPF 2021) (the Framework). At the heart of the NPPF is a presumption in favour of sustainable development that should run through both place-making and decision-taking. The NPPF sets out three overarching objectives to achieving sustainable development at Paragraph 8. These are independent but should be sought to be achieved in mutually supportive ways. The objectives are:

***"An economic objective** - to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places at the right time to*

support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;

***A social objective** - to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering well-designed beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and*

***An environmental objective** - to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."*

7.2.2 Part of Paragraph 119 within Section 11, '*Making effective use of land*', of the NPPF relates to the preference for developing previously developed or brownfield land, stating:

'Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land.'

7.2.3 With specific reference to the commercial nature of the proposal, the NPPF also provides high level support for sustainable economic growth and productivity. Paragraph 81 (in part) at Section 6 'Building a strong, competitive economy', is relevant and states:

'81. Planning policies and decisions should help create the conditions in which businesses can invest, expand and adapt. Significant weight should be placed on the need to support economic growth and productivity, taking into account both local business needs and wider opportunities for development.'

7.2.4 Paragraph 83 at Section 6, 'Building a strong, competitive economy', within the NPPF identifies the need to consider the locational requirements of different sectors. It continues by stating the need to make provision for 'clusters or networks of knowledge and data-driven, creative or high technology industries; and for storage and distribution operations at a variety of scales and in suitably accessible locations'.

7.2.5 Section 12 'Achieving well-designed places', of the NPPF requires good design and notes that proposals should aim to respond to local character and history, and reflect the identity of local surroundings and materials, while not preventing or discouraging appropriate innovation. It also requires proposals to be visually attractive as a result of good architecture and effective landscaping.

7.2.6 it is considered that the Proposed Development adheres to the broad policy and economic aims noted within the NPPF above. For further information, refer to the Planning Statement.

7.2.7 Each chapter of this ES sets out the policy relevant to the respective discipline and identifies the key elements of the NPPF that need to be considered.

Planning Practice Guidance (PPG)

7.2.8 The Planning Practice Guidance (PPG) supports the NPPF and covers a wide range of categories. Of most relevance to this development are the following categories:

- Environmental Impact Assessment (EIA); which provides information on the purpose of EIA, overview of the EIA process, development covered by the regulations, preparing an environmental statement and the procedures for submitting an Environmental Statement. This EIA chapter has been considered as part of the process of preparing this statement.

- Effective use of land
- Travel Plans, Transport Assessments and Statements

7.2.9 The above chapters have been considered in the context of this Environmental Statement.

7.3 Local Planning Policy and Guidance

Cherwell Local Plan 2011 - 2031

7.3.1 The Adopted Cherwell Local Plan 2011 - 2031 (Part 1) was formally adopted on 20th July 2015 and provides the Strategic Planning Framework for the district to 2031. The Adopted Cherwell Local Plan 2011 – 2031 (Part 1) Partial Review – 'Oxford's Unmet Housing Need' (September, 2020) forms part of the Development Plan. However, as the amendment predominantly relates to housing, it is considered less relevant to this proposal.

7.3.2 The Cherwell Local Plan (hereafter referred to as 'CLP 2011') replaced a number of saved policies of the adopted Cherwell Local Plan 1996. However, some of the policies contained within the 1996 Local Plan are 'saved' and remain part of the Development Plan.

7.3.3 The policies of most relevance to the Proposed Development are outlined below.

Policy PSD 1: Presumption in Favour of Sustainable Development

7.3.4 This policy notes that the Council will always work proactively with applicants and will seek to approve planning applications that accord with the policies in the Local Plan without delay, unless material considerations indicate otherwise.

Policy SLE 1: Employment Development

7.3.5 Policy SLE 1 seeks to focus new employment floorspace at allocated sites within the district. There are 6 Strategic Employment Sites identified in Table 1.1 of the CLP 2011.The site falls within the Graven Hill site ('Policy Bicester 2: Graven Hill') and is identified as having major development potential.

7.3.6 Policy SLE1 notes that 'in cases where planning permission is required existing employment sites should be retained for employment use'. It goes on to state that employment development will be focused "*on existing employment sites".* It then goes onto state that *"employment development, including intensification, will be permitted subject to compliance with other policies in the Plan and other material considerations."*

Policy Bicester 2: Graven Hill

7.3.7 The Site forms part of a wider allocated brownfield site under Policy Bicester 2: Graven Hill in the CLP 2011 which extends to 241 hectares. Allocated land available for employment purposes has been set at approximately 26 ha. The Policy notes that approx. 2,000 jobs could be created at the site across a range of uses, including B1 (now Class E), B2 and B8 'storage and distribution' use.

7.3.8 The Proposed Development would respond to this allocation and would result in an efficient use of this large vacant brownfield site. The Site, at 30.5 hectares, is some 4.5 ha larger than the 26 ha allocated for employment under Policy Bicester 2, however the Policy does not raise an objection by providing additional employment land. This matter is discussed further within the Supporting Planning Statement.

7.3.9 With reference to Policy Bicester 2, the key strategic planning objectives include the provision of 2,100 homes and associated social infrastructure etc. The total area for Bicester 2 encompasses 241 hectares of which 26 hectares is allocated for employment land (10.8% of

total area). Given the large size of the site, the increase in employment land at the site, (4.5 hectares) represents just under 2.1% of the total area, resulting in a total employment area of 12.9% of the 241 hectares, thus leaving 210 hectares, (rather than 215 hectares) to achieve the Policy aims of Bicester 2. The increased area for employment uses at Graven Hill will also increase the likelihood of achieving the employment policy aim of 2,000 jobs.

Policy C28 'Layout, design and external appearance of new development' - Cherwell Local Plan 1996 (Saved Policies)

7.3.10 This saved Policy seeks to ensure that new development is both sensitive to its context and of a high quality.

7.3.11 In support of this Planning Application, an Economic Impact Assessment has been submitted which demonstrates the strong demand for logistics floorspace at the site and in the wider region, however the indicative design of the proposed buildings shows that modern warehouse units can easily be accommodated at the site.

7.3.12 The Proposed Development also includes the opportunity to ensure a high degree of placemaking to incorporate functional and attractive open space areas within the Site, in accordance with the aspirations of Policy Bicester 2.

7.3.13 Other policies of relevance to the Proposed Development are outlined below and detailed in the Planning Statement and individual technical ES chapters:

- Policy ESD 6: Sustainable Flood Risk Management;
- Policy ESD 7: Sustainable Drainage Systems (SuDS);
- Policy ESD 8: Water Resources;
- Policy ESD 10: Protection and Enhancement of Biodiversity and the Natural Environment;
- Policy ESD 13: Local Landscape Protection and Enhancement;
- Policy ESD 15: The Character of the Built and Historic Environment; and
- Policy ESD 17: Green Infrastructure.

Joint Statutory Spatial Plan (JSSP)

7.3.14 The six Oxfordshire Councils - Cherwell District Council, Oxford City Council, Oxfordshire County Council, South Oxfordshire District Council, Vale of White Horse District Council and West Oxfordshire District Council - and the Oxfordshire Local Enterprise Partnership (OXLEP) have agreed the Oxfordshire Housing and Growth Deal with Government. Under the terms of the Deal the local authorities have committed to producing an Oxfordshire Joint Statutory Spatial Plan (JSSP) known as the Oxfordshire Plan 2050.

7.3.15 The JSSP will be a formal Development Plan Document (DPD), prepared under Section 28 of the Planning and Compulsory Purchase Act 2004 (as amended) which enables two or more local planning authorities to agree a joint Plan.

7.3.16 The JSSP will provide an Oxfordshire-wide, integrated strategic planning framework and supporting evidence base to support sustainable growth across the county to 2050, including the planned delivery of the new homes and economic development, and the anticipated supporting infrastructure needed.

7.3.17 We understand that the aim is to submit the Oxfordshire Plan 2050 to the Planning Inspectorate for independent examination with adoption by 31st October 2022, subject to the examination process.

8 Ecology and Nature Conservation

8.1 Introduction

8.1.1 This chapter of the Environmental Statement (ES) considers the likely significant effects on ecological receptors associated with the Proposed Development.

8.1.2 The specific objectives for this chapter of the ES are as follows:

- To describe the ecological baseline conditions;
- To describe the assessment methodology and significance criteria used in completing the impact assessment;
- To evaluate the likely effects, including direct, indirect, cumulative and inter-relationship effects; and
- To describe the mitigation measures proposed to avoid, mitigate or compensate for likely significant effects and any proposed enhancement measures.

8.1.3 This chapter has been prepared by RPS. All staff who have contributed to this chapter of the ES have relevant experience, hold an undergraduate and/or higher postgraduate degree in relevant subjects, and have achieved professional membership of the Chartered Institute of Ecology and Environmental Management (CIEEM).

8.1.4 Details of the Proposed Development, including the location and key design parameters, are set out in **Chapter 3**: The Proposed Development of this ES. This chapter concentrates on the likely effects of the Proposed Development within and adjacent to the Site boundary, and, where appropriate, considers the potential effects over a wider Zone of Influence (ZoI).

8.2 Policy Context, Legislation, Guidance and Standards

8.2.1 The scope of this assessment has been informed with due regard for relevant national and local planning policy, which are identified below.

National Planning Policy Framework

8.2.2 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021) sets out the national planning policies for England and is a material consideration in planning decisions.

8.2.3 The principle of sustainable development in the NPPF acknowledges the role of planning in protecting and enhancing the natural environment and helping to improve biodiversity. The NPPF recognises that achieving sustainable development involves pursuing positive improvements in the natural environment.

8.2.4 **Chapter 15** of the NPPF 'Conserving and enhancing the natural environment' contains provisions for ensuring that planning can be sustainable from an environmental perspective. Specifically, paragraph 174 states that:

8.2.5 '…Planning policies and decisions should contribute to and enhance the natural and local environment by:

- 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);

- 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;

- Maintaining the character of the undeveloped coast, while improving public access to it where appropriate;

- Minimising impacts and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;

- Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air quality, taking into account relevant information such as river basin management plans; and

- Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate'.

8.2.6 Paragraph 180 of the NPPF goes on to state that:

'…When determining planning applications, local planning authorities should apply the following principles:

- 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;

- 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 site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;

- 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 63 and a suitable compensation strategy exists; and

- Development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate'.

8.2.7 Paragraph 182 of the NPPF states that 'The presumption in favour of sustainable development does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site.'

8.2.8 The NPPF is supported by the Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Effect within the Planning System, jointly issued by the Office of the Deputy Prime Minister (ODPM) and the Department for Environment, Food and Rural Affairs (Defra) (ODPM, Defra, 2005). This joint circular aims to provide 'guidance on the application of the law in relation to planning and nature conservation as it applies in England'.

8.2.9 The Government Circular refers to the UK Biodiversity Action Plan (UKBAP), England Biodiversity Strategy and Local Biodiversity Partnerships. These documents outline strategic actions for biodiversity at both the national and local level.

Adopted Cherwell Local Plan 2011-2031 (Part 1)

Policy ESD 10: Protection and Enhancement of Biodiversity and the Natural Environment

8.2.10 Policy ESD 10 of the Adopted Cherwell Local Plan 2011-2031 (Part 1) is as follows:

Protection and enhancement of biodiversity and the natural environment will be achieved by the following:

- In considering proposals for development, a net gain in biodiversity will be sought by protecting, managing, enhancing and extending existing resources, and by creating new resources;
- The protection of trees will be encouraged, with an aim to increase the number of trees in the District;
- The reuse of soils will be sought If significant harm 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 development will not be permitted;
- Development which would result in damage to or loss of a site of international value will be subject to the Habitats Regulations Assessment process and will not be permitted unless it can be demonstrated that there will be no likely significant effects on the international site or that effects can be mitigated;
- Development which would result in damage to or loss of a site of biodiversity or geological value of national importance will not be permitted unless the benefits of the development clearly outweigh the harm it would cause to the site and the wider national network of SSSIs, and the loss can be mitigated to achieve a net gain in biodiversity/geodiversity;
- Development which would result in damage to or loss of a site of biodiversity or geological value of regional or local importance including habitats of species of principal importance for biodiversity will not be permitted unless the benefits of the development clearly outweigh the harm it would cause to the site, and the loss can be mitigated to achieve a net gain in biodiversity/geodiversity
- Development proposals will be expected to incorporate features to encourage biodiversity and retain and where possible enhance existing features of nature conservation value within the site. Existing ecological networks should be identified and maintained to avoid habitat fragmentation, and ecological corridors should form an essential component of green infrastructure provision in association with new development to ensure habitat connectivity;
- Relevant habitat and species surveys and associated reports will be required to accompany planning applications which may affect a site, habitat or species of known or potential ecological value
- Air quality assessments will also be required for development proposals that would be likely to have a significantly adverse impact on biodiversity by generating an increase in air pollution;
- Planning conditions/obligations will be used to secure net gains in biodiversity by helping to deliver Biodiversity Action Plan targets and/or meeting the aims of Conservation Target Areas. Developments for which these are the principal aims will be viewed favourably; and
- A monitoring and management plan will be required for biodiversity features on site to ensure their long-term suitable management.

Relevant Guidance

8.2.11 The key legislation and guidance relevant to this assessment are as follows:

- The Environment Act, 2021;
- The National Planning Policy Framework (NPPF, 2021);
- ODPM Circular 06/2005 (retained as Technical Guidance on NPPF 2021);
- The Wildlife and Countryside Act 1981 (as amended);
- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019;
- Countryside and Rights of Way (CRoW) Act 2000;
- Natural Environment and Rural Communities (NERC) Act 2006;
- The Protection of Badgers Act 1992;
- The UK Biodiversity Action Plan (UKBAP) 1994;
- UK Post-2010 Biodiversity Framework (2012); and
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (V1.1).

8.3 Consultation

8.3.1 A summary of the pre-application consultation responses relevant to this chapter, which were received in relation to the Proposed Development is provided in **Table 8.1** below.

Table 8.1: Consultation Responses Relevant to this Chapter

Date	Consultee and Issues Raised	How/where Addressed
Email correspondence on 25th February 2022	**Natural England** Discretionary Advice Service request specifically in respect of great crested newt and bats	Natural England responded that capacity was not available to deal with the request.
Teleconference meeting on 3rd March 2022 Email correspondence on 10th March 2022	**Dr Charlotte Watkins, Ecology Office, Cherwell District Council**	The main points confirmed were; ▪ The LPA are happy with the initial design of the bat house. ▪ A European Protected Species (EPS) licence for bats must be conditioned as part of any permission. ▪ In addition updated surveys for great crested newts (GCN), reptiles and badgers are required and should be conditioned pre-

Date	Consultee and Issues Raised	How/where Addressed
		commencement with the results and details of all mitigation strategies clearly demonstrated. ▪ A nesting bird condition (e.g. no works within the nesting bird season unless preceded by a nesting survey/check by an ecologist) should also be included.

8.4 Scope of Assessment

Not Significant Effects

8.4.1 Potential ecological receptors which have not been considered as having any significant effect in this assessment include the following:

- Statutory designated sites;
- Plants;
- Invertebrates;
- Otter;
- Water vole; and
- Dormouse.

8.4.2 A detailed review of these ecological features including why they have not been considered is provided in Table 8.5.

Likely Significant Effects

8.4.3 Effects upon ecological features (habitats, species, ecosystems and their functions/processes) within the following categories are subject to assessment:

- Designated sites;
- Habitats of Principal Importance (HPI) and other habitats of nature conservation value at a Local scale and above; and
- Species of Principal Importance (SPI), protected species and other species of conservation concern.

8.4.4 Effects upon the above features during the construction (including demolition) and operation phase within the following categories have been considered:

- Direct loss of habitat;
- Direct loss (through mortality and/or injury) of species;
- Degradation of habitat through various means (e.g. light, dust, pollution or water regime alterations);

- Disturbance to wildlife (e.g. light, visual and noise);
- Fragmentation of habitats; and,
- Creation and management (for enhancement) of habitats, also benefiting fauna.

8.4.5 A detailed review of these ecological features is provided in Table 8.5.

8.5 Ecology Survey Status

8.5.1 The assessment in this chapter aligns with that recorded in **Appendix 8.1**. Updated surveys for reptiles, bat emergence/re-entry (trees), bat activity and badgers are currently ongoing to update the 2019 baseline and will be made available to CDC in a separate appendix when all surveys are complete in October 2022.

8.6 Methodology

Study Area

8.6.1 The study area used in the assessment was defined as land within the Site boundary and the surrounding area. In accordance with Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018) (referred to hereafter as 'the CIEEM EcIA Guidelines'), the study area was based on the Zone of Influence (ZoI) for the Site and considered the following ecological receptors:

- Internationally designated sites, including Special Areas of Conservation (SACs), potential SACs (pSACs), Special Protected Areas (SPAs), potential SPAs (pSPAs) and Ramsar sites, located within 10 km of the Proposed Development;
- Statutory designated sites, including Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR) and Local Nature Reserves (LNR) located within 5 km of the Proposed Development;
- Non-statutory designated sites, including Local Wildlife Sites (LWS) and records of protected and/or notable species located within 2 km of the Project site; and
- Waterbodies located within 500 m of the Proposed Development.

Baseline Data Collection

8.6.2 The baseline ecological surveys that underpin this assessment have, as matter of best practice, been undertaken following published guidance from the relevant body. Between 2010 and 2022, a wealth of Phase 2 ecology surveys have been carried out on the Site. The aim of these ongoing surveys was to keep the ecological baseline survey information up to date, to ensure that the conversations on mitigation and enhancements remained relevant.

8.6.3 Previous ecological surveys were undertaken by AMEC Ltd. in 2010 and 2011 (AMEC Ltd., 2011) to inform the 2011 ES. Subsequent protected species surveys have been undertaken by Waterman Group between 2014 and 2019 and Ecology Solutions in 2018, which included those for bat activity and bat roost assessments, badger, dormouse, reptiles, GCN, breeding birds and invertebrates.

8.6.4 Since 2019, the following ecological surveys have been undertaken at the Site:

- Desk study review and Phase 1 Habitat Survey (undertaken in 2020);
- Updated Phase 1 Habitat Survey and habitat condition assessment (undertaken in 2022);

- GCN environmental DNA (eDNA) and population assessment surveys (undertaken in 2020);
- GCN eDNA survey (undertaken in 2022);
- Assessment of buildings for bat roost potential and bat emergence/hibernation surveys (2020 and 2021); and
- A badger survey (undertaken in 2020).

Desk Study

8.6.5 In 2018 a data request was made by Ecology Solutions Ltd. to Thames Valley Environmental Records Centre (TVERC) for records of protected and notable species and non-statutory designated sites located within 5 km of the Site boundary at that time.

8.6.6 For the purposes of this assessment, a review was undertaken of existing statutory sites designated at the national level, including SSSIs, NNRs and LNRs, for sites located within 5 km of the Proposed Development boundary.

8.6.7 A review of internationally designated sites, including Ramsar sites, SPAs and SACs, was undertaken to indicate any existing nature conservation interest within 10 km, that could potentially be affected by the Proposed Development.

8.6.8 The following publicly available online data sources were used to inform the designated sites search:

- Multi-Agency Geographic Information for the Countryside (MAGIC) website; and
- Joint Nature Conservation Committee (JNCC) UK Protected Areas website.

Updated Phase 1 Habitat Survey

8.6.9 An updated Phase 1 Habitat Survey of the Site was undertaken in July 2020. The survey followed the standard methodology (JNCC, 2010), and as described in the Guidelines for Preliminary Ecological Assessment (CIEEM, 2017). In summary, this comprised walking over the Site and recording the habitat types and boundary features present.

8.6.10 In addition, a verification walkover of the Site was undertaken in April 2022 to provide an accurate and up to date baseline and condition assessment for the Biodiversity Net Gain (BNG) assessment.

Great Crested Newts

8.6.11 Due to historic presence of GCN recorded in a pond located within 100 m of the Site, the GCN surveys were updated in June 2020. This included an updated Habitat Suitability Index (HSI) assessment and presence/absence surveys of all accessible waterbodies within 500 m of the Site, following the advice given in the Great Crested Newt Mitigation Guidelines (English Nature, 2001) in 2020.

8.6.12 Due to project delays, each of the waterbodies was visited on six occasions in June 2020 to determine the presence / absence of GCN. During each survey, three out of four possible survey methods (bottle trapping, torch survey, egg search and netting) were employed. Generally, bottle trapping and torching were carried out on each occasion, with the third method being netting as no vegetation was present in the ponds to undertake egg-searching.

8.6.13 In April 2022 an updated eDNA survey was undertaken on four ponds present within the Site boundary. The eDNA survey followed the eDNA surveying and laboratory analysis described by Biggs *et al.* (2014).

8.6.14 Water samples were collected and subsequently analysed using sampling kits supplied by SureScreen Scientifics Ltd.

Bat Roost Assessment

8.6.15 As a number of trees and buildings on Site had previously been identified as having potential to support roosting bats and / or were confirmed as bat roosts (Waterman Group, 2020). The bat roost assessment was updated in July 2020. A ground-based visual inspection of the buildings within the Site was completed using binoculars to search for Potential Roost Features (PRFs) which may provide suitable roosting opportunities for bats, and to grade the building's suitability accordingly.

8.6.16 The trees within the wider Site boundary were scoped out of further bat survey as they were not being affected by the Proposed Development at the time.

8.6.17 The assessment followed the guidelines published by the Bat Conservation Trust (BCT, 2016).

Bat Emergence and Re-entry Surveys

8.6.18 Bat emergence and re-entry surveys were undertaken between September 2020 and August 2021, in accordance with the latest best practice guidelines and recommendations published by the Bat Conservation Trust in Bat Survey: Good Practice Guidelines (BCT, 2016).

8.6.19 As recommended by the BCT guidance, three dusk emergence or dawn re-entry surveys were undertaken on buildings identified as having high potential, two surveys were undertaken on buildings with moderate potential and one dusk emergence survey was undertaken on the building identified as having low potential.

8.6.20 Elekon Batlogger and Anabat bat detectors were used to detect echolocation calls which were subsequently analysed using BatExplorer and Kaleidoscope software to identify the species.

Bat Hibernation Surveys

8.6.21 Hibernation surveys were undertaken on the single-storey brick outbuildings associated with Buildings D1, D4 and D7.

8.6.22 Internal inspections of the buildings were undertaken between January and February 2021 following best practice as described by the Bat Conservation Trust (Collins, 2016), English Nature's Bat Mitigation Guidelines (Mitchell-Jones, 2004) and the Joint Nature Conservation Committee's Bat Worker's Manual (Mitchell-Jones & McLeish, 2004).

8.6.23 Static bat detectors were left at specific locations which were chosen due to their potential to support hibernating bats. The detectors were left to record for a minimum of 14 nights in January and February 2021.

8.6.24 The static bat detectors were used to record bat echolocation calls and identify species, where possible. Anabat Swift and Express detectors were used. Calls were analysed using Analook and Kaleidoscope software to identify bat species recorded in each survey location.

Badger Survey

8.6.25 The badger survey was undertaken at the same time as the Phase 1 Habitat Survey in July 2020 and included all areas within the Site boundary and a 30 m buffer, where access was

provided. The survey sought to identify and record all signs of badger activity based primarily on field signs. Supplementary surveys for badgers are currently ongoing to update the baseline and will be made available to CDC (see Section 8.5.1).

Other Studies

8.6.26 In addition to the above surveys, a Biodiversity Net Gain (BNG) assessment was undertaken of the Proposed Development in order to inform and quantify the change in biodiversity value of the Site before and after development. This calculation was based on the updated Phase 1 Habitat Survey data collected in 2022, the Parameters Plan (see **Appendix 1.2**) and uses the DEFRA Biodiversity Net Gain metric 3.1 for calculations. Further details on the methodology are included at **Appendix 8.2.**

Assessment

8.6.27 The significance of likely effects from the Proposed Development has been assessed in the context of the existing baseline conditions, taking into account any anticipated changes in the baseline that may occur during demolition, prior to construction of the Site or during its operational phase (future baseline conditions).

8.6.28 In accordance with the CIEEM EcIA Guidelines the assessment focusses on Important Ecological Features (IEFs) which are likely to be affected during construction and operation of the Proposed Development.

8.6.29 IEFs are species or habitats that are of value to conservation or biodiversity which may be affected by the Proposed Development and therefore require further assessment. Other IEFs may be present within the Site or the surrounding area, but do not require further assessment as they are unlikely to be affected (i.e. no pathway between the source and the receptor).

8.6.30 The interaction between the sensitivity/value of the IEF and impact magnitude informs the overall significance of the identified effect.

8.6.31 Once the importance of the ecological features is understood and impacts of the Proposed Development on the IEFs are characterised, the significance of the effect has been assessed. The assessment also takes into account mitigation that forms part of the Proposed Development and to which the Applicant is committed to avoid or minimise the effect of potential impacts on IEFs.

8.6.32 The CIEEM EcIA Guidelines also require the identification of potential cumulative effects from other developments. Proposals that could result in significant cumulative effects have been identified and can be found in **Appendix 6.1**. Cumulative effects have been addressed through consideration of the potential for other proposed developments to result in effects on ecological features identified in the assessment.

Receptor Sensitivity/Value

8.6.33 The approach to the assessment of the sensitivity and value of IEFs has been to consider the conservation status and importance of the feature present within the Site or surrounding ZoI.

8.6.34 The resources used to assess the value and importance of features also help to define the importance in the context of geographical scale. The CIEEM EcIA Guidelines state that significance of effects on ecological features should be qualified with reference to the appropriate geographic scale. In order to ensure consistency when assessing the importance of ecological features and determining the significance of effects, IEFs have been assigned at one of the following geographic scales described in **Table 8.2.**

Table 8.2: Definitions of Sensitivity or Value

Sensitivity	Typical Descriptors
Very High (International)	A feature (e.g. habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in an international/national context, such that the site is likely to be designated as a site of European importance (e.g. SAC). Habitats or species that form part of the cited interest within an internationally protected site, such as those designated under the Habitats Directive (e.g. SACs) or other international convention (e.g. Ramsar site)
High (National)	Habitats or species that form part of the cited interest within a nationally designated site, such as an SSSI or a NNR. A feature (e.g., habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in a national context for which the site could potentially be designated as a SSSI. Presence of UKBAP habitats or species, where the action plan states that all areas of representative habitat or individuals of the species should be protected, including national importance.
Medium (Regional)	A feature (e.g. habitat or population), which is either unique or sufficiently unusual to be considered as being of nature conservation value from a county to regional level. Habitats or species that form part of the cited interest of a LNR, or some local-level designated sites, such as a LWS, also referred to as a non-statutory SINC or the equivalent, e.g., Ancient Woodland designation. Presence of Local Biodiversity Action Plan (LBAP) habitats or species, where the action plan states that all areas of representative habitat or individuals of the species should be protected.
Low (Local)	A feature (e.g. habitat or population) that is of nature conservation value in a local context only, with insufficient value to merit a formal nature conservation designation. This would include features of local importance.
Negligible (Site)	This would include features of site level importance.

8.6.35 The valuation of sites has taken full account of existing value systems such as SSSIs and LWS designations. Judgement has been used for the valuation of sites of less than county importance.

8.6.36 The valuation of habitats considered parameters including extent, diversity, naturalness, rarity, fragility, typicalness, recorded history, position in an ecological or geographical unit, current condition and potential importance.

8.6.37 Criteria for the valuation of habitats and plant communities include Annex III of the Habitats Directive, guidelines for the selection of biological SSSIs and criteria used by Local Planning Authorities and the Wildlife Trusts for the selection of local sites. Legal protection status has also been considered for habitats where these are features of statutory designated sites.

8.6.38 Species populations are valued on the basis of their size, recognised status (such as recognised through published lists of species of conservation concern and designation of BAP status) and legal protection status. For example, bird populations exceeding 1% of published information on biogeographic populations are considered to be of international importance, those exceeding 1% of published data for national populations are considered to be of national importance, etc.

8.6.39 In assigning importance to species populations, it is important to consider the status of the species in terms of any legal protection to which it is subject. However, it is also important to consider other factors such as its distribution, rarity, population trends, and the size of the population which would be affected. Thus, for example, whilst GCN is protected under the

Habitats Directive, and therefore conservation of the species is of significance at the international level, this does not mean that every population of GCN is internationally important and thus of very high value. It is important to consider the particular population in its context. Thus, in assigning values to species the geographic scale at which they are important has been considered. The assessments of value are based on the professional opinion and judgement of experienced ecologists.

8.6.40 Due regard has been paid to the legal protection afforded to such species in the development of mitigation measures to be implemented during construction and operation of the Proposed Development. For European Protected Species (EPS) there is a requirement that a development should not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range, i.e. to maintain favourable conservation status, a scheme should not affect the long-term availability of sufficient habitat required by the population, the long-term viability of the population, or the long-term natural range of the species.

8.6.41 Assessing feature values requires consideration of both existing and future predicted baseline conditions, and therefore, the description and valuation of ecological features has taken account of any likely changes, including for example, trends in the population size or distribution of species, likely changes to the extent of habitats and the effects of other proposed developments or land use changes.

Magnitude of Impact

8.6.42 Impacts may be described in terms of changes to the structure or function of ecological resource and are characterised according to a number of parameters where these are relevant to understanding ecological effects. These parameters include:

- Beneficial or adverse – impacts may be either, depending on the nature of the impact;
- Extent – the geographical range over which the impact occurs;
- Magnitude – the size of the impact in terms of the amount of a feature affected;
- Duration and timing – when the effect will occur and how long it will last;
- Frequency – whether the effect will be a single event or multiple events; and
- Reversibility – the effect may be permanent or may naturally reverse without mitigation or may be reversible with appropriate mitigation.

8.6.43 **Table 8.3** below gives the magnitude categories and descriptors used in this assessment, considering the CIEEM EcIA Guidelines.

Table 8.3: Definitions of Magnitude

Sensitivity	Typical Descriptors
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).

Sensitivity	Typical Descriptors
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristic, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristic, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.
	Minor benefit to, or addition of, one (maybe more) key characteristic, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).

Significance of Effects

8.6.44 As stated in the CIEEM EcIA Guidelines, an ecologically significant effect is defined as an effect on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species. The effect is assessed within a specific geographic context, considering the scale at which the IEF was valued (e.g. local, national, international importance).

8.6.45 **Table 8.4** shows the assessment matrix used to guide the determination of significant effects, informed by professional judgement.

Table 8.4: Matrix for determination of significant effects

Sensitivity	Magnitude of Impact			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
Low	Negligible or minor	Negligible or minor	Minor	Minor or moderate
Medium	Negligible or minor	Minor	Moderate	Moderate or major
High	Minor	Minor or moderate	Moderate or major	Major
Very high	Minor	Moderate to major	Major to substantial	Substantial

8.6.46 Using the above matrix, further consideration is then given to the following levels of significance:

- Substantial: only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category;

- Major: effects are likely to be important considerations at a regional or district scale but which, if adverse, are potential concerns to the Proposed Development, depending upon the relative importance attached to the issue during the decision-making process;

- Moderate: effects, if adverse, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource;

- Minor: effects may be raised as local issues, but which are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in the detailed design of the Proposed Development; and

- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

8.6.47 For the purpose of this assessment, any effects with a significance level of Minor or Negligible lower are not considered to be significant in Environmental Impact Assessment (EIA) terms.

Biodiversity Net Gain Assessment

8.6.48 As is encouraged through planning policy including the latest NPPF and Policy ESD10 of the Cherwell Local Plan, the BNG assessment (based on the DEFRA metric version 3.1) has been used to guide the development of the Parameter Plan. A finalised assessment has been undertaken and is presented separately with the outline planning application.

Cumulative Effects

8.6.49 Other committed developments (existing and/or approved) that could result in cumulative effects (when considered alongside the Proposed Development) have been identified through a review of published information (see **Table 6.3**). Cumulative effects have been addressed through consideration of the potential for other proposed developments to result in impacts on ecological features identified in the assessment, and which could contribute to the combined effect on that feature, which would be greater than that anticipated from the Proposed Development alone.

Limitations

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

- At the time of writing, surveys in relation to reptiles, bat emergence/re-entry (trees), bat activity and badgers were ongoing in order to update the baseline data from 2019;

- Assumptions and limitations associated with the survey work and analyses undertaken are detailed in **Appendix 8.1**. As with any environmental assessment, there will be elements of uncertainty; these are identified and reported on. Any assumptions made include commentary to the likely extent that such difficulties affect the conclusions; and

- The majority of ecological data remain valid for only short periods due to the inherently transient nature of the subject. The survey results contained in this chapter of the ES and supporting appendices are considered accurate for up to two years, assuming no considerable changes to the site conditions occur during this period.

8.7 Baseline Conditions

The Site

8.7.1 The Site predominately comprised buildings, hardstanding and occasionally managed neutral semi-improved grassland. Other habitats present included scattered broadleaved trees, areas of dense and scattered, wet and dry ditches and semi-natural/plantation woodland. A number of waterbodies were identified within the Site itself and within 500 m of its boundary.

8.7.2 The habitats present on the Site had the potential to support roosting, foraging and commuting bats, breeding birds, reptiles, GCN and badgers. Updated surveys for reptiles, bat emergence/re-entry (trees), bat activity and badgers are currently ongoing to update the 2019 baseline and will be made available in a separate appendix when all surveys are complete in October 2022

8.7.3 For full information on baseline ecological surveys, refer to **Appendix 8.1**. The sections below summarise the key habitats and species groups.

Designated Sites

8.7.4 There were no statutory designated sites for nature conservation value within or immediately adjacent to the Site. The nearest statutory designated site was Arncott Bridge Meadows SSSI located approximately 1.8 km south east of the Site. Arncott Bridge Meadows SSSI lie on the floodplain of the River Ray. The meadows exhibit medieval ridge-and-furrow features indicating that parts, at least, have remained unploughed for many centuries. They are managed as hay meadow and pasture and accordingly support a wide range of plant species which are largely confined to such old, unimproved, neutral grassland.

8.7.5 There were no non-statutory designations of conservation value within the Site. The nearest non-statutory designated site was Graven Hill LWS , which lies approximately 380 m north west of the Site and is designated as ancient woodland.

Habitats

8.7.6 The Site contains a variety of habitat types of ecological value including plantation and semi-natural woodland. Other habitat present included semi-improved neutral grassland, dense and scattered scrub, scattered trees and standing water. Overall, the habitats present are not considered of significant value given they are of relatively recent origin, are heavily managed, are not of high botanical or structural diversity and comprise habitat types that are reasonably widespread in a landscape context. However collectively, particularly waterbodies, woodland, and semi-neutral grassland provide a range of habitat to flora and fauna that is likely to be of significance at a Local level.

8.7.7 A summary description of the habitats present is provided below, with full details and species lists provided in **Appendix 8.1.**

Semi-natural Broadleaved Woodland

8.7.8 A block of semi-natural woodland was located to the south of the Site. The species here comprised of silver birch *Betula pendula,* poplar *Populus sp*. and oak *Quercus robur*. The understorey comprised of false fox-sedge *Carex otrubae,* pendulous sedge *Carex pendula*, bramble *Rubus fruticosus*, wood woundwort *Stachys sylvatica*, wood dock *Rumex sanguineus* and small balsam *Impatiens parviflora.*

Broadleaved Plantation Woodland

8.7.9 Small blocks of planted woodland were located in the north east of the Site. They comprised of poplar, cherry *Prunus avium*, oak and hornbeam *Carpinus betulus.*

Mixed Plantation Woodland

8.7.10 A block of plantation woodland was located to the south of the Site within an area of semi-natural woodland. The plantation canopy was dominated with Scot's pine *Pinus sylvestris.*

Scrub

8.7.11 Areas of dense and scattered scrub within the Site and wider area were dominated by willow species *Salix sp*. and bramble, with occasional rose *Rosa sp.,* great mullein *Verbascum thapsus* and hard rush *Juncus inflexus.* Increasing quantities of hawthorn *Crataegus monogyna*, common gorse *Ulex europaeus* and willow species, were present towards the northern end of the Site.

Scattered Broadleaved Trees

8.7.12 A number of trees were located throughout the Site and wider area with species including, hawthorn, ash *Fraxinus excelsior*, alder *Alnus glutinosa*, horse chestnut *Aesculus hippocastanum* and sweet chestnut *Castanea sativa.*

8.7.13 A number of trees were located throughout the grassland in the north of the Site, comprising mature oak, with occasional ash, field maple *Acer campestre*, hawthorn and willow species.

Semi-improved Neutral Grassland

8.7.14 In 2022, the large areas of neutral semi-improved grassland within the Site and wider area were subject to occasional management through cutting, which created a short sward. Species within the sward included perennial rye-grass *Lolium perenne*, Yorkshire fog *Holcus lanatus*, creeping bent *Agrostis stolonifera*, red fescue *Festuca rubra*, meadow foxtail *Alopecurus pratensis* and cock's foot *Dactylis glomerata*. Herbaceous species present included yarrow *Achillea millefolium*, creeping buttercup *Ranunculus repens*, white clover *Trifolium repens*, ribwort plantain *Plantago lanceolata*, groundsel *Senecio vulgaris*, selfheal *Prunella vulgaris*, ragwort *Jacobaea vulgaris*, primrose *Primula vulgaris*, daisy *Bellis perennis* and dandelion *Taraxacum officinale agg.*

8.7.15 Additional species of false oat grass *Arrhenatherum elatius,* spear thistle *Cirsium vulgare*, cinquefoil *Potentilla sp*. common mouse-ear *Cerastium fontanum*, lesser celandine *Ranunculus ficaria*, red dead nettle *Lamium purpureum*, bristly ox-tongue *Helminthotheca echioides*, dove's-foot crane's-bill *Geranium molle* and glaucous sedge *Carex flacca* were also present, but less frequently.

8.7.16 Strips of diverse semi-improved grassland were identified along the banks parallel to the disused rail tracks. The species here were consistent with that of the other semi-improved grassland with the addition of goat's beard *Tragopogon dubious*, false fox-sedge, wild carrot *Daucus carota*, black knapweed *Centaurea nigra*, agrimony *Agrimonia eupatoria*, common spotted orchid *Dactylorhiza fuchsii*, ox-eye daisy *Leucanthemum vulgaris* and field horsetail *Equisetum arvense.*

Ditches

8.7.17 A mixture of wet and dry ditches were present across the Site, dominated by ruderal vegetation and saplings. Species included rose, willow, bramble, hawthorn, elm *Ulmus procera*, gorse, spear thistle, hard rush, broad-leaved willowherb *Epilobium montanum,* common hogweed

Heracleum sphondylium, broadleaved dock *Rumex obtusifolius*, hairy bittercress *Cardamine hirsuta,* cowslip *Primula veris,* wild teasel *Dipsacus fullonum*, cleavers *Galium aparine* and field speedwell *Veronica persica.*

8.7.18 Since the Phase 1 Habitat Survey was undertaken, the ruderal vegetation has been cleared in addition to the disused rail tracks across the Site.

Standing Water

8.7.19 A number of waterbodies were present within the Site boundary, comprising a tall (approximately 2.5 m high) red-brick fire pit and four waterbodies formerly used as emergency fire resource ponds, constructed of concrete with sloping banks and slight kerbs around the edges.

Buildings

8.7.20 The buildings on the Site comprised large warehouses, constructed of brick with metal sheeted roofs , single-storey prefabricated buildings, small sheds constructed of brick with flat roofs and single-storey brick structures with corrugated roofs.

Bare Ground and Hardstanding

8.7.21 Areas of bare ground and hardstanding were located around the buildings and included a number of access roads and car parks. Some areas of hardstanding within the Site have been colonised by willow and bramble scrub.

8.7.22 Subsequent removal of the railway tracks and associated vegetation across the Site has left large areas of bare ground.

Protected Species

8.7.23 Species-specific surveys for the Site (and relevant surrounding habitat, where accessible and appropriate for the survey type) have been completed for the following species groups between 2020 and 2021: GCN, bats (roosting – buildings) and badgers. This information has been utilised in order to inform their associated baseline assessments.

8.7.24 For species groups for which targeted surveys have not been undertaken since 2019 (e.g. where surveys are now considered out of date) for bats (roosting – trees), bat activity and reptiles, the value of the Site is calculated based on the presence of local records, previous baseline data and habitat suitability, area and connectivity.

Great Crested Newts

8.7.25 The majority of the Site was not considered suitable for GCN (comprising hardstanding and occasionally managed grassland), however the ditches, areas of scrubby woodland and less managed grassland areas are considered suitable.

8.7.26 A low population of GCN were recorded in a pond located within 100 m of the Site in 2020 (RPS, 2020) and previously recorded in a pond within the Site boundary. Since these surveys were undertaken, two ponds have been cleared and drained under a Natural England (NE) GCN mitigation licence held for the wider Graven Hill development and a mitigation pond (receptor site) has been created over 700 m to the north of the Site boundary. The ruderal vegetated banks (associated with the railway lines) have also been cleared.

8.7.27 An updated environmental DNA (eDNA) survey of the remaining four waterbodies within the Site boundary was undertaken in April 2022 to reaffirm presence / likely absence. The eDNA surveys were negative, confirming likely absence of GCN from these waterbodies.

Reptiles

8.7.28 In 2020, the majority of the Site was not suitable for reptiles (regularly managed grassland through cutting), although the ditches with ruderal vegetation banks were considered suitable. Common lizard and slow worm have previously been recorded in the north easterly area of the Site and within the ruderal banks along the railway.

8.7.29 Since the Phase 1 Habitat Survey was undertaken in 2020, the ruderal vegetation has been cleared in addition to the disused rail tracks across the Site, however the grassland is not managed frequently and has subsequently matured and diversified.

8.7.30 Due to the presence of reptiles on Site and the time elapsed since the original surveys, these surveys will be updated in 2022 in order to determine the current reptile populations that may be affected by the Proposed Development.

Bat Roosts

8.7.31 A bat roost assessment was undertaken in July 2020 (RPS, 2021) which identified 12 buildings with high potential, two buildings with moderate potential and one building with low potential to support roosting bats. Bat droppings were found in two buildings during the PRA. The outbuildings associated with Buildings D1, D4 and D7 were also considered suitable as hibernation roosts.

8.7.32 The emergence / re-entry surveys undertaken between September 2020 and August 2021 identified seven buildings with confirmed bat roosts, including day roosts for common pipistrelle, soprano pipistrelle and brown long-eared bats; night / feeding roosts for brown long-eared bats and a satellite roost for natterer's bats. One building was confirmed as a maternity roost for common pipistrelle and one building was confirmed as a hibernation roost for brown long-eared during the surveys undertaken between January and February 2021.

8.7.33 A number of trees within the current development Site have been identified as having low bat roost potential (T356, T456), moderate bat roost potential (T494) and high bat roost potential (T492). T492 was also confirmed as a bat roost.

8.7.34 Due to the presence of a confirmed roost and time elapsed since the original surveys in 2019, an updated roost assessment will be undertaken on all trees within the Site boundary in 2022, to reaffirm their potential as a bat roost.

8.7.35 Further survey work (i.e. emergence/re-entry surveys) will be undertaken on any moderate or high potential trees which are likely to be affected by the Proposed Development, for example removal, pruning or artificial lighting, to determine whether these are currently being used by bats. This survey work is due for completion in July 2022.

Bat Activity

8.7.36 Bat activity surveys were undertaken across the Site by Waterman Group in 2019 (Waterman Group, 2020) which identified ten bat species; activity appeared to be relatively evenly distributed throughout the Site.

8.7.37 Species recorded included common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus,* Nathusius' pipistrelle *Pipistrellus nathusii,* noctule *Nyctalus noctula*, Leisler's bat *Nyctalus leisleri,* brown long-eared *Plecotus auritus*, Daubenton's bat *Myotis daubentonii,* Brandt's bat *Myotis brandtii*, serotine *Eptesicus serotinus* and barbastelle *Barbastella barbastellus,*

8.7.38 Due to the loss of large areas of woodland along the southern boundary and the time elapsed since the original surveys, updated monthly transect and static activity surveys will be undertaken between April and October 2022. The surveys will aim to determine the importance

of these areas to the bat assemblage present and using the Site and complement the existing data from 2019.

Breeding Birds

8.7.39 The buildings, trees and scrub provide habitat for a range of breeding bird species, including Red and Amber-listed species of Conservation Concern (Stanbury *et al.,* 2021). At the time of the surveys undertaken in 2019, a total of 46 bird species were recorded within the Site boundary. A total of four Red- and 12 Amber-listed Birds of Conservation Concern (BoCC, 2018) species were recorded on the Site, including five species listed under Section 41 of the NERC Act 2006. Two species listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended): red kite *Milvus milvus* and barn owl *Tyto alba* were also recorded on the Site. The remainder of the species recorded during the surveys were of low conservation concern,

8.7.40 Barn owl, which is listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), was regularly recorded foraging over the Site during bat surveys undertaken between 2020 and 2021. There were no suitable roost or nest sites present within the Site boundary.

8.7.41 For the most part, the Site supports a typical assemblage of breeding / probable breeding birds for the local area, which reflects the limited range and quality of habitats that are present within it. With the exception of one or two 'specialists', the species recorded at the Site in 2019 is typical of an urban-edge site in lowland Britain as a whole**.**

8.7.42 It was considered likely that both red kite and barn owl are breeding in the local area adjacent to the Site and it is possible that both breed on Site, but no evidence was found during surveys in 2019 or updated walkovers of the Site undertaken between 2020 and 2022. It is considered likely that these species are using the Site for foraging and commuting.

Badgers

8.7.43 Due to the sensitive nature of badger data the results are provided within a confidential appendix (**Appendix 8.1:** Ecology Survey Report), the circulation of which is restricted.

8.7.44 An active main badger sett was identified along the southern boundary of the Site by Ecology Solutions Ltd. in 2018. The sett comprised six active entrances and one inactive entrance. An annex sett, comprising four active entrances, was identified approximately 15-20 m to the south east of the main sett.

8.7.45 One active main badger sett was found adjacent to the eastern boundary of the Site with approximately six active entrances; one entrance was located within the boundary fencing, with the remainder outside of it. Fresh badger prints in the entrance indicated that had been recently used.

8.7.46 An active annex to this sett was also found approximately 15 m to the north of the main sett, outside of the boundary fencing. The annex had approximately three active entrances. The number of active entrances could not be definitively determined for either sett as the boundary fencing and access permissions prevented the ecologist from carrying out a thorough inspection.

8.7.47 An access point under the fence was present to the south of the setts, with badger prints going through it.

8.7.48 The Site had a number of badger runs. Two ran the length of the Site vertically, one on the eastern tide of the railway lines, one on the western. One run went horizontally across the railway lines connecting the pathway under the fence with the eastern and western vertical runs.

8.7.49 Due to the distance between the two main setts, it is possible that these relate to two distinct social territory groups.

Baseline Evolution

8.7.50 In the absence of the Proposed Development and assuming no management on the Site, it would be expected that the features would remain largely unchanged and existing resident populations of protected and/or notable species would continue to utilise the Site at a similar level.

8.7.51 Given that the Site is currently predominantly hardstanding and bare ground, the likely progression of succession would be for the Site to be colonised by scrub along with low-growing annual / perennial species including mosses. In the medium – long term the Site would likely develop into open mosaic habitat and ultimately dense scrub. It could also be expected that more woodland species of flora would take up residence as the scrub matured.

8.7.52 Climate change could influence the future ecological baseline situation at the Site in the longer term. For example, an increase in temperatures may place increased stress on ecosystems within designated sites in the local area. However, ecological change associated with climate will be gradual and long term. Consequently, within the operational lifetime of the project any changes to ecosystems are predicted to be extremely small.

8.8 Important Ecological Features

8.8.1 **Table 8.5** below lists the IEFs identified during the baseline assessment and summarises the scoping of potential effects which are to be taken forward in the ecological impact assessment.

Table 8.5: Summary of potential pathways of effect on ecological features

Ecological Feature	Nature Conservation Importance	Scope In/Out	Potential Pathway of Effect
Statutory sites	N/A	Out	No such sites are located within distances over which impact pathways may cause an effect to them.
Non-statutory sites	Local	In	Graven Hill LWS located within 380 m of the Site. Potential for pollution events and increased disturbance during construction and operation
Habitats	Local	In	Neutral semi-improved grassland, mature scattered trees, scrub, broadleaved woodland and small waterbodies are of ecological value. May be affected by: ▪ Direct loss during the construction phase; ▪ Fragmentation during the construction stage; ▪ Degradation associated with pollution or disturbance during the construction and/or operation phase.
Plants	N/A	Out	No nationally rare, nationally scarce or species listed as being of principal conservation importance in England, under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 were identified within the Site.
Invertebrates	N/A	Out	There was limited suitable habitat on Site which had the potential to support invertebrates. The woodland and mature trees had limited amounts of deadwood and the ponds and ditches on the Site were

Ecological Feature	Nature Conservation Importance	Scope In/Out	Potential Pathway of Effect
			relatively shallow with little aquatic vegetation present. The grassland was limited in species diversity, limiting their value to invertebrates.
Great Crested Newts	Regional	In	GCN have been previously recorded within 100 m of the Site, however eDNA surveys undertaken in 2022 confirmed absence from waterbodies within the Site boundary and suitable aquatic and terrestrial habitat adjacent to the Site has been cleared under a licence held for the wider Graven Hill development. In the highly unlikely event that GCN are using the Site, they may be impacted by: ▪ Habitat degradation (pollution, drainage or other alteration) during the construction and/or operational phases; ▪ Habitat fragmentation; ▪ Habitat creation and management of retained habitat during the operational phase.
Reptiles	Local	In	Low populations of slow worm and common lizard may be affected by: ▪ Direct loss (mortality and injury) during the construction and/or operational phases; ▪ Direct habitat loss during the construction phase; ▪ Disturbance (noise, visual and light) during construction and/or operational phases; ▪ Habitat degradation (fragmentation / other alteration) during the construction and/or operational phases; ▪ Habitat creation and management of retained habitat during the operational phase.
Breeding Birds	Local	In	Birds using the Site may be affected by: ▪ Direct loss (mortality and injury) during the construction and/or operational phases; ▪ Direct habitat loss during the construction phase; ▪ Disturbance (noise, visual and light) during construction and/or operational phases; ▪ Habitat degradation (fragmentation / other alteration) during the construction and/or operational phases; ▪ Habitat creation and management of retained habitat during the operational phase.
Bats	County / Local	In	Bats using the Site could be affected by: ▪ Direct loss (mortality and injury) during the construction and/or operational phases; ▪ Direct loss of foraging and commuting habitat such as woodland edges;

Ecological Feature	Nature Conservation Importance	Scope In/Out	Potential Pathway of Effect
			▪ Disturbance (noise, visual and light) during construction and/or operational phases; ▪ Habitat degradation (fragmentation / other alteration) during the construction and/or operational phases; ▪ Habitat creation and management of retained habitat during the operational phase.
Badger	Local	In	Badgers using the Site could be affected by: ▪ Direct loss (mortality and injury) during the construction and/or operational phases; ▪ Direct loss of foraging habitat; ▪ Disturbance (noise, visual and light) during construction and/or operational phases; ▪ Habitat degradation (fragmentation / other alteration) during the construction and/or operational phases; ▪ Habitat creation and management of retained habitat during the operational phase.
Dormouse	N/A	Out	Dormouse surveys were undertaken in 2010 and 2011 recorded a single dormouse nest in a nest-tube in September 2011, on the northern edge of Graven Hill Wood (approximately 600 m to the north of the Site). Waterman Group undertook further surveys for dormouse in 2014. No dormice or evidence of this species was recorded during the nest tube surveys and no evidence of dormice was recorded during the nest search. Therefore it was considered unlikely that dormice were present on the Site and the Site was of negligible value to this species. An updated assessment for dormice was undertaken in 2020 (Waterman Group, 2020) which concluded that the species remained absent from the Site. The habitats currently present on the Site are of negligible suitability for dormouse and are not well connected to Graven Hill Wood. Considering the absence of dormouse in the desk study data and the historic absence of dormouse on Site, the conclusions of the 2020 assessment (Waterman Group, 2020) remain valid and accurate.
Otter and Water Vole	N/A	Out	The streams and wet ditches running to either side of the old railway line were narrow with small amounts of water present; approximately 15 cm of water. The banks and channel where heavily shaded by surrounding vegetation. Given the characteristics of the watercourses, they were deemed as being unsuitable for water vole. The streams and ditches do not connect with any larger rivers or streams and are not large enough to support a stable fish population. These features are therefore considered unsuitable habitat for otter.

8.9 Primary Mitigation

Construction

8.9.1 An outline CEMP is provided in **Appendix 4.1**. This Outline CEMP will be developed into a final CEMP, which will be agreed with CDC prior to the commencement of construction. The final CEMP shall include the measures set out in the outline CEMP, together with detailed method statements.

8.9.2 Construction working hours would be Monday to Friday 07:30 to 18:00 hours, and Saturday 08:00 to 12:30. Work undertaken on Sundays will be limited to 'quiet' activities and there will be no work on public or bank holidays. Therefore, there would be no artificial lighting on the construction site between 18:00 and 07:30 to ensure there is no artificial light spill which could impact species (e.g. foraging and commuting bats).

8.9.3 Activities such as fit-out within buildings may be undertaken outside of those hours, where these would not cause disturbance off-site. In addition, some activities which cannot be interrupted may occur outside of these working hours. However, these activities are likely to be infrequent and short term in duration and would be agreed with the council in advance.

8.9.4 Construction of the Project would be managed through a CEMP, that sets out the principles of good environmental management to be followed to avoid or minimise environmental impacts. This will include principles for management of construction noise, dust, traffic, materials storage and waste management, drainage and ecological protection.

8.9.5 Relevant mitigation measures would be implemented through the CEMP:

- Cut off ditches to prevent water from entering excavations;
- Temporary bunding and a settlement pond to allow for isolation and on-site treatment of any sediment laden or contaminated water. This will be prior to discharge to the receiving system;
- Use of temporary land drains draining to a catch-pits to remove the solids before draining to a watercourse;
- Using pump sumps in excavations;
- Protection of the pump inlet to avoid drawing in aquatic life and other debris; and
- Minimising disturbance of standing water.

Noise and Visual Disturbance

8.9.6 The potential impact of noise and visual disturbance on the sensitive ecological receptors within the Site would be mitigated though the adoption of the following mitigation measures.

- 'Toolbox Talks' conducted by a suitably experienced Ecological Clerk of Works (ECoW) to explain how contractors can minimise the occurrence of unpredictable/sudden bursts of noise (e.g. restricting the use of horns on site);
- Implementation of a Construction Traffic Management Plan (CTMP) to ensure that vehicles have sufficient turning circles to minimise the frequency of reversing vehicle alarms on site; and
- Retention of existing woodland along the southern boundary of the Site which would assist in screening retained habitats within and adjacent to it.

Lighting

8.9.7 There is currently no construction lighting strategy in place for the construction phase, however, the principles set out below with regards to operational lighting will be adhered to when designing this, namely avoidance of night-time lighting and avoiding positioning near sensitive receptors such as retained boundary habitats (including the woodland to the south of the Site).

Protected and Notable Species

8.9.8 An ECoW would be employed to oversee key elements of enabling works and construction. The ECoW would be a suitably experienced ecologist, whose role would ensure works are carried out in accordance with the CEMP to ensure compliance with international and national legislation and planning conditions. The ECoW would also review results of protected species surveys prior to commencement of works in different areas within the Site.

8.9.9 Once works are underway, the ECoW would provide ecological advice and supervision for all relevant mitigation measures and monitoring. The ECoW would complete checks for all protected species during the construction phase of the Proposed Development.

8.9.10 Best practice measures for minimising the potential for disturbance and injury to protected species will be employed and detailed in the CEMP. These would include the following:

- Directional lighting when required. Outside normal construction working hours, motion-activated directional security lighting may be used;
- Covering all trenches, trial pits and excavations to prevent animals becoming trapped;
- Provision of a method of escape (e.g. a plank) where such excavations cannot be closed or filled on a nightly basis; and
- Restricting vehicle speeds across site in order to minimise the risk of collision with animals.

8.9.11 The potential impact on protected species (specifically breeding birds, GCN, reptiles and badgers) would be largely mitigated through appropriate mitigation measures which include the following:

- Allow a qualified ECoW to undertake pre-commencement surveys for nesting birds and reptiles. If nesting birds are identified these areas will be protected in accordance with relevant legislation (typically until chicks have fledged);
- Ensure that vegetation clearance (if required) occurs outside of breeding bird season (March to September inclusive);
- Conduct updated surveys for reptiles, GCN and badgers to determine which species are present within the Site;
- Removal of suitable reptile habitat (including potential refugia/hibernacula) supervised under ECoW, to take place outside of the hibernation periods for these species;
- Incorporate suitable reptile hibernacula (e.g. log and brash piles) within areas of retained habitat; and
- Ensure that any construction lighting and operational lighting are located and designed in accordance with Guidance Note 08/18, Bats and artificial lighting in the UK (Bat Conservation Trust, Institution of lighting Professionals, 2018).

8.9.12 Due to the presence of bat roosts in multiple buildings across the Site, a Natural England European Protected Species (EPS) licence will be applied for prior to works commencing on

the Site. As part of the licence application a detailed method statement and mitigation strategy will be produced, including details of the 'soft-strip' approach during demolition. Further survey work on trees across the Site is required to determine their use by roosting bats.

8.9.13 If any signs of bats are recorded present or bats are seen emerging or returning from any of the trees, this will be included within the Natural England EPS licence to inform the overall mitigation design for the Site.

8.9.14 No further survey work is required for trees identified as having low suitability. Any trees that are to be removed will require a 'soft fell' methodology to be employed. This can be undertaken at any time of year during suitable weather conditions, but a bat licenced ecologist must be present to oversee the works. If any features are accessible from the ground/aerial inspection the bat licenced ecologist will first check any potential roost features (PRFs)/cavities for signs of bat use (using a high-powered torch/endoscope). If no signs of bat use are identified a soft felling technique can be undertaken on the tree.

8.9.15 Soft felling a tree entails felling the tree in sections, with the following precautions: cutting above or below (rather than directly through) a potential roost feature; lowering cut sections gently to ground level by rope; and, cut sections are then to be left on the Site, with any potential roost feature entrances left unobstructed, for 48 hours prior to chipping or removal from Site.

Operation

Habitat Management

8.9.16 During the operational phase, new and retained habitats will be managed and maintained to optimise their value for biodiversity. Detailed methods would be provided in a Landscape Ecological Management Plan (LEMP) produced for the Proposed Development.

Landscape

8.9.17 Landscape mitigation has been embedded in the overall project design (as shown in the Parameters Plan) to minimise potential landscape and visual impacts and maximise enhancement of biodiversity of the Site. Indicative landscape proposals are presented on **Figure 10.5** Illustrative Landscape Master Plan and have been informed by guidance detailed in the Design and Access Statement. The landscape proposals will be worked-up for subsequent Reserved Matters Application(s).

8.9.18 Details of the indicative landscape layout which could be achieved for the Site are discussed further in **Chapter 10: Landscape and Visual**.

Lighting

8.9.19 BWB prepared a Lighting Impact Assessment (LIA) which has been submitted separately with the outline planning application. A lighting strategy for the Proposed Development would provide a *"modern external lighting installation"* (Lighting Impact Assessment (LIA), paragraph 5.2). BWB have prepared a lighting design layout which is included in Appendix 3 to the LIA.

8.9.20 The design parameters for the lighting design are set out at paragraphs 5.5 to 5.10 of the LIA. In summary, *"the proposed luminaires are LED light source to provide optimum energy efficiency and accurate targeting of light output to keep light pollution effects to the absolute minimum"* (LIA, paragraph 5.5). While column and wall-mounted lights form part of the design the lighting *"shall be arranged to maximise the amount of light reaching trafficked hard surfacing while minimising light spill onto adjacent areas"* (LIA, paragraph 5.7). The details of the lighting types proposed for different areas of the development are at paragraphs 5.11 to 5.25 of the LIA.

8.9.21 All luminaires comply with the relevant ecological requirements (LIA, paragraphs 5.26 to 5.30), specifically in order to minimise disturbance on retained boundary habitat along the south eastern and south western boundaries. This includes:

- Use of warm white, narrow spectrum lights with little or no UV;
- Lowest practical luminaire Wattage;
- Directional lighting with near full horizontal cut off;
- Minimum height columns at maximum spacing;
- Introduction of shielding via cowls where deemed necessary; and
- Use of luminaires with sharp cut-off.

Drainage

8.9.22 An operational drainage strategy has been prepared for the Site which incorporates a number of surface water cleaning techniques in order that any discharges are as 'clean' as reasonably practicable. The impacts of the increase in surface water runoff will be reduced by the incorporation of appropriate and practicable SuDS mitigations measures in the built design.

8.9.23 For further information see **Chapter 11: Hydrology and Flood Risk** and the Sustainable Drainage Strategy (SuDS) Report produced by Alan Baxter (April 2022) can be found in **Appendix 11.2.**

8.10 Assessment of Likely Effects

8.10.1 This section provides a high level and qualitative assessment of the effects of the Proposed Development only against the baseline, based on the details provided in **Chapter 3** of this ES and the Parameters Plan (drawing reference: 410_S-51-P2) which can be found in **Appendix 1.2.**

Demolition and Construction

8.10.2 This section identifies and assesses the likely effects on IEFs during construction of the Proposed Development. Further information with regard to the design of the Proposed Development and activities required to facilitate the construction phase are provided in **Chapters 3 and 4** of this ES.

8.10.3 The assessment has considered the following likely effects on IEFs during construction of the Proposed Development:

- Permanent or temporary loss of natural or semi-natural habitats;
- Permanent or temporary loss of habitat that supports species of conservation importance;
- Direct loss of species through mortality and injury;
- Indirect impacts to habitats and species due to habitat fragmentation/severance, degradation and damage;
- Temporary disturbance to wildlife (e.g. noise, vibration, light pollution, human activity, vehicular movements, overshadowing of habitats); and
- Accidental release of pollution from the Site.

8.10.4 If a particular effect has not been identified in the list above, it is considered that there is no potential for any significant effect to occur on identified IEFs and has not been considered further in the assessment.

Non-statutory Designated Sites

8.10.5 The Proposed Development would not result in any direct or indirect loss of habitat within non-statutory sites identified as IEFs; the closest designated site, Graven Hill LWS, is located 380 m to the north west of the Site and is designated as ancient woodland.

8.10.6 During demolition and construction, there is a low risk of air- or water-borne pollutants being transmitted to nearby designated sites. There are no ecological pathways (e.g. watercourses) flowing to the designated sites; best practice pollution and dust control measures would be implemented, and this would ensure they would not affect the designated sites.

8.10.7 Noise levels generated by vehicular activity would be greater than noise levels generated by vehicles that currently utilise the Site (e.g. cars and vans). At St David's Barracks, when demolition works are being undertaken at the closest distance, the predicted noise level just exceeds the construction threshold value of 65dB, resulting in a short-term, temporary, local moderate adverse level of effect (**Chapter 14: Noise and Vibration**), however, the level of noise produced by vehicles would be highly unlikely to result in any adverse effects on nearby designated sites, given their distance from the Proposed Development. Furthermore, additional noise generated by vehicle movements during demolition and construction would be short-term, temporary and highly localised in nature (**Chapter 13: Traffic and Transport**).

8.10.8 Taking the above information into account, and on the basis that the mitigation measures set out in the CEMP are implemented and adhered to by the principal contractor on-site, the magnitude of the impact has been assessed as negligible and the sensitivity of the receptor is considered to be medium (i.e. regional). The effect will therefore be **Negligible to Minor Adverse (Not Significant).**

Habitats

8.10.9 The Site predominately comprised buildings, hardstanding and occasionally managed neutral semi-improved grassland. Other habitats present included areas of dense and scattered scrub, wet and dry ditches and semi-natural/plantation woodland.

8.10.10 Large areas of neutral semi-improved grassland, mature scattered trees, scrub, broadleaved woodland and small waterbodies, which are of higher ecological value, would be lost during the construction phase. The majority of the loss would be associated with the developmental footprint in the northern half of the Site, however some high-quality habitat (i.e. woodland) may also be lost to accommodate access roads, amenity areas and proposed Sustainable Drainage Systems (SuDS) along the southern boundary of the Site.

8.10.11 Retained habitats such as woodland on Site could be affected indirectly by dust, airborne pollution or waterborne pollution during the construction phase. This applies to retained habitats and to newly created ones established during the early stages of construction. All habitats are sensitive to changes in soil pH or toxicity from deposition or chemical runoff to light blocking from dust in the air or on leaves, and to changes in drainage regime which may increase or decrease available water and its quality. The waterbodies are particularly sensitive to chemical runoff, including to nourishing runoff which could cause a eutrophication event. Pollution may occur at chronic levels from day-to-day construction activities, or at acute levels from a pollution event such as a fire or chemical/ fertiliser spill.

8.10.12 Although the Proposed Development would result in the total loss of the majority of habitats on Site, these habitats are common within the wider landscape and are not considered to have an ecological value beyond the Site level (i.e. negligible value), however their loss would be direct, long-term and irreversible.

8.10.13 The Proposed Development would include the retention of some woodland along the southern boundary of the Site and additional wildlife corridors have been incorporated into the green infrastructure to ensure the continuity of established habitat connectivity across the Site to be complemented by additional habitat creation.

8.10.14 Therefore the magnitude of demolition and construction activities on habitats present within the Site is considered to be high and the sensitivity of the receptor is low, leading to a **Minor Adverse (Not Significant)** effect.

8.10.15 Habitats within the Site boundary may support a range of protected species. The potential effects arising from construction of the Proposed Development on protected and notable species are discussed in the sections below.

Great Crested Newts

8.10.16 GCN were recorded in a pond located within 100 m of the Site in 2020 (RPS, 2020) and previously recorded in a pond within the Site boundary. Since these surveys were undertaken, two ponds have been cleared and drained under a Natural England EPS GCN mitigation licence held for the wider Graven Hill development and numerous receptor sites have been created over 700 m to the north of the Site boundary.

8.10.17 In April 2022, an updated eDNA survey of the waterbodies on Site confirmed likely absence of GCN from waterbodies within the Site boundary.

8.10.18 The potential for offences and impacts on GCN within the Site has been assessed using the Natural England Rapid Risk Assessment tool which indicates 'Amber: Offence Likely'. This is due to the scale of the Proposed Development. The approach advocated by NE is to consider options for redesign of the scheme in terms of location, layout, methods duration and timing so that effects can be minimised. It also recommends that the exact location of development in relation to resting places, dispersal areas and barriers to movement is critically examined prior to determining whether a derogation licence under the Habitats Regulations is required.

8.10.19 The nearest receptor site for GCN for the wider Graven Hill development is over 500 m from the Proposed Development. Newts disperse over land to forage for food and move between ponds. As part of the GCN licence held under the wider Graven Hill development, extensive newt fencing is present around the boundary of the Site, which will likely act as a significant barrier to dispersal.

8.10.20 The distances moved during dispersal vary widely according to habitat quality and availability. At most sites, the majority of adults stay within around 250 m of the breeding pond, so the density of individuals gradually decreases away from the pond. However, newts may well travel further if there are areas of high-quality foraging and refuge habitat extending beyond this range.

8.10.21 The majority of the Site comprised areas of hardstanding, buildings and open semi-improved grassland which is of sub-optimal value and considered unlikely to be used by GCN other than for dispersal, as they offer few foraging opportunities and little shelter. Areas of higher quality habitat such as scrub and woodland were present in the south of the Site.

8.10.22 In the absence of mitigation, the loss of habitat as a result of the Proposed Development is unlikely to significantly affect GCN.

8.10.23 Nonetheless a precautionary method of working will be employed during demolition and site clearance to ensure that an offence is not committed and to minimise or eliminate the risk of encountering GCN, as detailed within the outline CEMP. The measures would include altering the timing of works to avoid periods when newts are likely to be present within the terrestrial phase; toolbox talks prior to works within the area by an ecologist; and works within the area to be completed under the ecological watching brief of an Ecological Clerk of Works (ECoW).

8.10.24 With the implementation of a precautionary method of working, it is anticipated that adverse impacts and offences relating to the killing, injury or disturbance of GCN will be avoided, leading to a low magnitude of impact. Due to the absence of this species from the Site and the distance to the closest receptor site for the wider Graven Hill development, the sensitivity of the receptor is considered to be medium, therefore this would lead to a permanent **Minor Adverse (Not Significant)** effect.

Reptiles

8.10.25 During reptile surveys undertaken in 2018 (Ecology Solutions, 2019) and 2019 (Waterman Group, 2020), low populations of common lizard and slow worm were recorded in the north easterly area of the Site and within the ruderal vegetation along the banks of the railway.

8.10.26 Since the Phase 1 Habitat Survey was undertaken in 2020, the ruderal vegetation along the banks of the railway have been cleared, however the grassland has matured and diversified; providing increased opportunities for foraging, basking and shelter.

8.10.27 The majority of habitat with reptile value (approximately 15 ha) would be cleared to facilitate construction. In the absence of mitigation, direct loss of animals from the population as a result of mortality and/or injury during clearance works is possible. Clearance of habitats such as waterbody margins and long grassland during the summer risks encountering active animals, whilst during the hibernation season clearance of habitats such as woodland, scrub and any refugia or habitat piles are more likely to disturb, injure or kill individuals.

8.10.28 In addition, habitat removal required during the construction phase will reduce the area of habitat available to support the reptile population present and fragment retained areas of suitable habitat; however there is also the potential for low levels of displacement during construction of the Proposed Development.

8.10.29 Pollution, including vibration and noise as well as chemical and airborne pollution could also degrade reptile habitats within and adjacent to works.

8.10.30 In the absence of current survey data, it is anticipated that the reptile population will not have increased significantly since 2019; the only change likely is a more even spread of individuals across the Site as the grassland has been less frequently managed. Nonetheless, the loss of the majority of suitable reptile habitat across the Site would result in permanent, direct impacts to reptiles over the medium- to long-term.

8.10.31 Best practice measures for minimising the potential for disturbance and injury to reptiles will be employed and are detailed in the CEMP. An ECoW would be employed to ensure works are carried out in accordance with the CEMP to ensure compliance with legislation and planning conditions. This will include an appropriate sensitive habitat clearance procedure, requiring two-stage strimming of suitable reptile habitat, encouraging reptiles to move away from the affected area into the surrounding retained habitat in the south of the Site.

8.10.32 Taking this into account, this would lead to a medium magnitude of impact for reptiles. The sensitivity of the receptor is considered to be low, therefore this would lead to a permanent **Minor Adverse (Not Significant)** effect.

Breeding Birds

8.10.33 Based on the surveys undertaken in 2019, species likely to be affected by demolition and construction activities could include linnet, starling and song thrush, which are Red-listed species and swallow, whitethroat and willow warbler which are Amber-listed species under the Birds of Conservation Concern (previously cited under Eaton *et al.,* 2009). Barn owl have been frequently recorded foraging over the Site since the original surveys were undertaken in 2019.

8.10.34 Approximately 6.41 ha of suitable breeding habitat (2.42 ha woodland, 3.99 ha parkland/ scattered trees) and 2.41 ha of scrub would be removed during the construction phase, removing breeding opportunities. Further suitable habitat (10.08 ha of semi-improved grassland and 0.06 ha of standing water) of value for foraging would be removed. Loss of foraging habitat could also reduce breeding viability of populations independent of nesting habitat availability.

8.10.35 The only effects considered possible are to any breeding bird species on the Site itself. Based on data reviewed, the Site supports common and widespread breeding bird species (with the exception of foraging barn owl). Impacts could include small losses to nesting and foraging resources within the Site and disturbance during construction, which would be medium-term, temporary and reversible.

8.10.36 Construction and demolition activities will also lead to disturbance of retained habitats through visual and noise disturbance. This could contribute to the reduction of breeding activity within retained habitats during the construction phase, as well as reducing foraging success for bird species using the Site. The removal and degradation of habitat, and likely direct loss of individuals from the bird assemblage would likely result in a permanent negative adverse effect at a Local scale as a few notable species would be affected.

8.10.37 To minimise the impacts on the breeding bird assemblage within the development boundary, any features with potential to support nesting birds will be removed outside of the breeding bird season. It should be noted that whilst the main bird breeding season runs between March and September some birds can nest at any time of year.

8.10.38 If any clearance was required during the breeding season, the relevant areas will be inspected by a suitably qualified ecologist within 48 hours prior to clearance to check for the presence of nesting birds. If an active nest was present, the nest and vegetation within 5 m of it will be retained until the young birds had fledged.

8.10.39 If a nest proved to be of a species listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), advice from the inspecting ecologist regarding suitable distances to avoid disturbance of the nest and any birds using it will be sought and agreed with clearance contractors. Such buffers would remain in place until the young birds had fledged and left the nest.

8.10.40 These measures are detailed within the outline CEMP.

8.10.41 Taking the primary mitigation into account, this would lead to a medium magnitude of impact for breeding birds. The sensitivity of the receptor is considered to be low to medium, therefore this would lead to a **Minor to Moderate adverse (Not Significant)** effect.

Bats

8.10.42 The emergence / re-entry surveys undertaken between September 2020 and August 2021 identified seven buildings with confirmed bat roosts, including day roosts for common pipistrelle, soprano pipistrelle and brown long-eared bats; night / feeding roosts for brown long-eared bats and a satellite roost for natterer's bats. One building was confirmed as a maternity roost for common pipistrelle and one building was confirmed as a hibernation roost for brown long-eared during the surveys undertaken between January and February 2021.

8.10.43 The common pipistrelle maternity roost, satellite for natterer's bat and brown long-eared hibernation roost were assessed as being of County importance. The day and feeding roosts associated with common species such as day roosts for common and soprano pipistrelle and brown long-eared bats are of Local importance (Wray *et al.,* 2010).

8.10.44 All of the buildings present within the Site boundary would be demolished during the demolition and construction phase, resulting in the permanent loss of all known bat roosts. At least one

known roost would be lost as a result of tree removal, however due to the lack of current survey data, it is not known how many tree roosts would be lost.

8.10.45 As detailed within the outline CEMP and due to the presence of roosts in multiple buildings across the Site, a Natural England European Protected Species (EPS) licence will be applied for prior to works commencing on the Site. Any tree roosts identified during surveys undertaken in 2022 will also be included in the licence application.

8.10.46 As part of the licence application a detailed method statement and mitigation strategy will be produced. Due to the type of roosts and species present, a bespoke bat house will be constructed on Site prior to demolition in order to compensate for the roosts lost. The location of the bat house will be chosen to maximise the likelihood of successful occupation; the bat house would be well connected to high-quality foraging and commuting habitat (off-site) and be shielded from excessive lighting of the project Site. It is anticipated that this will be secured via condition.

8.10.47 The timings of building demolition will avoid the most sensitive times of the known roosts, which would be the bat maternity and hibernation periods. Thus, demolition will be undertaken between October and March inclusive (and October to November for the hibernation roost). Demolition of the maternity roost can only take place after construction of the bat house. Compensatory roosting habitat (i.e. bat boxes) will be in situ prior to demolition commencing.

8.10.48 With respect to foraging and commuting habitat, the Proposed Development would result in the direct loss of large areas of suitable open habitat (i..e grassland), wooded areas to the south, mature trees and areas of mature scrubby woodland. Big bat species, including noctule, serotine and Leisler's bat typically forage and commute at high altitudes and would therefore be more tolerant to habitat fragmentation, but would still suffer from the loss of woodland and their associated prey species. Other species incidentally recorded during the emergence/re-entry surveys such as pipistrelle, *Myotis,* brown long-eared bat and barbastelle would likely be more susceptible to the loss of woodland along the southern boundary of the Site.

8.10.49 Based on Wray *et al.* (2010) and in the absence of current survey data, the Site is likely to be of District level value to more common species, including pipistrelles, brown long-eared bats, *Myotis* species, *Nyctalus* species and Leisler's bats. Whereas the Site is likely to be of County importance for rarer bats such as barbastelle.

8.10.50 During the construction phase, night time working will generally not be undertaken and therefore disturbance will be minimised, however it is anticipated that some level of security lighting will be required. This could lead to the avoidance of foraging and commuting routes, roost abandonment and ultimately the survival of individuals.

8.10.51 The CEMP includes measures to minimise the effects of construction phase lighting and noise, including ensuring that light spill on retained habitats (specifically woodland) and wildlife corridors adjacent to the Site are minimised.

8.10.52 Taking this into account, the loss of roosts and foraging / commuting habitat would be of a high magnitude. The sensitivity of the receptor is considered to be low to medium, therefore this would lead to a **Moderate to Major adverse** effect (**Significant**).

Badgers

8.10.53 Two main setts and one annex sett were identified within the Site boundary. Fresh badger prints and numerous runs were recorded across the Site.

8.10.54 Construction and demolition works could cause direct mortality to individuals, for example collapsing setts, individuals becoming trapped in open trenches or consuming toxic materials.

8.10.55 The works will also result in the loss of a large area of foraging habitat and could cause degradation of retained habitat through disturbance or pollution. Temporary habitat loss and disturbance may encourage individuals to exploit other resources thereby increasing their risk of traffic mortality.

8.10.56 As detailed within the CEMP, an offset of a minimum 30 m around active setts, where no works would be undertaken would be required to avoid disturbing or destroying the setts. If this is not possible, a licence from Natural England may be required; licences can only be issued for work undertaken between July and November. The nature of the licence required would be dependent on whether a main sett is destroyed.

8.10.57 It may be possible to undertake some works (i.e. use of light machinery/hand tools) within the 30 m buffer zone without a licence, however this will be determined and agreed with an ecologist prior to works being undertaken.

8.10.58 Badgers use the Site for foraging and commuting therefore the following measures will be put in place during the demolition and construction phase to minimise impacts on badgers moving across the Site, as detailed within the CEMP:

- Prior to the commencement of works a site induction and toolbox talks should be provided to all site workers and contractors which should include measures described in this report as well as emergency procedures to be followed should a badger or sett be located during construction works;
- Night working should be avoided unless essential. Where this is not practicable, lighting should be focussed on construction areas and directed away from areas of high potential value to badgers and other wildlife as directed by the project ecologist (i.e. nearby setts, parcels of woodland and hedgerows);
- Excavations more than 0.5 m deep should be fenced or covered overnight where practicable, and a means of escape, such as wooden planks that could be used as ladders, should be set in place within these excavations, or excavations should be profiled so as to enable badgers to escape; and
- An emergency procedure should be undertaken if a badger or sett is located during construction. This should involve immediately halting works within 30 m of any new sett and then the project ecologist should report this to the construction site manager and developer as soon as practicable and works in the area should be halted until a licence has been obtained.

8.10.59 On the basis that the mitigation measures set out in the CEMP are implemented and adhered to by the principal contractor on-site, the magnitude of the impact has been assessed as low and the sensitivity of the receptor is considered to be low. The effect will therefore be **Negligible to Minor adverse (Not Significant).**

Operation

8.10.60 The assessment has considered the following likely effects on IEFs during operation of the Project:

- Degradation and loss of habitats (e.g. from pollution and changes to water quality);
- Degradation and loss of habitats that support species of conservation importance (e.g. from pollution);
- Disturbance to wildlife (e.g. from noise or light pollution, human activity and vehicular movement); and

- Long-term benefits of ongoing habitat management.

Non-statutory Designated Sites

8.10.61 The nearby designated sites are located in private land and cannot therefore be accessed by contractors or future users of the Proposed Development, minimising the risk of adverse recreational effects.

8.10.62 Pollution from the Proposed Development is unlikely to enter via water or air during operation based on the drainage regime and the nature of the Proposed Development. The impacts of surface water runoff will be reduced by the incorporation of appropriate and practicable SuDS mitigations measures in the built design (see **Chapter 11: Hydrology and Flood Risk**).

8.10.63 Increased traffic flows nearby may cause chronic low-level pollution, for example nitrous oxide (NOx) deposition which may affect growth rates and other factors such as soil diversity. However, traffic related effects are likely to be confined to the area around the access junction where vehicles will accelerate away, generating most pollutants.

8.10.64 The extent of effects would likely minor (limited to within a few metres of the road), and NOx levels are likely to be high already in habitat associated with the junction of the A41 and wider Graven Hill development.

8.10.65 Taking the above information into account, and on the basis that the mitigation measures set out during the construction stage (as detailed in the CEMP) continue to be implemented and adhered to, the magnitude of the impact has been assessed as negligible and the sensitivity of the receptor is considered to be medium. The effect would therefore be **Negligible to Minor Adverse** significance (**Not Significant**).

Habitats

8.10.66 Operational impacts on the habitats created during construction and those retained post development could include degradation due to visitor pressure and poor or inappropriate management.

8.10.67 Landscaping elements will focus on habitats of ecological value, including tree planting, within the carparks and green fingers/wildlife corridors (see Layout Parameter Plan in **Appendix 1.2**), replacing those that would be removed. The most sensitive elements on the Site are the areas of mature and regenerating woodland along the southern boundary. For the most part these are being retained and will be supplemented with additional planting (see **Chapter 10: Landscape and Visual**).

8.10.68 The drainage strategy (see **Chapter 11: Hydrology and Flood Risk**) details measures to ensure that surface water drainage does not have significant negative effects relating to pollution upon the water environment, and in turn the ecologically valuable habitats during the operational phase.

8.10.69 On this basis, there would be no impact to the new habitats created during the operation of the development. The effect would therefore be **Negligible to Minor Adverse** significance (**Not Significant**).

Great Crested Newts

8.10.70 During the operation of the Proposed Development, new habitats created in the south of the Site, including SuDS, woodland and native shrub planting, will become established and serve to provide foraging and commuting habitat. The habitat creation measures (e.g. green fingers / wildlife corridors as depicted on the Layout Parameter Plan in **Appendix 1.2**) and features built into the detailed design shall provide enhanced and safely accessible terrestrial habitat from the north to the south of the Site.

8.10.71 Nonetheless, it is likely that should GCN populate the Site, their presence will be confined to the Site's boundaries, given the large reduction of available habitat.

8.10.72 There is no primary mitigation in relation to GCN during the operational phase, therefore in the absence of mitigation there would likely be a **Negligible or Minor adverse** effect (**Not Significant).**

Reptiles

8.10.73 A low population of slow worm and common lizard have been previously recorded on Site during surveys undertaken in 2019. During the operation of the Proposed Development, new and enhanced habitats will become established and provide foraging and commuting habitat in the south of the Site and reptiles. The habitat creation measures (e.g. green fingers / wildlife corridors) and features built into the design shall provide enhanced and safely accessible terrestrial habitat from the north to the south of the Site.

8.10.74 Nonetheless, it is likely that reptiles will be confined to the Site's boundaries, given the large reduction of available habitat.

8.10.75 As such, it is considered likely that the magnitude of the impacts of the development on this feature of low value would be low. This would result in a **Negligible or Minor adverse** and **Not Significant** effect.

Breeding Birds

8.10.76 During the operation of the Proposed Development, new habitats will become established and provide additional foraging and commuting habitat.

8.10.77 Operational effects of the Proposed Development have the potential to cause harm or mortality to barn owls whilst flying and foraging due to the increased density of roads and traffic within the Site. Grass verges alongside roads passing through the Site will be managed to provide minimal cover for small mammals, to minimize hunting opportunities and reduce the risk of potential for collisions with vehicles.

8.10.78 As such, it is considered likely that the magnitude of the impacts of the development on these features of low to medium value would be negligible to low. This would result in a **Negligible or Minor beneficial (Not Significant)** effect.

Bats

8.10.79 Lighting of roost sites can discourage bats from using the roost and/or delay emergence times. However, the site-wide lighting strategy proposed in the LIA (BWA, 2022) proposes that lighting within the completed Site is of a type that would not significantly impact wildlife - bats, in particular. Some bat species (including the common and soprano pipistrelles identified on the Site) would forage around anthropogenic light sources.

8.10.80 The Proposed Development would include focused lighting, that is focused to the ground and avoiding spread into more sensitive areas including potential foraging and commuting routes as well as bat roosts. Any lighting that is required at a higher level would be suitably cowled and directional. However, some low-level light spill (warm light) is unavoidable within the green corridors due to security and operational requirements.

8.10.81 The Proposed Development would include a purpose-built bat house along the southern boundary of the Site.

8.10.82 Furthermore, once the Proposed Development is complete, it is unlikely that there would be any disturbance of bat roosts from the operational phase as any new roosts would be located on away from visitors to the Site.

8.10.83 The enhancements to areas of open space within the Proposed Development would enhance the Site with respect to foraging bats, through the provision of native tree and scrub planting, new grassland, and a SuDS feature.

8.10.84 Therefore, the operational impact on this low to medium value receptor would be low beneficial, leading to a **Negligible or Minor** beneficial effect **(Not Significant).**

Badgers

8.10.85 Free movement through the Site will be maintained due to the provision of on-site green fingers / wildlife corridors linking to suitable off-site habitats to the north and south secured via planning condition. The potential effects of mortality and harm from increased vehicular traffic and also of disturbance are considered to be low, due to the access to greenways and speed limits of all roads within the Proposed Development (**Chapter 13 Traffic and Transport**).

8.10.86 Therefore the magnitude of the impact has been assessed as low and the sensitivity of the receptor is considered to be low. The effect will therefore be of **Negligible to Minor Adverse** significance (**Not Significant**).

Biodiversity Net Gain Assessment

8.10.87 In accordance with Chapter 15 of the NPPF and Policy ESD10 of the Adopted Cherwell Local Plan 2011-2031, a Biodiversity Net Gain (BNG) assessment of the Site has been undertaken to calculate the biodiversity value of the Proposed Development and to demonstrate the value of the habitats created on Site post-development.

8.10.88 Indicative calculations based on the Parameters Plan (drawing reference: 410_S-51-P2) estimate a net loss of approximately 75% of biodiversity value. The minimum requirement for net gain is 10%. For further information see the BNG assessment submitted separately with the outline planning application.

8.10.89 Following the Reserved Matter application for the Proposed Development, the BNG calculations will be updated to include the landscaping associated with it. If, at any time, it is likely that the Proposed Development will not achieve a net gain on the Site overall, discussions will be had as to how achieve this (i.e. offsite mitigation or financial offsetting).

8.11 Secondary Mitigation and Enhancement

Demolition and Construction

8.11.1 The CEMP will include details on how ecological features will be retained and / or protected during demolition and construction activities. It will also include measures to minimise the effects of construction phase lighting and noise, including ensuring that light spill on adjacent habitats (notably the woodland along the southern boundary of the Site) is minimised.

8.11.2 Pollution prevention methods and precautions during construction will serve to minimise the mortality or injury risk to other mammals, including fencing open trenches and ensuring means of egress, secure storage of chemicals and efficient clean-up of spills. Careful clearance methods should be utilised including avoiding removal of brash or leaf piles during winter (as disturbing hibernating individuals may kill them), and hand-removal of leaf and brash piles during the active season.

8.11.3 The measures detailed to protect birds and mammals will also serve to safeguard GCN and reptiles during the construction phase.

8.11.4 In the highly unlikely event that a GCN is discovered during the hand or destructive search, works will stop immediately, and advice sought from the project ecologist.

Operation

8.11.5 Management of habitats, as detailed within the respective LEMP for the Proposed Development will result in newly created and retained habitats achieving a higher condition than currently recorded.

8.11.6 The implementation of a suitable green space management strategy (including for visitors) would ensure that such degradation of newly created and retained habitats does not occur. The strategy would include details of how visitors would be managed, how the habitats present would be managed (in the long-term), and any ongoing maintenance actions, which would ultimately prevent negative impacts on the other retained habitats.

8.12 Residual Effects

8.12.1 With the implementation of the mitigation measures detailed in the CEMP, it is anticipated that adverse residual effects relating to habitats and protected and notable species during construction will be negligible and therefore not significant.

8.12.2 The management of newly created and retained habitats will, in turn, benefit protected and notable species including reptiles, bats and birds. Overall there will be a negligible residual effect for habitats and species during operation.

8.13 Monitoring

8.13.1 Future monitoring will be required associated with the Natural England mitigation licence for bats. Details would be specified within the licence application itself but would include monitoring of any permanent bat boxes/bat house installed as mitigation for the loss of habitat.

8.13.2 Monitoring usually ranges from between 2- and 5-years post construction, with the results submitted annually to Natural England as part of the licence return.

8.13.3 A monitoring programme will be implemented following the completion of construction and habitat creation. The monitoring proposals would tie in with the duration of the LEMP which covers a 5-year period. The post construction monitoring will be agreed with statutory consultees at the time.

8.13.4 Monitoring survey reports will be produced at the end years 2 and 5 following any detailed surveys, a copy of which will be provided to the local planning authority and the results of the monitoring will be reviewed against the habitat creation objectives. The site management will be adjusted accordingly should be surveys identify a requirement to alter approaches. Further monitoring required for BNG purposes will be extended to comply with requirements at the time.

8.14 Cumulative Effects

8.14.1 In accordance with the CIEEM EcIA Guidelines, any effect that arises as a result of incremental changes caused by other proposed developments (which are reasonably foreseeable) in combination with the effects of the Proposed Development is defined as a ‘cumulative’ effect.

8.14.2 A review of proposed developments that may result in significant cumulative effects with the Proposed Development has been undertaken within a radius of 2.5 km and used to inform this ES. Details of the projects are provided in **Chapter 6**: Assessment Method and Scope of ES.

8.14.3 In relation to the assessment of ecology, additional proposed developments which may result in cumulative impacts with the Proposed Development have been examined as part of the assessment of cumulative effects.

8.14.4 Other proposed developments within 10 km of the Site, which may lead to cumulative effects, are listed in **Table 8.5** below.

Table 8.6: List of Other Proposed Developments for Cumulative Assessment

Application Number	Status	Description	Distance from Proposed Development
22/00835/F	Submitted	Demolition of existing buildings and structures at the Site and provision of a bat barn. Demolition forms part of the application for the planning permission, so is not considered as a separate cumulative development.	~0 m
20/02415/F	Permitted	New dedicated Employment Access Road (EAR), adjacent to part of the northern boundary of the Application Site.	~0 m
11/01494/OUT as amended under 19/00937/OUT	Permitted	Excluding the employment element of the permission which forms the basis of the Application Site. The residential element is located to the north of Graven Hill adjoining and to the north of the Application Site. The employment uses are located to the south of Graven Hill (Sites D1 and EL1) at the Site	~0 m
16/00861/HYBRID	Permitted	Warehouse development at Symmetry Park. The final remaining development opportunity, Unit C, is under construction speculatively and totals 270,000 sq ft. Practical Completion due September 2022	~300 m
16/01268/OUT	In Planning	Residential Development of up to 1,500 dwellings with associated amenities, retail, infrastructure and green open space.	~700 m

8.14.5 Considering the nature of the other developments located within 2.5 km of the Site, it is inevitable that these would run concurrently with the Proposed Development. However, the applications for these other proposed developments will include mitigation for the loss of habitat as for species present within their respective Site. Therefore, it is considered that significant cumulative effects are unlikely to occur between the proposed Site and other proposed development sites.

8.14.6 Documentation will be reviewed and updated throughout the construction phase if further potential risks are identified.

8.15 Comparison to 2014 Permission

Habitats

8.15.1 While the same habitats will be directly affected by the Proposed Development as the development permitted in the 2014 Planning Permission , significantly large areas of existing habitat (notably the woodland along the southern boundary of the Site) were being retained.

The 2014 Planning Permission also incorporated large areas of amenity planting and landscaping, which would maintain overall connectivity across the Site.

8.15.2 An indicative BNG assessment of the 2014 Planning Permission for the Site produced a score of -61.32%, however this assumed a 'worst-case' scenario in the absence of detailed landscaping plans. This is in comparison to a score of -75.57% for the Proposed Development (drawing reference: 410_S-51-P2), largely as a result of the loss of grassland across the Site.

Species

8.15.3 There are no perceivable differences in impacts to protected and notable species. The change in use of existing buildings, removal of trees and reduction of foraging and commuting habitat would still necessitate the requirement for an EPS mitigation licence from Natural England for bats; the reduction in terrestrial habitat and degradation of existing/retained features would have required compensation/mitigation for reptiles, GCN, breeding birds and badgers.

8.15.4 Notwithstanding detailed landscaping proposals accompanying the development permitted by the 2014 Planning Permission, the operational impacts upon protected and notable species would likely have been of slight benefit, given the amount of soft landscaping proposed and greater retention of high-value habitat.

8.16 References

- Bat Conservation Trust, Institution of lighting Professionals (2018) Guidance Note 08/18, Bats and artificial lighting in the UK
- British Standard BS 5837: 2012 (Trees in Relation to design, demolition and construction – Recommendations)
- CIBSE (2018) Society of Light and Lighting, Lighting Handbook.
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. Chartered Institute of Ecology and Environmental Management, Winchester.
- Collins J. (ed.) (2016) Bat surveys for Professional Ecologists: Good practice guidelines (3rd Edition). Bat Conservation Trust, London.
- Department for Environment, Food and Rural Affairs (Defra)(2001). European Community Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora. First report by the United Kingdom under Article 17 on implementation of the Directive from June 1994 to December 2000. Defra Bristol.
- Eaton et al (2009) Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and Isle of Man.
- Ecology Solutions Ltd. (2018) Graven Hill, Units D1 and D4 Ecological Assessment.
- English Nature (2001). Great Crested Newt mitigation guidelines. English Nature, Peterborough.
- European Commission (1985). Directive 85/337/EEC of the European Parliament and of the Council on the assessment of the effects of certain public and private projects on the environment.
- European Commission (2009). Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.
- Froglife (1999) Froglife Advice Note Sheet 10: Reptile Survey.

- Gent, T. & Gibson, S. (2003) Herpetofauna Workers' Manual. Joint Nature Conservation Committee.
- Gilbert, G., Gibbons, D.W. and Evans, J. (1998) Bird Monitoring Methods. RSPB, Sandy.
- Joint Nature Conservation Committee (JNCC) and Defra (2012) UK Post-2010 Biodiversity Framework.
- Legislation.gov.uk. Wildlife and Countryside Act 1981. [online] Available at: http://www.legislation.gov.uk/ukpga/1981/69/contents [Accessed: May 2022].
- Legislation.gov.uk. The Conservation of Habitats and Species Regulations 2019 (EU Exit Amendment) [online] Available at: https://www.legislation.gov.uk/ukdsi/2019/9780111179512/contents [Accessed: May 2022]
- Legislation.gov.uk. The Countryside and Rights of Way Act 2000. [online] Available at: https://www.legislation.gov.uk/ukpga/2000/37/contents [Accessed May 2022].
- Legislation.gov.uk. Natural Environment and Rural Communities Act 2006 [Online]. Available at: https://www.legislation.gov.uk/ukpga/2006/16/contents [Accessed May 2022].
- MAGIC (2021) Statutory Designated Site and Ordnance Survey map information. Available from www.magic.gov.uk [Accessed: May 2022].
- Met Office 2018 UK Climate Projections 2018.
- Ministry of Housing, Communities and Local Government (2021) National Planning Policy Framework [available online at:// https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf]
- RPS (2022) MOD Bicester Ecology: Ecological Appraisal. RPS, Abingdon.
- Stace, C.A. (2010) New Flora of the British Isles (3rd Ed.). Cambridge University Press, Cambridge.
- Stansbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D. and Win, I. (2021). Birds of Conservation Concern (BoCC) 5: the status of our bird populations the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114. 723-747.
- The Mammal Society (1989) Surveying Badgers. The Mammal Society, London.
- Woodward, I., Aebischer, N., Burnell, D., Eaton, M., Frost, T., Hall, C., Stroud, S. & Noble, D. (2020) Population estimates of birds in Great Britain and the United Kingdom. British Birds Volume 113.
- UK BAP (2010) UK Biodiversity Action Plan. UK BAP. Available from: www.jncc.defra.gov.uk [Accessed: 5 May 2022].
- Waterman Group (2020) Graven Hill Development LTA2, Bicester Protected Species Report
- Wray S; Wells D, Long E and Mitchell-Jones T (2010). Valuing Bats in Ecological Impact Assessment. In Practice December 2010, 23-25.

9 Historic Environment

9.1 Introduction

9.1.1 This chapter has been prepared by Waterman IE and presents an assessment of the likely significant effects of the Proposed Development on the historic environment.

9.1.2 This chapter provides a description of the methods used in the assessment. This is followed by a description of the relevant baseline conditions of the Site and surrounding area, together with an assessment of the likely potential effects of the Proposed Development during the Site preparation and construction works and once the Proposed Development is completed and operational. Mitigation measures are identified where appropriate to avoid, reduce or offset any adverse effects identified and / or enhance likely beneficial effects. Taking account of the mitigation measures, the nature and significance of the likely residual effects are described. The cumulative effects of the Proposed Development and other relevant developments have also been considered and are presented in this chapter.

9.1.3 This chapter is supported by the following technical appendices, provided in **Volume 2** of this ES:

- **Appendix 9.1:** Waterman, 2022. *Graven Hill, D1, Bicester: Historic Environment Desk-Based Assessment*. Report Ref. WIE11386-177-R-1-1-2-HEDBA.

9.2 Policy Context, Legislation, Guidance and Standards

9.2.1 This assessment has been produced within the context of national planning policy:

- National Planning Policy Framework (NPPF), **Chapter 16** (Department for Levelling Up, Housing and Communities, 2021).
  - The current National Planning Policy Framework was adopted July 2021 (see Section 16 'Conserving and enhancing the historic environment'). In relation to the historic environment, the NPPF outlines that:

    "*Heritage assets range from sites and buildings of local historic value to those of the highest significance, such as World Heritage Sites which are internationally recognised to be of Outstanding Universal Value. These assets are an irreplaceable resource, and should be conserved in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of existing and future generations*."

9.2.2 This assessment has been produced within the context of local planning policy prepared by CDC including:

- Cherwell Local Plan 2011 – 2031 (Cherwell District Council – North Oxfordshire, 2022b).
  - The adopted Cherwell Local Plan 2011 – 2031 (adopted July 2015) contains strategic planning policies for development and the use of land. It forms part of the statutory Development Plan for Cherwell to which regard must be given in the determination of planning applications.
  - Strategic Objective (SO) 15, part of the SOs for ensuring sustainable development within the district highlights the importance of the consideration for the historic environment. SO 15 states: "*To protect and enhance the historic and natural environment and Cherwell's core assets, including protecting and enhancing cultural heritage assets and archaeology, maximising opportunities for improving biodiversity and minimising pollution in urban and rural areas*"

- The relevant policies relating to the conservation and protection of the historic environment within the Site, include:

  'Policy ESD 15: The Character of the Built and Historic Environment'; and
  'Policy Bicester 2: Graven Hill'.

- Saved, retained policies of the Adopted Cherwell Local Plan 1996 (Cherwell District Council – North Oxfordshire, 2022a).

  - The following relevant policy is retained from the 1996 Local Plan within in the currently adopted Local Plan 2011 – 2031:

    'Policy C10: Historic landscapes, parks and gardens and historic battlefields'.

  - The policy states that "development which would have a detrimental effect upon the character and appearance of historic landscapes, parks and gardens and battlefields and their settings will normally be resisted."

9.2.3 This assessment has been produced within the context of the following relevant legislation:

- Ancient Monuments and Archaeological Areas Act 1979 (HMSO 1979); and
- Planning (Listed Buildings and Conservation Areas Act) 1990 (see Paragraph 66 (1) and Paragraph 72) (HMSO 1990).

9.2.4 The assessment has been undertaken in accordance with the methodologies described in the following guidance documents:

- The Chartered Institute for Archaeologists' [CIfA] Standard and guidance for historic environment desk-based assessment, updated 2020 (Chartered Institute for Archaeologists, 2014);
- Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment, 2008 (published under English Heritage) (Historic England, 2008);
- Historic England's Good Practice Advice in Planning Note 2 (GPA 2) – Managing Significance in Decision Taking, 2015 (Historic England, 2015);
- Historic Environment Good Practice Advice in Planning Note 3 (2nd edition) (GPA 3) – The Setting of Heritage Assets, 2017 (Historic England, 2017a); and
- Solent-Thames Research Framework (Hey & Hind, 2014) – for historic environment resource assessments and research agendas. Applicable to Berkshire, Buckinghamshire, Oxfordshire, Hampshire and the Isle of Wight.

9.2.5 The criteria for assessing the value of heritage assets and magnitude of impacts are drawn from National Highways Design Manual for Roads and Bridges (DMRB) (National Highways, 2020a-b). Although the Proposed Development is not a highways scheme, the methodologies for cultural heritage assessment as set out in the DMRB are considered applicable and appropriate for other types of development and are often applied. They have been applied in this assessment.

9.2.6 For reference, a summary of relevant legislation, policy and guidance can also be found in the Historic Environment Desk-Based Assessment (HEDBA) (see Section 3.1-3.2 and Section 4.1 of **Appendix 9.1)**.

9.3 Consultation

9.3.1 Consultation has been undertaken with Cherwell District Council's Conservation Officer and the Oxfordshire County Council Archaeology Service (OCCAS).

9.3.2 The Conservation Officer confirmed the requirement to consider potential impacts from the Proposed Development on built heritage assets in the vicinity of the Site. This is covered via the inclusion of a 1 km study area surrounding the Site to consider potential impacts to recorded built heritage assets through beneficial or adverse change to their settings.

9.3.3 The OCCAS confirmed the requirement to consider potential impacts from the Proposed Development on buried heritage assets (archaeological remains). The Planning Archaeologist was informed that this HEDBA would include a summary of the previous investigations undertaken within the Site and wider Graven Hill area, to provide the most informed and confident determination of the Site's remaining archaeological potential.

9.3.4 No further consultation was conducted prior to the submission of the planning application.

9.4 Scope of Assessment

9.4.1 A preliminary assessment determined the need to cover the following aspects of the historic environment in the assessment of potential impacts from the Proposed Development during Demolition/Construction and Complete and Operational stages on known and unknown heritage assets. These include:

- Built heritage assets (above ground)
- Archaeological assets (below ground)

9.4.2 An initial review of the known historic environment records from the Oxfordshire Historic Environment Record and the National Heritage List for England (NHLE) (Historic England, 2022), identified the requirements to assess designated Listed Buildings to the southeast, northeast and north of the Site within a surrounding 1 km study area. Additionally, to require the assessment of potential impacts on known non-designated heritage assets within the Site, associated with the former Bicester Central Ordnance Depot.

9.4.3 Initial assessment confirmed that Listed Buildings located from *c.* 800m southeast of the Site within the village of Ambrosden c. 800m would not be impacted by the Proposed Development through a negative change in setting. An existing mature woodland is situated between the Site and village, oriented NE-SW. Additionally, modern farm storage structures are located between the Site and village of Ambrosden also, to the west side of the existing woodland. The combined considerable distance and existing screening between the Site and study area provides negligible intervisibility between the Site and designated heritage assets within the village of Ambrosden. As such, potential impacts to these Listed Buildings were not considered any further.

9.5 Methodology

Study Area

9.5.1 The study area for potential impacts from the Proposed Development on both built heritage assets and known/unknown archaeological remains, included both the area contained within the application boundary ('the Site') and a surrounding 1 km area.

9.5.2 Within the Site, potential impacts to both above ground built heritage assets and below ground archaeological remains were assessed.

9.5.3 A 1 km surrounding study area to the Site was utilised during the assessment. This was agreed upon during consultation with the Conservation Officer for CDC, outlined in Section 9.3. A 1 km study area surrounding the Site was chosen to ensure the appropriate consideration for potential setting impacts from the Proposed Development on nearby designated and non-designated built heritage assets only.

Baseline Data Collection

9.5.4 The HEDBA (**Appendix 9.1,** Section 5) presents an account of the known historic environment resource within the Site and study area. The potential for buried, as yet unknown archaeological remains within the Site was inferred based on the known historic environment resource (see **Appendix 9.1**, Section 5.5). The HEDBA was informed by the following sources:

- Oxfordshire Historic Environment Record (OHER) commercial search dataset April 2022 – for a comprehensive record of known designated and non-designated heritage assets within the Site and 1 km study area;
- Historic England's The National Heritage List for England (NHLE) (Historic England, 2022) – for data on designated heritage assets within the Site and study area;
- British Geological Survey (BGS) (British Geological Survey, 2022) – for superficial deposit and bedrock geology data, and publicly available borehole logs to aid in the interpretation of disturbance and truncation within the Site;
- National Library Scotland Online Maps (National Library Scotland, 2022) – for viewing and interpretation of historic OS maps; and
- Secondary sources – historic documents, maps and images for contextual background information of the Site and its history.

9.5.5 Designated and non-designated heritage assets from the OHER are referenced throughout this Chapter by their 'Preferred Reference' OHER number. The exceptions to this include the reference of Scheduled Monuments and Listed Buildings by their NHLE 'National Reference/List UID' number, the reference of HLCs by their 'HLCUID' number, and the reference of previous archaeological investigations by their OCCHER 'Event UID' number (e.g. [EOX6694]), or Waterman reference number (e.g. [WIE001]). Full descriptions and spatial distribution maps of identified heritage assets and previous investigations can be found in the HEDBA (see **Appendix 9.1**) and are not reproduced here unless pertinent to the identified receptors.

Assessment

9.5.1 A multi-stepped approach was utilised in the HEDBA for determining the level of importance/value of each heritage asset, the justification for its assignment, the magnitude of impact on each heritage asset from the Proposed Development and the significance of effect on each heritage asset. The following sources were used in the assessment of each known heritage asset's value:

- NPPF, **Chapter 16** (Department for Levelling Up, Housing and Communities, 2021);
- Historic England 2019 – Statements of Heritage Significance: Analysing Significance in Heritage Assets (Historic England, 2019);
- Construction Highways England 2020 - Design Manual for Roads and Bridges: Section LA 104 - Environmental assessment and monitoring (National Highways, 2020a);
- Department for Levelling Up, Housing and Communities 2014 - Planning Policy Guidance - Historic environment (Department for Levelling Up, Housing and Communities, 2014) and

- Historic England 2017 - The Setting of Heritage Assets (Historic England, 2017b)

9.5.2 Each step of the assessment process is outlined under the 'Significance Criteria' section below.

Significance Criteria

9.5.3 The significance of the effects of the Proposed Development on the historic environment resource have been determined using the assessment criteria described below.

9.5.4 The value/sensitivity of a heritage asset is typically determined according to its statutory designation (i.e. designated, non-designated or locally listed). An overview of such standard values is outlined in **Table 9.1**.

Table 9.1 Value/Sensitivity of Heritage Assets

Value/Sensitivity	Type of Heritage Asset
Very High	World Heritage Sites (including nominated sites) Heritage assets of international importance
High	Scheduled Monuments Undesignated assets of schedulable quality Registered Battlefields Protected Wrecks Heritage assets of national importance
Medium	Heritage assets of regional importance
Low	Heritage assets of local importance Heritage assets compromised by poor preservation and/or poor survival of contextual associations Assets of limited value, but with potential to contribute to local research objectives
Negligible	Historic environment resource with no significant value or interest
Unknown	Heritage assets for which current level of understanding is insufficient to allow significance to be determined

9.5.5 **Table 9.1** provides an initial framework for identifying the likely most sensitive assets. However, it must be noted that the importance/value outlined in **Table 9.1** provides an initial framework based on standard value ratings only. For example, a locally listed building, which are described in **Table 9.1** as being of low value, may have a higher value if they are associated with a Listed Building (by Historic England) or play a key part in the setting of a Listed Building. As such, professional judgement may change the above values, however, robust reasoning should be provided in such an instance.

9.5.6 Further assessment of a heritage asset's value is then undertaken against Department for Levelling Up, Housing and Communities' planning policy guidance on attributing the interest of an asset to specific categories as 'Archaeological', 'Historic' and 'Architectural and Artistic'. These are set out in **Table 9.2** below.

Table 9.2 Interest of Heritage Assets

Heritage Interest	Definition
Archaeological	As defined in the Glossary to the National Planning Policy Framework, there will be archaeological interest in a heritage asset if it holds, or potentially holds, evidence of past human activity worthy of expert investigation at some point.
Historic	An interest in past lives and events (including pre-historic). Heritage assets can illustrate or be associated with them. Heritage assets with historic interest not only provide a material record of our nation's history, but can also provide meaning for communities derived from their collective experience of a place and can symbolise wider values such as faith and cultural identity.
Architectural and Artistic	Interests in the design and general aesthetics of a place. They can arise from conscious design or fortuitously from the way the heritage asset has evolved. More specifically, architectural interest is an interest in the art or science of the design, construction, craftsmanship and decoration of buildings and structures of all types. Artistic interest is an interest in other human creative skill, like sculpture.

9.5.7 The definition of setting is taken from the NPPF Annex 2: Glossary as "*the surroundings in which an asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance [value] of an asset, may affect the ability to appreciate that significance [value] or may be neutral*".

9.5.8 Historic England's guidance considers that the importance of setting lies in what it contributes to the value of the heritage asset. This depends on a wide range of physical elements within, as well as perceptual and associational attributes pertaining to the heritage asset's surroundings.

- Guidance produced by Historic England (Historic England, 2017a) has been used to adopt a stepped approach for settings assessment, which is summarised below:
- Step 1: Identify which heritage assets and their settings are affected;
- Step 2: Assess the degree to which these settings make a contribution to the value of the heritage asset(s) or allow value to be appreciated;
- Step 3: Assess the effects of the Proposed Development, whether beneficial or harmful, on that value or on the ability to appreciate it;
- Step 4: Explore ways to maximise enhancement and avoid or minimise harm; and
- Step 5: Make and document the decision and monitor outcomes.

9.5.9 As such, in assessing whether, how and to what degree the settings contribute to the cultural heritage value of the heritage assets, a number of potential attributes of a heritage asset's setting are considered. The attributes of setting contribute to the sensitivity and the value of a heritage asset.

9.5.10 Having assessed the contribution of the setting to the cultural heritage value of the heritage asset, the effect of a Proposed Development on the setting can be determined by consideration

of the potential attributes of a Proposed Development affecting setting. These attributes, as taken from Historic England's guidance document are presented in **Table 19.3**.

Table 9.3 Potential Attributes of Settings

Potential Attributes of Settings
The asset's physical surroundings: ▪ Topography; ▪ Aspect; ▪ Other heritage assets (archaeological remains, buildings, structures, landscapes, areas of archaeological remains); ▪ Definition, scale and 'grain' of surrounding streetscape, landscape and spaces; ▪ Formal design e.g. hierarchy, layout; ▪ Orientation and aspect; ▪ Historic materials and surfaces; ▪ Openness, enclosure and boundaries; functional relationships and communications; ▪ Green spaces, trees and vegetation; and ▪ History and degree of change over time.
Experience of the asset: ▪ Surrounding landscape and town character; ▪ Views from, towards, through and across, including the asset; ▪ Visual dominance, prominence or role as focal point; ▪ Intentional intervisibility with other historic and natural features; ▪ Noise, vibration and other pollutants and nuisances; ▪ Tranquillity, remoteness, 'wildness'; ▪ Busyness, bustle, movement and activity; ▪ Scents and smells; ▪ Diurnal changes; ▪ Sense of enclosure, seclusion, intimacy or privacy; ▪ Land use; ▪ Dynamism and activity; ▪ Accessibility, permeability and patterns of movement; ▪ Degree of interpretation or promotion to the public - The rarity of comparable survivals of setting; ▪ Cultural associations; ▪ Celebrated artistic representations; and ▪ Traditions.

9.5.11 Once the sensitivity and contribution of the setting to the value of the heritage asset has been determined and the potential attributes of a Proposed Development identified, the level of adverse or beneficial impacts of a proposed development on the heritage asset through a change in setting needs to be evaluated. The judgement for the magnitude of impacts on the setting is based on professional judgement, experience on similar schemes and developments, and takes into regard the policies set out in the NPPF and the guidance provided by Historic England. The assessment criteria developed for assessing the level of impacts on heritage assets including settings (adverse or beneficial) is discussed below and presented in **Table 9.4**.

9.5.12 The magnitude of impact on a heritage asset from development is assessed based on the criteria outlined in **Table 9.4**. These criteria are adapted and developed from guidance outlined in the DMRB, which provide a detailed description of negative impacts on heritage assets from major to no change.

Table 9.4 Summary for Assessment of Impact Magnitude on Heritage Assets

Magnitude of Impact (change)		Description
Major	Adverse	▪ Loss of resource and/or quality and integrity of heritage asset and it setting. ▪ Severe damage to key characteristics, features or elements that contribute to value of the heritage asset and its setting
	Beneficial	▪ Large scale or major improvement of heritage asset and/or setting. ▪ Extensive restoration which reintroduces elements which contribute to the value of the heritage asset previously lost.
Moderate	Adverse	▪ Loss of resource and/or quality, but not adversely affecting the integrity of heritage asset and its setting. ▪ Partial loss or damage to key characteristics, features or elements that contribute to value of the heritage asset and its setting.
	Beneficial	▪ Benefit to, or addition of, key characteristics, features of elements of heritage asset and/or setting; and/or ▪ Improvement of elements which contribute to the value of the heritage asset previously lost.
Minor	Adverse	▪ Some measurable change in attributes that contribute to the value of heritage asset and its setting. ▪ Minor loss or alteration to key characteristics, features or elements that contribute to value of the heritage asset and its setting.
	Beneficial	▪ Minor benefit to, or addition of, key characteristics, features of elements of heritage asset and/or setting. ▪ Minor improvement of elements which contribute to the value of the heritage asset previously lost.
Negligible	Adverse	▪ Very minor loss or alteration to key characteristics, features or elements that contribute to value of the heritage asset and its setting.
	Beneficial	▪ Minor benefit to, or addition of, key characteristics, features of elements of heritage asset and/or setting. ▪ Minor improvement of elements which contribute to the value of the heritage asset previously lost.
No Change		▪ No loss or alteration of characteristics, features or elements; no observable impact in either direction.

9.5.13 The overall significance of the impact's effect on a heritage asset's value is determined by combining the value of the asset (see **Table 9.1**) with the magnitude of impact (see **Table 9.4**) which leads to a resultant significance of effect score (see **Table 9.5**).

Table 9.5 Significance of Effect Matrix

		Magnitude of Impact				
		Major	Moderate	Minor	Negligible	No Change
Value / Importance	**Very High**	Very Large	Large/ Very Large	Moderate/ Large	Slight	Neutral
	High	Large/ Very Large	Moderate/ Large	Moderate/ Slight	Slight	Neutral
	Medium	Moderate/ Large	Moderate	Slight	Neutral/ Slight	Neutral
	Low	Slight/ Moderate	Slight	Neutral/ Slight	Neutral/ Slight	Neutral
	Negligible	Slight	Neutral/ Slight	Neutral/ Slight	Neutral	Neutral
	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

9.5.14 For the purposes of the assessment, those effects assessed as moderate, large or very large are considered to be 'significant', and those assessed as slight or neutral are considered to be 'insignificant'.

9.5.15 While the above methodology provides a quantifiable matrix in determining value/sensitivity of heritage assets, magnitude of impacts and the significance of effects to heritage assets, professional judgement is applied to all stages of the above process.

Limitations

9.5.16 The potential for archaeological remains outlined in this Chapter and in the HEDBA (**Appendix 9.1**) are based on sources of information outlined in the 'Baseline Data Collection' Section presented above and additional reporting included as supporting appendices only.

9.5.17 The assessment of the potential for and value of currently unknown buried heritage assets has been undertaken using professional judgement of the baseline information and uses a reasonable worst-case scenario.

9.5.18 The data provided by OHER is not a record of all surviving heritage assets, but a record of the discovery of a wide range of archaeological and historical components of the historic environment. There is the potential for the presence of further, unrecorded, heritage assets and components of the historic environment.

9.6 Baseline Conditions

9.6.1 The HEDBA (**Appendix 9.1)** provides a comprehensive background of existing baseline conditions and a historic and archaeological background (see Section 5 of Appendix I), as such, the following text provides a summary only and should be read in conjunction with Appendix I for a full understanding of the Site and study area. A gazetteer outlining all known designated and non-designated heritage assets is provided in Appendix A of the HEDBA and the locations are shown in Appendix B of the HEDBA. A distribution map showing the extent of previous archaeological investigations across Graven Hill is shown on in Appendix C of the HEDBA.

The Site

Designated Heritage Assets

9.6.2 No designated heritage assets (World Heritage Sites, Scheduled Monuments, Listed Buildings, Registered Parks and Gardens or Conservation Areas) are located within the Site.

Non-Designated Heritage Assets

9.6.3 Three non-designated heritage assets are recorded within the Site. These comprise of features associated with the former Ministry of Defence (MoD) Bicester Central Ordnance Depot, which include:

- Monument record for the demolished P.O.W. Camp 657 [29709], within plot D35 of the southeast corner of the Site;
- Monument record for the railway tracks part of the Bicester Military Railway [29495], running across the Site E-W; and
- Historic building record for storage hanger Unit D2 and its six adjacent air raid shelters [27973], within the centre of the Site.

9.6.4 The assessment has identified potential direct physical impacts on all three non-designated heritage assets located within the Site. All three non-designated heritage assets are of low value.

Historic Landscape Characterisation (HLC) areas

9.6.5 There are four Historic Landscape Characterisation (HLC) areas present within the Site which are listed in Appendix E of the HEDBA. The HLC areas encompass industrial areas and railway communication routes associated with the former Bicester Central Ordnance Depot across the Site. The four HLC areas within the Site are fully assessed in the HEDBA (Appendix I, Section 5.2, Section 6.4 and Section 7.3).

9.6.6 A summary description and value of the four HLC areas within the Site is provided below:

- The west side of the Site is largely recorded as an industrial area, labelled as Military Depot at Graven Hill [HOX3673]. The current HLC is dated to the early-late 20th century, and is of low value attributed to the former MoD base's historical value;
- The east side of the Site is largely recorded as an industrial area [HOX3675]. The current HLC is dated to the 20th century and is of low value attributed to the former MOD base's historical value;
- Segments of the west side of the Site are recorded as railway communication routes [HOX3686], part of the wider former Bicester military railway network. The current HLC is dated to the 20th century and is of low value attributed to the former MOD base's historical value; and
- Segments of the east side of the Site are recorded as railway communication routes [HOX3685], part of the wider former Bicester military railway network. The current HLC is dates to the 20th century and is of low value attributed to the former MOD base's historical value.

9.6.7 All four current HLC areas within the Site have been identified to hold a low historic interest, due to their association with the former MoD base. A number of original features and structures have been removed from within the Site. The HLCs are of low value.

9.6.8 The assessment has identified potential direct physical impacts to the value of the HLCs within the Site.

The Surrounding Area (1 km study area)

9.6.9 Within the study area, designated and non-designated heritage assets are recorded.

Designated Heritage Assets

9.6.10 Designated heritage assets include three Scheduled Monuments and 13 Listed Buildings (one Grade II*, 12 Grade II).

9.6.11 The three Scheduled Monuments within the study area, include:

- Alchester Roman parade ground, access road and marching camp [1443650], located c. 500m southeast of the Roman settlement of Alchester and c. 792m west of the Site respectively;
- Ambrosden Churchyard Cross [1015166], which stands at the main approach to the church of St. Mary the Virgin in Ambrosden. It is located c. 855m southeast of the Site; and
- Wretchwick deserted Medieval settlement [1015549], located *c*. 948m northeast of the Site.

9.6.12 The assessment has identified no potential impacts on the setting of the Scheduled Monument of high value.

9.6.13 Listed Buildings within the study area include one Grade II* [1046525] and 12 Grade II designated heritage assets (see Appendix A within the HEDBA). The Listed Buildings range between the 12th-18th centuries in date, however, the majority of heritage assets date 18th century of the late Post-Medieval period.

9.6.14 The closest Listed Buildings in proximity to the Site include the two Grade II Listed Buildings of Wretchwick Farmhouse [1046521] and its associated barn [1046522], located *c*. 340m and *c*. 310m, respectively, northeast of the Site. The remaining Listed Buildings are located within a cluster to the southeast of the Site within the village of Ambrosden located from *c*. 800m, and an isolated heritage asset located *c*. 840m north of the Site, named Wretchwick Lodge [1046523].

9.6.15 The assessment has identified potential impacts on the setting and value of the following designated heritage assets of medium value:

- Listed Building of Wretchwick Farmhouse [1046521];
- Listed Building of the barn associated with Wretchwick Farmhouse [1046522]; and
- Listed Building of Wretchwick Lodge [1046523].

Non-Designated Heritage Assets

9.6.16 There are 34 non-designated heritage assets within study area.

9.6.17 These include monument records (Iron and Roman period settlements/occupation evidence, Roman field systems, Roman Akeman Street, unconfirmed Anglo-Saxon battle site, Medieval occupation evidence, Medieval field systems, Medieval to Post-Medieval burials, Post-Medieval recreational park, Post-Medieval earthworks, demolished former buildings, undated cropmarks), element records (undated earthworks, Medieval and Post-Medieval earthworks and discrete features, Bronze Age barrows/enclosure and demolition layers associated with the former WWII base) and archaeological findspots (Neolithic polished flint axe, Bronze Age spearhead, Roman pottery scatter, Roman coins, Medieval coin and Medieval pottery).

9.6.18 Non-designated heritage assets range in date from the Neolithic to Modern period. These heritage assets are distributed across the study area, with two concentrations located towards the southeast and west edges of the study area.

Historic Landscape Characterisation (HLC) areas

9.6.19 There are 50 Historic Landscape Characterisation (HLC) areas present within the study area which are listed in Appendix E of the HEDBA. The HLC areas broadly encompass enclosures, woodlands, rural settlements, recreational areas, communication routes and industrial areas. All HLC areas within the study area are fully assessed in the HEDBA (Appendix I, Section 5.2, Section 6.4 and Section 7.3).

9.6.20 HLC areas within the study area provide contextual information to the Site's immediate surrounding's land use. Three directly border the Site, which include:

- Two separate fields bordering the northeast and southeast edges of the Site, described as prairie/amalgamated field enclosures [HOX3680]. These fields are dated to the 20th century. This HLC holds no historic interest and is of negligible value;
- Field and farm bordering the centre eastern edge of the Site, labelled as Wretchwick Farm and described as a rural settlement [HOX3681]. Wretchwick Farm's HLC is dated to the 20th century. This HLC for this area holds no historic interest and is of negligible value; and
- A stretch of land which boarders the Site at its southeast corner, and runs approximately NE-SW, is recorded as woodland [HOX3683]. This woodland is dated to the 20th century. This HLC holds no historic interest and is of negligible value.

Archaeological Potential within the Site

Known Heritage Assets

9.6.21 The potential for known archaeological remains within the Site is limited to the three modern non-designated heritage assets recorded within the Site [29709, 29495 and 27973]. All three records are considered built heritage assets, associated with the former MoD Central Ordnance Depot within the Site and wider Graven Hill 'D-site' (armaments depot).

9.6.22 The P.O.W. camp has been demolished and only a concrete hardstanding area marking the footprint of plot D35 remains within the Site. Multiple segments of the Bicester Military Railway remain within the Site, running roughly E-W. The Unit D2 storage hanger and its six adjacent air raid shelters also remain extant within the Site.

9.6.23 Archaeological remains associated with the P.O.W. camp below the concrete hardstanding area of D35 are unlikely, due to the nature of the underlying stratigraphy for these concrete bases within the Site, observed during the John Moore Heritage Service's demolition archaeological watching brief in 2021, discussed in Section 5.1.3 of Appendix I. Although, no previous archaeological investigation has occurred within the footprint of plot D35 and the former P.O.W. camp, to confirm the potential for below ground archaeological remains associated with the former camp.

9.6.24 The remaining two modern heritage assets are also likely to only contain foundation deposits below ground related to the landscaping of the railway tracks and foundations of the D2 hanger building and adjacent air raid shelters. These would be of little to no archaeological interest.

Unknown Archaeological Remains

9.6.25 The area contained within the Site has been subjected to substantial disturbance and truncation of its natural stratigraphy from 20th century building development and landscaping practices associated with the former MoD base, since its initial construction during the early 1940s. Prior

to this, the Site was retained as an open area on the southern slopes of Graven Hill. The Site was utilised as agricultural land up until the construction of the Bicester Central Ordnance Depot.

9.6.26 A total of four previous archaeological investigation events are recorded within the Site, while a further 32 events are recorded in the study area.

9.6.27 Previous geophysical surveys undertaken within the Site [EOX6693 and EOX6781] and wider Graven Hill area [WIE001, WIE002 and EOX6781], have repeatedly demonstrated that non-intrusive prospection methods for detecting and identifying potential archaeological anomalies and features are impeded by the presence of widespread magnetic disturbance from ferrous material. This disturbance is associated with landscaping practices and the construction of building associated with the former Bicester Central Ordnance Depot.

9.6.28 Intrusive archaeological investigations within the study area to the north of Graven Hill and fields to the south of the Site have recorded ample evidence for the preservation of archaeological remains, primarily dating to the Iron Age – Roman periods.

9.6.29 Identified archaeological remains within the study area during previous archaeological investigations tend to be located from a shallow depth from *c*. 0.5m bgl, often shallowly cut into the natural geology. Hence, areas where truncation which exceeds *c*. 1.0m bgl or greater will likely have residual to no remaining potential for the survival of unknown archaeological remains.

9.6.30 The potential for unknown archaeological remains within the Site is identified to be **medium**, limited to open areas between remaining extant structures and the footprints of demolished structures associated with the former MoD base. Unknown archaeological remains are likely to date to the Iron Age – Roman periods onwards. Any encountered archaeological remains would likely be of up to **medium** value.

Baseline Evolution

9.6.31 The established historic environment baseline within the Site would not be subject to change if the Proposed Development and any other developments occurred.

9.6.32 Within the Site and study area, there is no expectation that the historic environment baseline conditions with regards to built heritage, and known and unknown archaeological remains will change if current land uses remain the same.

Sensitive Receptors

9.6.33 A number of sensitive receptors have been identified following the baseline review, as set out in as set out in **Table 9.6.** These are the heritage assets identified as being at risk of impact from the Proposed Development, either through direct physical impacts or through a change in setting.

Table 9.6 Sensitive Receptors

Receptor	Description	Value
Wretchwick Farmhouse	Designated grade II Listed Building. Farmhouse. Two-storeys and attic. Built early 18th and extended late 18th - early 19th century. Limestone rubble fabric with brick dressings and wooden lintels. Old plain-tile roof with brick gable stacks. L-shape in plan. Heritage asset located *c*. 340m northeast of the Site, at	Medium

	the north end of an enclosed a small farm complex.	
Barn associated with Wretchwick Farmhouse	Designated grade II Listed Building. Barn. Associated with Wretchwick Farmhouse and enclosed farm complex, built during the early 18th century. Coursed square limestone fabric with wooded lintels. Corrugated-asbestos roof. Three bay plan. Central doors on front side, lower opposed doors rear side. Included on HER for group value with Wretchwick Farmhouse [1046521]. Heritage asset located *c*. 310m northeast of the Site.	Medium
Wretchwick Lodge	Designated grade II Listed Building. Cottage. Single-storey. Built late 18th - early 19th century. Colourwashed square coursed limestone fabric with thatched roof. Brick ridge stack. Square in plan. Symmetrical front with central doorway. Hipped roof extends over a front verandah, supported by four wooden posts. Heritage asset located *c*. 840m north of the Site.	Medium
P.O.W. Camp 657	Non-designated monument. The site of a Second World War prisoner of war camp within Central Ordnance Depot plot D35, part of the armaments sub-depot 'D-site'. Operated as a working camp for German prisoners, who worked as labourers in the local area. Camp bolero structures demolished by 1945. Concrete slab base of plot visible on surface. No standing structures remain.	Low
Bicester Military Railway	Non-designated monument. Railway tracks located E-W across Site. Part of Britain's largest WWII military railway system at Bicester Central Ordnance Depot, Tracks still present within Site.	Low
Storage hanger D2 and adjacent six air raid shelters	Non-designated historic building. Storage hanger and six adjacent air raid shelters. Structures part of original WWII Bicester Central Ordnance depot.	Low
As yet unknown archaeological remains ranging from the prehistoric to modern periods.	The presence of as yet unknown archaeological remains ranging from the prehistoric to modern period cannot be precluded. As their nature, extent, condition and survival is currently unknown, their sensitivity would range between low to very high.	Unknown (likely neutral-medium)

9.7 Primary Mitigation

9.7.1 There is no embedded mitigation measures for archaeology and built heritage assets within the design.

9.8 Assessment of Likely Effects

Demolition and Construction

9.8.1 The approach to the demolition and construction of the Proposed Development and its proposed construction programme is presented in **Chapter 4:** Construction and Site Management.

9.8.2 During the construction phase, any activities that include ground disturbance have the potential to adversely impact any buried heritage assets within the Site. All direct, physical impacts on buried archaeological remains would be adverse and permanent. The likely indicative construction activities that could result in an impact are as follows:

- Site set-up – intrusive groundworks for welfare and logistical facilities;
- Sub-structure works - piling (if required) / groundworks;
- External landscaping – Intrusive groundworks associated with the landscaping of wildlife corridors;

9.8.3 There is a potential for temporary impacts and effects on built heritage assets in the vicinity of the Site due to a minor change in the setting as a result of the construction phase. The impacts are predicted to derive from temporary visual intrusions from construction related infrastructure, such as lighting, piling rigs, cranes, plant, along with a temporary increase in noise, ground vibration, construction related traffic and dust.

9.8.4 An outline Construction Environment Management Plan (CEMP) has only been produced at this time, as such no detailed construction programme was available for assessment.

Assessment of Likely Effects per Identified Sensitive Receptor

9.8.5 Wretchwick Farmhouse [1046521]:

- Temporary impacts would occur on Wretchwick Farmhouse's setting through the visibility of mobile plant (e.g. cranes) to the south of the heritage asset. The heritage asset is also likely to experience a negligible increase in noise during construction works (see **Chapter 14:** Noise and Vibration). The magnitude of impact would be **negligible adverse** and have a **slight** significance of effect.

9.8.6 Barn associated with Wretchwick Farmhouse [1046522]:

- Temporary impacts would occur on the barn's setting through the visibility of mobile plant (cranes) to the south of the heritage asset. The heritage asset is also likely to experience a negligible increase in noise during construction works (see **Chapter 14:** Noise and Vibration). The magnitude of impact would be **negligible adverse** and have a **slight** significance of effect.

9.8.7 Wretchwick Lodge [1046523]:

- No temporary adverse impacts have been identified for the heritage asset during demolition and construction.

9.8.8 P.O.W. Camp 657 [29709]:

- Permanent impacts to the surface and below ground remains associated with the demolished P.O.W. camp would occur during demolition and construction. This would occur through the removal of remaining surface and sub-surface features and deposits

associated with the P.O.W. camp. The magnitude of impact would be **major adverse** and have a **slight** significance of effect.

9.8.9 Bicester Military Railway [29495]:

- Permanent impacts to the remaining railway tracks and below ground remains associated with them would occur during demolition and construction. This would occur through the removal of the railway tracks and sub-surface deposits in places. This would have a slight significance of effect. The magnitude of impact would be **major adverse** and have a **slight** significance of effect.

9.8.10 Storage hanger D2 and six adjacent air raid shelters [27973]:

- Permanent impacts to the storage hanger, air raid shelters and below ground remains associated with them would occur during demolition and construction. This would occur through the demolition of standing structures and removal of sub-surface features and/or deposits. The magnitude of impact would be **major adverse** and have a **slight** significance of effect.

9.8.11 Unknown Archaeological Remains

- The assessment has established a potential for currently unknown buried heritage assets to be present within the Site. The value of any currently unknown buried heritage assets has been indicated to be of up to medium value, but would be dependent on the nature of the heritage asset and the quality of its preservation.

- Ground disturbance associated with construction works would have up to a **major adverse** impact on any buried heritage assets present, potentially resulting in a direct, permanent adverse effect of **neutral-moderate** significance, depending on the value of the heritage assets.

Complete and Operational Development

9.8.12 The Complete and Operational phase of the Proposed Development has the potential to have an impact on built heritage assets due to a change in setting. Change is anticipated to be as a result of a change in views to and from the heritage assets as a result of the introduction of the proposed buildings and other associated landscaping and infrastructure that are contained within the maximum parameters envelope.

Assessment of Likely Effects per Identified Sensitive Receptor

9.8.13 Wretchwick Farmhouse [1046521]:

- A permanent settings impact would occur to Wretchwick Farmhouse, from a minor change in views south towards the Site from the heritage asset. This change would be a minor change to the sensory experience of skyline views with the introduction of the upper parts of the Proposed Development's structures between existing treelines and hedgerows and the skyline above. The magnitude of impact would be **negligible adverse** and have a **slight** significance of effect.

9.8.14 Barn associated with Wretchwick Farmhouse [1046522]:

- A permanent settings impact would occur to the value of Wretchwick Farmhouse, from a minor change in views south towards the Site from the heritage asset. This change would be a minor change to the sensory experience of skyline views with the introduction of the upper parts of the Proposed Development's structures between existing treelines and hedgerows and the skyline above. The magnitude of impact would be **negligible adverse** and have a **slight** significance of effect.

9.8.15 Wretchwick Lodge [1046523]:

- No permanent adverse impacts would occur to the heritage asset at the completion and operational development phase given the distance of the asset and current screening.

9.8.16 P.O.W. Camp 657 [29709]:

- No permanent adverse impacts would occur to the heritage asset at the completion and operational development phase.

9.8.17 Bicester Military Railway [29495]:

- No permanent adverse impacts would occur to the heritage asset at the completion and operational development phase.

9.8.18 Storage hanger D2 and six adjacent air raid shelters [27973]:

- No permanent adverse impacts would occur to the heritage asset at the completion and operational development phase.

9.8.19 Unknown Archaeological Remains

- No permanent adverse impacts would occur to the heritage asset at the completion and operational development phase.

9.9 Secondary Mitigation and Enhancement

9.9.1 A programme of archaeological building recording has been undertaken in 2015 by Waterman (Waterman, 2015) across the entirety of the former MoD Bicester Central Ordnance Depot 'D' and 'E' sites. No further built heritage mitigation is required within the Site.

9.9.2 The magnitude of impact on unknown archaeological remains can be reduced through a programme of archaeological investigation and/or mitigation. The scope of any investigation/mitigation may need to be undertaken as staged approach, starting with a programme of archaeological evaluation (i.e. trial trenching) to confirm the archaeological potential. This would inform an appropriate approach to any mitigation required either before or during the demolition or construction phase. The scope and methodology for archaeological investigations would be set out in a Written Scheme of Investigation and agreed with the OCCAS. This could be secured by CDC through a suitably worded planning condition.

9.10 Residual Effects

Demolition and Construction

Assessment of Likely Effects per Identified Sensitive Receptor

9.10.1 Wretchwick Farmhouse [1046521]:

- No change to temporary **negligible adverse** impacts of **slight** significance of effect.

9.10.2 Barn associated with Wretchwick Farmhouse [1046522]:

- No change to temporary **negligible adverse** impacts of **slight** significance of effect.

9.10.3 Wretchwick Lodge [1046523]:

- No residual effects.

9.10.4 P.O.W. Camp 657 [29709]:

- No change to permanent **major adverse** impacts to the removal of remaining surface and below ground features/deposits of the demolished P.O.W. camp. This would remain a **slight** significance of effect, due to pre-existing mitigation in the form of an archaeological building recording programme of the MoD base in 2015.

9.10.5 Bicester Military Railway [29495]:

- No change to permanent **major adverse** impacts to the removal of the railway tracks associated with the former Bicester miliary railway. This would remain a **slight** significance of effect, due to pre-existing mitigation in the form of an archaeological building recording programme of the MoD base in 2015.

9.10.6 Storage hanger D2 and six adjacent air raid shelters [27973]:

- No change to permanent **major adverse** impacts to the removal of storage hanger D2, its six adjacent air raid shelters and below ground remains. This would remain a **slight** significance of effect, due to pre-existing mitigation in the form of an archaeological building recording programme of the MoD base in 2015.

9.10.7 Unknown Archaeological Remains

- No change of up to **major adverse** impacts on any buried heritage assets of **neutral-moderate** significance of effect.

Complete and Operational Development

Assessment of Likely Effects per Identified Sensitive Receptor

9.10.8 Wretchwick Farmhouse [1046521]:

- A permanent settings impact would remain to Wretchwick Farmhouse, from a minor change in views south towards the Site from the heritage asset. This change would be a minor change to the sensory experience of skyline views with the introduction of the upper parts of the Proposed Development's structures between existing treelines and hedgerows and the skyline above. The magnitude of impact would be **negligible adverse** and have a **slight** significance of effect.

9.10.9 Barn associated with Wretchwick Farmhouse [1046522]:

- A permanent settings impact would remain to the value of Wretchwick Farmhouse, from a minor change in views south towards the Site from the heritage asset. This change would be a minor change to the sensory experience of skyline views with the introduction of the upper parts of the Proposed Development's structures between existing treelines and hedgerows and the skyline above. The magnitude of impact would be **negligible adverse** and have a **slight** significance of effect.

9.10.10 Wretchwick Lodge [1046523]:

- No permanent adverse impacts would occur to the heritage asset at the completion and operational development phase given the distance of the asset and current screening.

9.10.11 P.O.W. Camp 657 [29709]:

- No permanent adverse impacts would occur to the heritage asset at the completion and operational development phase.

9.10.12 Bicester Military Railway [29495]:

- No permanent adverse impacts would occur to the heritage asset at the completion and operational development phase.

9.10.13 Storage hanger D2 and six adjacent air raid shelters [27973]:

- No permanent adverse impacts would occur to the heritage asset at the completion and operational development phase.

9.10.14 Unknown Archaeological Remains

- No permanent adverse impacts would occur to the heritage asset at the completion and operational development phase.

9.11 Cumulative Effects Assessment

9.11.1 Cumulative schemes identified to introduce additional impacts upon identified sensitive receptors, include:

- Wretchwick Way Site (Planning Application Ref. 16/01268/OUT)
- Symmetry Park Bicester Site (Planning Application Ref. 21/02861/OUT)

9.11.2 These schemes may introduce additional setting impacts to the Listed Buildings of Wretchwick Farmhouse [1046521], barn associated with Wretchwick Farmhouse [1046522] and Wretchwick Lodge [1046523].

9.11.3 Setting impacts comprise of the replacement of the northern rural open setting of the three designated built heritage assets with residential and commercial property areas. This would have **negligible adverse** impact on the wider setting of all three heritage assets, and would have a **slight** significance of effect.

9.12 Monitoring

9.12.1 No monitoring is required.

9.13 Comparison to 2014 Planning Permission

9.13.1 A comparison of the identified sensitive receptors and residual impacts between those of the Proposed Development and the Historic Environment ES Chapter for the 2011 ES has been undertaken. Receptors identified in the 2011 ES are shared with those identified receptors for the Site and 1 km study area in this ES Chapter.

9.13.2 Identified impacts for the sensitive receptors shared with the Proposed Development included:

- The Listed Buildings of Wretchwick Farmhouse [1046521], barn associated with Wretchwick Farmhouse [1046522] and Wretchwick Lodge [1046523], were identified to have potential impacts with no significant effect on the setting of the heritage assets. The identified potential impacts from the Proposed Development concur with this finding in that only a negligible setting impact of slight significance of effect would occur for Wretchwick Farmhouse and barn associated with Wretchwick Farmhouse. No impact would occur to Wretchwick Lodge from the Proposed Development.

- The structures associated with the MoD Bicester Central Ordnance Depot across Graven Hill were identified to be subject to demolish as part of the Extant Permission's development. Mitigation was proposed in the form of a record creation for standing structures across Graven Hill, including those within the Site. This was achieved via the Waterman 2015 archaeology building recording programme report (Waterman, 2015). This enabled potential impacts to be reduced to a none significant level, which has been determined to be a negligible impact with a slight significance of effect for non-designated heritage assets located within the Site from the Proposed Development.

- Buried archaeological remains were identified to be at risk of loss in areas to the northwest of Graven Hill where construction activities would occur from Phase 3 residential development, in identified areas as having archaeological potential. This same potential pattern of disturbance and loss of unknown archaeological remains from construction activities has been identified as a potential impact within the Site from the Proposed Development. The potential impact would be up to a major impact to archaeological remains, and be a neutral-moderate significance of effect.

9.13.3 No residual impacts were identified in **Chapter 10** Historic Environment for the 2011 ES.

9.14 References

- British Geological Survey, 2022. Geology of Britain Viewer. [Online]. Available at: http://mapapps.bgs.ac.uk/geologyofbritain3d/.

- Chartered Institute for Archaeologists, 2014. Standard and Guidance for historic environment desk-based assessment. [Online]. Available at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf.

- Cherwell District Council – North Oxfordshire, 2022a. Adopted Local Plan 1996 (November 1996). [Online]. Available at: https://www.cherwell.gov.uk/info/83/local-plans/373/adopted-local-plan-1996-november-1996.

- Cherwell District Council – North Oxfordshire, 2022b. Adopted Cherwell Local Plan 2011-2031 (Part 1). [Online]. Available at: https://www.cherwell.gov.uk/info/83/local-plans/376/adopted-cherwell-local-plan-2011-2031-part-1.

- Department for Levelling Up, Housing and Communities, 2014. Planning Policy Guidance - Historic environment. https://www.gov.uk/guidance/conserving-and-enhancing-the-historic-environment#overview-historic-environment.

- Department for Levelling Up, Housing and Communities, 2021. National Planning Policy Framework. [Online]. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2.

- Her Majesty's Stationery Office (HMSO), 1979. Ancient Monuments and Archaeological Areas Act 1979. [Online]. Available at: https://www.legislation.gov.uk/ukpga/1979/46.

- Her Majesty's Stationery Office (HMSO), 1990. Planning (Listed Buildings and Conservation Areas) Act 1990. [Online]. Available at: www.legislation.gov.uk/ukpga/1990/9/contents.

- Hey, G. & Hind, J., 2014. Solent-Thames Research Framework for the Historic Environment Resource Assessments and Research Agendas. Project Report. [Online]. Available at: https://library.thehumanjourney.net/2597/. Oxford Wessex.

- Historic England, 2008. Conservation Principles, Policies and Guidance for the sustainable Management of the Historic Environment. [Online]. Available at: https://historicengland.org.uk/images-books/publications/conservation-principles-

sustainable-management-historic-environment/conservationprinciplespoliciesandguidanceapril08web/.

- Historic England, 2017a. Historic Environment Good Practice Advice in Planning Note 3 (2nd edition) (GPA 3) – The Setting of Heritage Assets. [Online]. Available at: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets.

- Historic England, 2017b. The Setting of Heritage Assets. [Online]. Available at: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/.

- Historic England, 2019. Statements of Heritage Significance: Analysing Significance in Heritage Assets. [Online]. Available at: https://historicengland.org.uk/images-books/publications/statements-heritage-significance-advice-note-12/.

- Historic England, 2022. The National Heritage List for England (NHLE) – Search the List. [Online]. Available at: https://historicengland.org.uk/listing/the-list.

- National Highways, 2020a. Design Manual for Roads and Bridges: Section LA 104 – Environmental assessment and monitoring. [Online]. Available at: https://www.standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a.

- National Highways, 2020b. DMRB LA 106 - Cultural heritage assessment. [Online]. Available at: https://www.standardsforhighways.co.uk/dmrb/search/8c51c51b-579b-405b-b583-9b584e996c80.

- Waterman Infrastructure & Environment, 2015. *Graven Hill, MOD Bicester, Oxfordshire – Archaeological Building Recording*. Report Ref. WIB13983-106_R_1_1_3_TM.

10 Landscape and Visual Resources

10.1 Introduction

10.1.1 RPS has been commissioned by Graven Hill Purchaser Ltd. to prepare this Landscape and Visual Impact Assessment (LVIA) of the Proposed Development. The objective of the LVIA is to identify the likelihood of the Proposed Development giving rise to significant landscape and/or visual effects, and to propose effective and appropriate measures to mitigate such effects.

10.1.2 All supporting figures referred to in this chapter are provided under **Appendix 10.1**.

10.2 Policy Context, Legislation, Guidance and Standards

Local Development Framework

10.2.1 The Site lies within Cherwell District, Oxfordshire. The relevant local policies are set out in The Cherwell Local Plan (Adopted July 2015, readopted December 2016)

The Cherwell Local Plan

10.2.2 Policies with potential to be of relevance to the impacts of the Proposed Development on landscape character and visual receptors are set out in paragraphs 102.3 to 10.2.19, below. The reasons for whether they (or parts of) are/are not relevant to this policy appraisal are also given.

Policy ESD 13: Local Landscape Protection and Enhancement

10.2.3 The accompanying text explains that Cherwell District Council, through Policy ESD13, *"seeks to conserve and enhance the distinctive and highly valued local character of the entire District"* (paragraph B.248).

10.2.4 It also notes that the council will use the Campaign for the Protection of Rural England (CPRE) tranquillity mapping to assess areas of tranquillity. However, it should be noted that the CPRE tranquillity mapping (Figure 10.6) dates from 2007 and that development around Bicester has progressed and that Graven Hill is an allocated development site (see Strategic Policy Bicester 2, below). The CPRE tranquillity mapping does not reflect the current situation.

10.2.5 The text explains that opportunity for landscape enhancement could be provided on Council-owned land or on other land with agreement (B.249). It notes that boundaries of new development and the surrounding countryside are particularly important and should be treated sensitively (B.250).

10.2.6 The most recent character assessment is the Oxfordshire Wildlife and Landscape Study (OWLS) (B.251). It notes that important landscape features, such as Muswell Hill, the River Cherwell and Otmoor, create a sense of place. Cherwell Council's Landscape Evidence Base documents identify the key landform and landscape features around Bicester as:

- *"The* open and agricultural setting and identity of the outlying villages…many with historic cores;
- Specific features at Bicester noted for their value include those showing notable 'time depth 'including Former RAF Bicester, Wretchwick deserted medieval village, Bignell Park and the Roman roads;
- Graven Hill and Blackthorn Hill which contrast with the relatively flat surrounding landform; and

- The River *Ray floodplains"* (B.252).

10.2.7 The policy seeks *"to retain woodlands, trees, hedges, ponds, walls and any other features that are important to the character or appearance of the local landscape".* Proposals that would result in the loss of such features won't be permitted unless their loss can be justified by appropriate mitigation and/or compensatory measures (B.253). To conserve and enhance landscape character, the type, scale and design of development will be carefully controlled, taking account of advice in the Council's Countryside Design Summary SPG and the OWLS (B.254).

10.2.8 The Policy ESD13 text emphasises all of the above aspirations and also explains that *"Proposals will not be permitted if they would:*

- *C*ause undue visual intrusion into the open countryside;
- Cause undue harm to important natural landscape features and topography;
- Be inconsistent with local character;
- Impact on areas judged to have a high level of tranquillity;
- Harm the setting of settlements, buildings, structures or other landmark features; or
- Harm t*he historic value of the landscape."*

Policy ESD 15: The Character of the Built and Historic Environment

10.2.9 Each of the three urban areas within Cherwell District, of which Bicester is one, display their own unique characters (B.261). The accompanying text to the policy notes that it is important to provide a framework for considering the quality of proposed development, to achieve locally distinct design which reflects and respects the context within which it is to be situated (B.264). The text notes that design standards are equally important for commercial, as well as residential development (B.266).

10.2.10 The policy notes that *"successful design is founded on an understanding and respect for an area's unique built, natural and cultural context",* and that *"new development will be expected to complement and enhance the character of its context through sensitive siting, layout and high quality design."* It emphasises that all new development is required to meet high design standards, and notes that *"where development is in the vicinity of any of the District's distinctive natural or historic assets, delivering high quality design that complements the asset will be essential."* Graven Hill is such an asset, as set out in Policy ESD 13 (paragraph 2.6, above). Amongst other matters, new development proposals should:

- *"…be* designed to improve the quality and appearance of an area and the way it functions;
- Contribute positively to an area's character and identity by creating or reinforcing local distinctiveness and respecting local topography and landscape features, including skylines, valley floors, significant trees, historic boundaries, landmarks, features or views…
- Reflect or, in a contemporary design response, re-interpret local distinctiveness, including elements of construction, elevational detailing, windows and doors, building and surfacing materials, mass, scale and colour palette; and
- Integrate *and enhance green infrastructure and incorporate biodiversity enhancement features where possible…well designed landscape schemes should be an integral part of development proposals…"*

10.2.11 The policy requires that the *"design of all new development will need to be informed by an analysis of the context, together with an explanation and justification of the principles that have*

informed the design rationale" this is to be set out in the Design and Access Statement that accompanies the planning application. On major developments design must be addressed in the pre-application process. On major developments design codes are required to ensure appropriate character and high-quality design is delivered throughout.

10.2.12 The explanatory text notes that securing new development that can positively contribute to the character of its local environment is therefore of key importance (B.268). The text acknowledges that a balance is to be struck between making the best use of land and vibrant sustainable neighbourhoods (B.270). Development in rural areas should reinforce locally distinct character, by being sensitive with location, scale, materials and design (B.271).

Policy ESD 17: Green Infrastructure

10.2.13 Green corridors include not only publicly accessible areas, but also river corridors or hedgerows, which provide opportunities for wildlife migration. Development proposals are expected to retain and enhance existing green corridors (paragraph B.279) with the aim of reducing fragmentation of habitats (B.280). New landscaped areas, particularly in the case of the strategic sites, of which Graven Hill is one, will be required to assimilate development into the landscape and assist in the transition between urban edge and rural areas (B.280).

10.2.14 The text accompanying the policy notes that a county-level Green Infrastructure Strategy was being formulated at the time the Local Plan was adopted (B.281).

10.2.15 The requires the District's Green Infrastructure (GI) to be maintained and enhanced, through a series of measures, including:

- pursuing opportunities for GI;
- protecting and enhancing existing GI;
- improving connectivity;
- ensuring GI is integral to new development;
- detail proposals for maintenance and management.

Strategic Development Policy Bicester 2 - Graven Hill

10.2.16 The explanatory text to the policy notes that the Site at Graven Hill, forms part of the extensive MoD site to the south and northeast of Bicester. The Site was a major logistics and distribution hub for the MoD (paragraph C.51). The presence of existing infrastructure and landscaping are noted (C.55) some of which has now been removed.

10.2.17 The policy requires development to increase public access, with public open space to include the hilltop area.

10.2.18 The policy requirements include:

- *"A w*ell designed approach to the urban edge, which relates development at the periphery to its rural setting;
- Development that respects the landscape setting and that demonstrates enhancement, restoration or creation of wildlife corridors, and that respects the relationship between the woodland and the open areas of Graven Hill and the development through the creation of 'green fingers' leading into the development area;
- Careful consideration of open space and structural planting around the site to achieve overall improvement in the landscape and visual impact of the site;

- Development proposals to be accompanied and influenced by landscape/visual and heritage impact assessments;
- Biodiversity protection and enhancement measures should be implemented…
- Significant sustainable access provision…
- Provision of opportunities for Green Infrastructure links…
- An Ecological and Landscape Management Plan to be provided to manage the woodland and other habitats on site; and
- Careful design of employment units onsite to limit adverse visual impact on the new develop*ment and the wider area."*

10.2.19 A master plan for Bicester 2 Graven Hill was approved with conditions under the Outline Planning Application (August 2014).

Other Material Considerations

National Planning Policy Framework

10.2.20 The National Planning Policy Framework (NPPF) published in July 2021 sets out the Government's planning policy for England and how it expects that policy to be applied. The NPPF emphasises the importance of sustainable development. Paragraph 7 states:

"The purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs. At a similarly high level, members of the United Nations – including the United Kingdom – have agreed to pursue the 17 Global Goals for Sustainable Development in the period to 2030. These address social progress, economic well-being and environmental protection."

10.2.21 NPPF paragraph 8, has three overarching objectives, this includes b) a social objective, which promotes well-designed, beautiful and safe places, and c) an environmental objective, to protect and enhance our natural, built and historic environment. Paragraph 9 explains that decisions should take into account of local character, needs and opportunities of each area.

10.2.22 NPPF paragraph 10 advises that:

"*So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development (paragraph 11)."*

10.2.23 Paragraph 11 explains that *"plans and decisions should apply a presumption in favour of sustainable development."* For decision-taking this means d) granting permission unless:

"i. the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed. 7"

10.2.24 Footnote 7 lists those sites of particular importance. For landscape these are: Green Belt; Local Green Space; Areas of Outstanding Natural Beauty; National Parks; and Heritage Coasts.

10.2.25 Section 3. Plan-making, explains that strategic policies *"should set out a strategy for the pattern, scale and design quality of places, and make 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 mitigation and adaption."*

10.2.26 Paragraph 28. Explains that non-strategic policies should be used to set out detailed policies for specific areas. This has been done in the case of Graven Hill.

10.2.27 Section 8. Promoting healthy and safe communities, paragraph 92, b) and c) require that policies and decisions should aim to achieve places that are attractive, well-designed, clear with legible pedestrian and cycle routes that enable healthy lifestyles, e.g. by the provision of safe and accessible green infrastructure. The provision of cycle paths and pedestrian routes is also promoted and prioritised in Section 9, Promoting sustainable transport, paragraph 112.

10.2.28 Section 12. Achieving well-designed places, is concerned with balancing the aspirations of both the developer and communities to create high quality, beautiful and sustainable buildings and places (paragraph 126). Paragraph 127 explains that design policies should be grounded in in an understanding of each area's defining characteristics and special qualities, this is repeated in paragraph 128.

10.2.29 NPPF, paragraph 130 requires policies and decisions to ensure that developments, amongst other things: a) add to the overall quality of the area, b) are visually attractive as a result of good architecture and layout and appropriate and effective landscaping, c) are sympathetic to local character and landscape setting, d) establish or maintain a strong sense of place, using the arrangements of streets, spaces, building types and materials to create attractive, welcoming and distinctive places to work, and e) optimise the potential of the site to include green and other public space.

10.2.30 Paragraph 131 notes that *"trees make an important contribution to the character and quality of urban environments".* Planning policies should *"ensure that new streets are tree-lined" and that "existing trees are retained wherever possible."* Paragraph 134 explains that development that is not well-designed should be refused.

10.2.31 Section 15 Conserving and enhancing the natural environment, paragraph 174 requires that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

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" … "trees and woodland."

10.2.32 Section 15 Conserving and enhancing the natural environment, paragraph 175 explains:

"Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital…"

10.2.33 Paragraph 185, requires policies and decisions to ensure that new development is appropriate for its location and the wider area, including: c) limiting the impact of light pollution from artificial light on local amenity, dark landscapes and nature conservation.

National Planning Practice Guidance

10.2.34 The NPPF is supported by the National Planning Practice Guidance (DCLG, 2014) a web-based guidance resource that was introduced in 2014, to bring together existing planning practice guidance for England in an accessible and useable way. The Natural Environment section was updated in July 2019. Only those sections of relevance to the Site are discussed below.

Natural environment – landscape (21st July 2019)

10.2.35 NPPG at paragraph: 036 (Reference ID: 8-036-20190721) explains the NPPF requires that:

"plans should recognise the intrinsic character and beauty of the countryside, and that strategic policies should provide for the conservation and enhancement of landscapes. This can include nationally and locally-designated landscapes but also the wider countryside."

10.2.36 In the same paragraph, the NPPG requires that where landscapes have a particular, local value planning policies should *"identify their special characteristics and be supported by proportionate evidence."* In addition, *"Plans can also include policies to avoid adverse impacts on landscapes and to set out necessary mitigation measures…"* Also *"The cumulative impacts of development on the landscape need to be considered carefully."*

10.2.37 In the same paragraph the NPPG refers to using Landscape and Visual Impact Assessments to demonstrate the likely effects of a proposed development on the landscape. The baseline character of the Site is described in this LVIA at section 10.6. The likely landscape and visual effects are assessed in section 10.7 with potential cumulative effects dealt with at section 10.14.

Planning for well-designed places (1st October 2019)

10.2.38 The guidance refers to The National Design Guide, which *"sets out the characteristics of well-designed places and demonstrates what good design means in practice."* The National Design Guide sets out factors that contribute to good design under 10 headings (Paragraph: 001 Reference ID: 26-001-20191001). These are explored in more detail in paragraph 2.43, below.

10.2.39 The NPPG explains that master plans set the vision for an area considered for development (paragraph: 006 Reference ID: 26-006-20191001).

10.2.40 The role of parameter plans is considered at paragraph: 011 Reference ID: 26-011-20191001. It explains that parameter plans *"can include information on the proposed land use, building heights, areas of potential built development, structure of landscape and green infrastructure, access and movement and other key structuring and placemaking components."*

Light pollution (1st November 2019)

10.2.41 The NPPG explains that factors that are relevant when considering when light shines, are: considering turning off or dimming light to minimise visual impact on humans, flora and fauna (paragraph: 004 Reference ID: 31-004-20191101).

10.2.42 Factors relevant to how much the light shines are considered at paragraph: 005 Reference ID: 31-005-20191101. Factors include, necessity, amount, glare, the colour of the light, as well as who and/or what might be affected by it. The ecological impacts of light are also considered at paragraph: 006 Reference ID: 31-006-20191101.

The National Design Guide

10.2.43 The National Design Guide addresses the question of how we recognise well-designed places, by outlining and illustrating the Government's priorities for well-designed places in the form of ten characteristics: Context; identity; built form; movement; nature; public spaces; uses; homes and buildings; resources; and, lifespan. While predominantly concerned with residential development, the basic principles are applicable to most types of new development.

10.3 Consultation

10.3.1 Judith Ward, Landscape Officer for Cherwell District and South Northamptonshire District Councils, provided advice on the potential visual impact in terms of the design and façades of the buildings, by email on the 31st January 2022, but not on the representative viewpoint locations.

10.3.2 Cherwell Council was contacted on the 8th March 2022 for agreement to candidate representative viewpoints, as marked on a ZTV. David Lowin, Principal Planning Officer at CDC responded:

"Having reviewed the plan attached to you email [ZTV with candidate representative viewpoints] *and in the absence of readily available current support for landscape advice in house, I think that the overall areas shaded* [areas covered by the ZTV] *are likely to be suitable, however clearly the area to the East of the site where there is a listed residential former farm complex* [Wretchwick Farm] *and a chicken farm need to be particularly included. I presume that your landscape consultant will adhere to the protocols for the submission of Landscape visual impact assessments in support of planning applications. On heritage matters I am also presuming that your study will identify all relevant public footpaths/ bridleways and all heritage assets. and provide commentary on the impact of the development of both footpaths/Bridleways and designated heritage assets"*

10.3.3 The items in CDC response have been addressed in this assessment. However, no response was received on specific candidate representative viewpoints.

10.4 Scope of Assessment

10.4.1 As noted in paragraph 10.1.3, the objective of the LVIA is to identify the likelihood of the Proposed Development giving rise to significant landscape and/or visual effects, and to propose effective and appropriate measures to mitigate such effects. The likely significant landscape and visual effects and those judged to not be significant are listed below and detailed in the relevant sections.

Not Significant Effects

10.4.2 Those landscape effects judged not to have the potential to be significant are:

- Effects on National Character Areas, due to the size of the Site and the large size of the National Character Area in which it sits

10.4.3 Those Visual effects judged not to have the potential to be significant are:

- Effects on Low sensitivity receptors, e.g. people in motor vehicles, as the proposed development is similar to that already present on the site; and
- Effects on people using some public rights of way to the north, east and west, particularly those over 5 km from the Site, due to topography and intervening vegetation.

Likely Significant Effects

10.4.4 Those landscape effects judged to have the potential to be significant are:

- Effects on County and District-level Landscape Character areas; and
- Effects on the landscape features, elements and characteristics of the Site.

10.4.5 Those visual effects judged to have the potential to be significant are:

- Effects experienced by High and Medium sensitivity receptors;
- Effects experienced by visual receptors at elevated locations; and
- Effects experienced by visual receptors within 5 km from the Site.

10.5 Methodology

Assessment Methodology

10.5.1 The method used to undertake this LVIA is detailed at Appendix A Landscape and Visual Impact Assessment Methodology A, as summarised in Diagram 10.1, below of this report. It is based on the following documents:

- Landscape Institute and Institute of Environmental Management and Assessment, Guidelines for Landscape and Visual Impact Assessment: Third Edition (May 2013).
- Landscape Institute Technical Guidance Note 02/21: Assessing landscape value outside national designations (May 2021).
- Landscape Institute, Landscape Institute *Technical Guidance Note 06/19 Visual Representation of Development Proposals* (September 2019).

10.5.2 The LVIA provides an overview of the existing or baseline conditions, and then assesses the potential significant effects of the proposed development upon baseline conditions during its construction and operational phases. This is undertaken through consideration of the sensitivity of the resources/receptor to the impact of the Proposed Development.

10.5.3 The introduction of built form to a site will result in landscape and/or visual change. This report identifies whether these changes are significant, or not, in terms of the physical landscape and its character, and when viewed by visual receptors (people) from the surrounding countryside.

Study Area

10.5.4 For the purposes of this LVIA the Study Area extends to 10 km from the outer edges of the Site. While it will be theoretically possible to see the Proposed Development outside the Study Area, given the site location and nature of development, there is no scope for significant effects to arise beyond this distance. Sensitive landscape and visual receptors within the Study Area as defined by the extent of the Zone of Theoretical Visibility (ZTV) have been included for assessment in the LVIA.

Baseline Data Collection

10.5.5 For this LVIA, a desktop review of published information, including landscape character assessments, OS data, online mapping data, aerial photography and local planning documents was undertaken. To further inform the LVIA, representative views looking towards the Site were selected. Figures have been produced to support the LVIA, including:

- Figure 10.1: Landscape Designations;
- Figure 10.3: Landscape Character Areas with Zone of Theoretical Visibility (ZTV);
- Figures 10.57 to 10.74: Photomontages (Parameter Extent);
- Figure 10.75 Parameters Plan;
- Figure 10.76: Indicative Landscape Strategy (for illustration only); and
- Figures 10.77 and 10.78: Comparative ZTVs.

10.5.6 A site visit was carried out on 25th March to record the character and views from the Site. Fieldwork was also undertaken on the 9th and 10th March and the 1st April to illustrate views from publicly accessible locations, as well as to gain an understanding of the local landscape

character. The surveys assisted in the assessment of the potential effects on the landscape character of the Site and the surrounding landscape character, as well as on visual receptors.

10.5.7 The relevant planning background and policies are outlined below in section 10.2 of this chapter. The landscape baseline is outlined in section 10.6 together with the visual baseline.

Assessment

Assessment Criteria and Assignment of Significance

Relevant Guidance

10.5.8 As a matter of best practice, this Landscape and Visual Impact Assessment (LVIA) has been undertaken based on the relevant guidance on LVIAs described in the following documents:

- Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA) (Landscape Institute and Institute of Environmental Management and Assessment, 2013);
- Landscape Character Assessment: Guidance for England and Scotland (The Countryside Agency and Scottish Natural Heritage, 2002);
- An Approach to Landscape Character Assessment (Natural England, 2014);
- Technical Guidance Note 2/19: Residential Visual Amenity Assessment (Landscape Institute, 2019);
- Technical Guidance Note 06/19: Visual Representation of Development Proposals (Landscape Institute, 2019); and
- Technical Guidance Note 02/21: Assessing landscape value outside national designations (Landscape Institute, 2021).

Distinction Between Landscape and Visual Effects

10.5.9 As set out in the GLVIA, paragraph 2.21, landscape and visual effects are assessed separately, although the procedure for assessing each is closely linked. A clear distinction has been drawn between landscape and visual effects as described below:

- Landscape effects relate to the effects of the Proposed Development on the physical and other characteristics of the landscape and its resulting character and quality.
- Visual effects relate to the effects on views experienced by visual receptors (people) e.g. footpath users, tourists, and on the visual amenity experienced by those people.

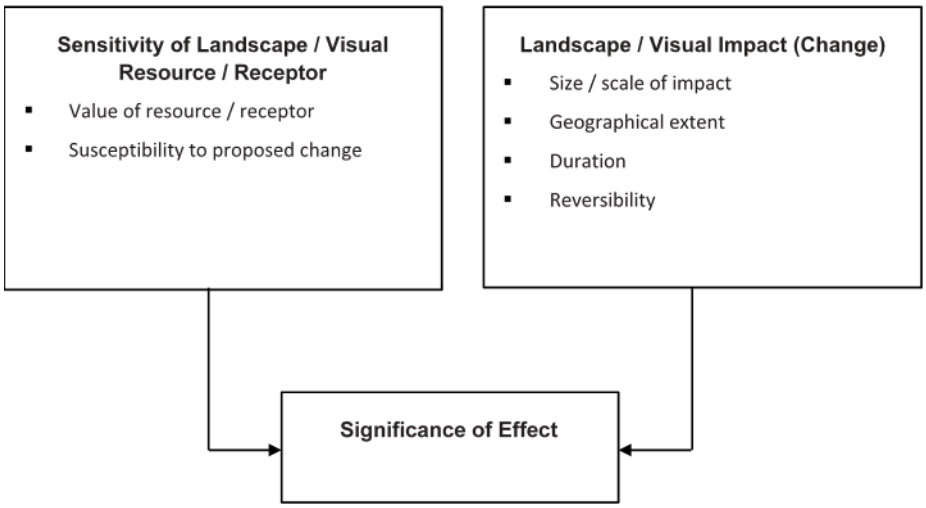
Assessment Criteria and Assignment of Significance of Effects

10.5.10 The GLVIA sets out broad guidelines rather than detailed prescriptive methodologies. The methodologies tailored for the assessment of this development is based on GLVIA guidance, which recommends that an assessment *"concentrates on principles and process"* and *"does not provide a detailed or formulaic recipe"* to assess effects, it being the *"responsibility of the professional to ensure that the approach and methodology are appropriate to the task in hand"* (preface to GLVIA). The effects on the landscape resources or visual receptors (people) are assessed by considering the proposed change in the baseline conditions (the impact of the proposal) against the type of landscape resource or visual receptor (including the importance and sensitivity of that resource or receptor). Unless stated otherwise, winter baseline conditions are assumed when deciduous vegetation is devoid of foliage. The methodology is set out in detail at paragraphs 10.5.8 to 10.5.27 of this chapter and summarised in Diagram 10.1, below.

These factors are determined through a combination of quantitative (objective) and qualitative (subjective) assessment using professional judgement.

With regards valency and visual effects, an unfavourable position has been taken. That is, that of a person who is not in favour of the proposed development. Hence the significance of effect is adverse, if you can see even a small part of the proposed development. However, if the view is improved, by landscape mitigation, effects might be considered to be neutral or perhaps even beneficial.

Diagram 10.1: Assessment Methodology Summary



10.5.11 Using a combination of objective evidence and professional judgement, the potentially significant effects on the landscape and visual resources and receptors during the operational phase of the Proposed Development are assessed below. Only those resources and receptors that have the potential to experience significant effects are considered

10.5.12 In this assessment, those effects of Moderate and below are not considered to be significant. Those effects to be Major and above are judged to be significant.

Sensitivity of Landscape Receptors

10.5.13 The sensitivity of a landscape receptor is a combination of "*judgements of their susceptibility to the type of change or development proposed and the value attached to the landscape*" (GLVIA, para 5.39). For the purpose of this assessment, susceptibility and value of landscape receptors are defined as follows:

- Landscape susceptibility: "the ability of the landscape receptor (whether it be the overall character or quality/condition of a particular landscape type or area, or an individual element and/or feature, or a particular aesthetic and perceptual aspect) to accommodate the proposed change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies" (GLVIA, para 5.40).

- Value of the landscape receptor: "The value of the Landscape Character Types or Areas that may be affected, based on review of designations at both national and local levels, and, where there are no designations, judgements based on criteria that can be used to establish landscape value; and, the value of individual contributors to landscape character, especially *the key characteristics, which may include individual elements of the landscape, particularly landscape features, notable aesthetic, perceptual or experiential qualities, and combinations of these contributors"* (GLVIA, para 5.44).

10.5.14 Sensitivity is not readily graded into bands. However, descriptions of landscape susceptibility and value are set out in Table 10.1 below.

Table 10.1: Definitions of Landscape Sensitivity

Sensitivity	Typical descriptors Landscape resource/receptor - Susceptibility	Typical descriptors Landscape resource/receptor - Value
Very High	Exceptional landscape quality, no or limited potential for substitution. Key elements / features well known to the wider public.	Nationally/internationally designated/valued landscape, or key elements or features of nationally/internationally designated landscapes.
High	Strong/distinctive landscape character; absence of landscape detractors.	Regionally/nationally designated/valued countryside and landscape features.
Medium	Some distinctive landscape characteristics; few landscape detractors.	Locally/regionally designated/valued countryside and landscape features.
Low	Absence of distinctive landscape characteristics; presence of landscape detractors.	Undesignated countryside and landscape features.
Negligible	Absence of positive landscape characteristics. Significant presence of landscape detractors.	Undesignated countryside and landscape features.

Sensitivity of Visual Receptor

10.5.15 Visual receptors are always people. The sensitivity of each visual receptor (the particular person or group of people likely to be affected at a specific viewpoint) "*should be assessed in terms of both their susceptibility to change and in views and visual amenity and also the value attached to particular views*" (GLVIA, para 6.31). For the purpose of this assessment, susceptibility and value of visual receptors are defined as follows:

- Visual susceptibility: *"The susceptibility of different visual receptors to changes in views and visual amenity is mainly a function of: The occupation or activity of people experiencing views at the particular locations; and, the extent to which their attention or interest may therefo*re be focused on the views and the visual amenity they experience at particular locations" (GLVIA, para 6.32).

- Value of views: Judgements made about the value of views should take account of: "recognit*ion of the value attached to particular views, for example in relation to heritage assets, or through planning designations; and, indicators of value attached to views by visitors, for example through appearances in guidebooks or on tourist maps, provision of facilities for their enjoyment (such as parking places, sign boards or interpretive material) and references to them in literature or art…"* (GLVIA, para 6.37).

10.5.16 Sensitivity is not readily graded in bands and GLVIA notes, with regards to visual sensitivity, that the division of who may or may not be sensitive to a particular change "*is not black and white and in reality, there will be a gradation in susceptibility to change*" (GLVIA, para 6.35). In order to provide both consistency and transparency to the assessment process, however, Table

10.2, below defines the criteria which have guided the judgement as to the intrinsic susceptibility and value of the resource/receptor and subsequent sensitivity to the proposed development.

Table 10.2: Definitions of Visual Sensitivity

Sensitivity	Typical descriptors Visual resource/receptor - Susceptibility	Typical descriptors Visual resource/receptor - Value
Very High	Observers, drawn to a particular view, including those who have travelled from around Britain and overseas to experience the views.	See paragraphs 10.5.13 to 10.5.14, above
High	Observers on the public rights of way network in the countryside are more sensitive to visual change.	See paragraphs 10.5.13 to 10.5.14, above
Medium	Observers enjoying the countryside from vehicles on quiet/promoted routes or pedestrians on less scenic/urban rights of way are moderately sensitive to visual change.	See paragraphs 10.5.13 to 10.5.14, above
Low	Observers in vehicles or people involved in outdoor activities where attention is not focused on landscape are less sensitive to visual change.	See paragraphs 10.5.13 to 10.5.14, above
Negligible	Observers in vehicles or people involved in frequent or frequently repeated activities are less sensitive to visual change.	See paragraphs 10.5.13 to 10.5.14, above

Magnitude of Impact

Magnitude of Impact on Landscape Receptors

10.5.17 The magnitude of impact or change affecting landscape receptors depends on the size or scale, geographical extent of the area influenced and its duration and reversibility. These factors are described below:

- Size or scale: *"The extent of the existing landscape elements that will be lost, the proportion of the total extent that this represents and the contribution of that element to the character of the l*andscape…; the degree to which aesthetic or perceptual aspects of the landscape are altered either by removal of existing components of the landscape or by addition of new ones…" and, "whether the effect [impact] changes the key characteristics of the landscape, which are critical to its distinctive character" (GLVIA, para 5.49).

- Geographical extent: Distinct from scale or size, this factor considers the geographical area over which the landscape impacts will be felt, it might, for example, be a moderate loss of

landscape receptors or character over a large area, or a large loss of receptors or character over a very localised area. At para 5.50 GLVIA notes that *"in general effects* [impacts] *may have an influence at the following scales, although this will vary according to the nature of the project and not all may be relevant on every occasion: at the site level within the development site itself; at the level of the immediate setting of the site; at the scale of the landscape type or character area within which the proposal lies; and, on a larger scale, influencing several landscape types or character areas."* For the purposes of this LVIA, the assessment considers the impact of the proposed development on the published landscape character areas, both at local (Cherwell District Council and Oxfordshire County) and national level, i.e. the third and fourth landscape scales.

10.5.18 Duration and reversibility: Duration is categorised as short, medium or long-term. GLVIA explains that as there are no standard lengths of time within these categories, the appraisal must state what these are and why these have been chosen (GLVIA, para 5.51). Reversibility is described as *"a judgement about the prospects and practicality of the particular effect being reversed in, for example, a generation"* (GLVIA, para 5.52). Projects can be considered to be permanent (irreversible), partially reversible or fully reversible. For the purposes of this assessment the proposed development is considered to be permanent.

Magnitude of impact on visual receptors

10.5.19 As with the magnitude of landscape impacts, the magnitude of impact or change affecting visual receptors depends on the size or scale, geographical extent of the area influenced and its duration and reversibility. These factors are described below:

- Size or scale: Judgements need to take account of: *"the scale of the change* [impact*] in the view wit*h respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the proposed development; the degree of contrast or integration of any new features or changes in the landscape with existing or remaining landscape elements and characteristics in terms of form, scale and mass, line, height, colour and texture; and, the nature of the view of the proposed development, in terms of the relative amount of time over which it will be experienced and whether views will be full, partial or glimpses" (GLVIA, para 6.39).

- Geographical extent: This will vary from viewpoint to viewpoint and will reflect: *"the angle* [orientation] *of view in relation to the main activity of the receptor; the distance of the viewpoint from the proposed development; and, the extent of the area over which the changes* [impacts] *would be visible"* (GLVIA, para 6.40).

10.5.20 Duration and reversibility of visual effects: As with landscape impacts, duration should be categorised as short, medium or long-term and projects considered to be permanent (irreversible), partially reversible or fully reversible (GLVIA, para 6.41). For the purposes of this appraisal the impacts on views of the proposed development are considered to be permanent.

10.5.21 The magnitude of the predicted impact has been described using criteria outlined above and Diagram 10.1 and detailed in methodology below. Magnitude of impact has been classified on a four-point scale (Large, Medium, Small and Negligible,). The definitions of terms relating to the magnitude of impact are set out in Table 10.3, below.

Table 10.3: Example Definitions of Magnitude of Impact

Magnitude of Impact	Typical descriptors – Landscape Resource/Receptor	Typical descriptors – Visual Receptor/Resource
Large	Total loss or addition or/very substantial loss or addition of key elements/features/patterns of the baseline i.e., pre-development landscape and/or introduction of dominant, uncharacteristic elements with the attributes of the receiving landscape.	Complete or very substantial change in view, dominant involving complete or very substantial obstruction of existing view or complete change in character and composition of baseline, e.g., through removal of key elements.
Medium	Partial loss or addition of or moderate alteration to one or more key elements/features/patterns of the baseline i.e., pre-development landscape and/or introduction of elements that may be prominent but may not necessarily be substantially uncharacteristic with the attributes of the receiving landscape.	Moderate change in view: which may involve partial obstruction of existing view of partial change in character and composition of baseline, i.e. pre-development view, through the introduction of new elements or removal of existing elements. Change may be prominent but would not substantially alter scale and character of the surroundings and the wider setting. Composition of the views would alter. View character may be partially changed through the introduction of features which, though uncharacteristic, may not necessarily be visually discordant.
Small	Minor loss or addition of or alteration to one or more key elements/features/patterns of the baseline i.e., pre-development landscape and/or introduction of elements that may not be uncharacteristic with the surrounding landscape.	Minor change in baseline, i.e. pre-development view, – change would be distinguishable from the surroundings whilst composition and character would be similar to the pre-change circumstances.
Negligible	Very minor loss or addition of or alteration to one or more key elements/features/patterns of the baseline i.e., pre-development landscape and/or introduction of elements that are not uncharacteristic with the surrounding landscape approximating to a 'no-change' situation.	Very slight change in baseline, i.e. pre-development view, – change barely distinguishable from the surroundings. Composition and character of view substantially unaltered.

Significance of Effect

10.5.22 It is recognised that new development will lead to some landscape and visual effects. However, it should be stressed that not all landscape and visual effects arising will be significant.

10.5.23 GLVIA3 explains, at paragraph 5.55, that a staged approach can be adopted when assessing landscape significance *"susceptibility to change and value can be combined into an assessment of sensitivity for each receptor, and size/scale, geographical extent and duration and reversibility can be combined into an assessment of magnitude for each effect. Magnitude and sensitivity can then be combined to assess overall significance."*

10.5.24 Within this assessment, the assessment of significance has taken the following into account (as appropriate):

- reference to regulations or standards;
- reference to best practice guidance;
- reference to policy objectives;
- reference to criteria, for example designations or protection status;
- outcomes of consultation to date; and
- professional judgement based on local / regional / specialist experience.

10.5.25 Significance varies depending on the receptor's sensitivity and the magnitude of impact of the project. The distance to the development can be a major factor in determining the magnitude of the impact. Those resources or receptors closer to the project are likely to experience a greater significance of effects than those further away.

10.5.26 A significant effect would not necessarily mean that the effect is unacceptable in planning terms. What is important is that the likely effects of any proposal are transparently assessed and understood in order that the determining authority can bring a balanced and well-informed judgement to bear when making any decision. This judgement should be based upon weighing up the benefits of the proposal against the anticipated effects, both positive and negative.

10.5.27 The matrix, at Table 10.4, has been used to guide the assessment of effects. Where the matrix provides a choice of level of effects, e.g., Minor to Moderate, the assessor has exercised professional judgement in determining which of the levels is more appropriate.

Table 10.4: Assessment Matrix

Sensitivity	Magnitude of impact			
	Negligible	Small	Medium	Large
Negligible	Negligible	Negligible to Minor	Negligible to Minor	Minor
Low	Negligible to Minor	Negligible to Minor	Minor	Minor to Moderate
Medium	Negligible to Minor	Minor	Moderate	Moderate to Major
High	Minor	Minor to Moderate	Moderate to Major	Major to Substantial
Very high	Minor	Moderate to Major	Major to Substantial	Substantial

10.5.28 The significance of effect on landscape, views and visual amenity has been described according to the five-point scale shown in the above matrix (Substantial, Major, Medium, Minor or Negligible). A description of these terms is provided in Table 10.5, below.

Table 10.5: Definitions of Significance Criteria

Significance	Typical descriptors – Landscape Resource/Receptor	Typical descriptors – Visual Receptor/Resource
Substantial	Where proposed changes would be uncharacteristic and/or would significantly alter a landscape of exceptional landscape quality (e.g., internationally designated landscapes), or key elements known to the wider public of nationally designated landscapes (where there is no or limited potential for substitution nationally).	Where proposed changes would be uncharacteristic and/or would significantly alter a view of remarkable scenic quality, within internationally designated landscapes or key features or elements of nationally designated landscapes that are well known to the wider public.
Major	Where proposed changes would be uncharacteristic and/or would significantly alter a valued aspect of (or a high quality) landscape.	Where proposed changes would be uncharacteristic and/or would significantly alter a valued view or a view of high scenic quality.
Moderate	Where proposed changes would be noticeably out of scale or at odds with the character of an area.	Where proposed changes to views would be noticeably out of scale or at odds with the existing view.
Minor	Where proposed changes would be at slight variance with the character of an area.	Where proposed changes to views, although discernible, would only be at slight variance with the existing view.
Negligible	Where proposed changes would have an indiscernible effect on the character of an area.	Where proposed changes would have a barely noticeable effect on views/visual amenity.

10.5.29 Those effects of Moderate and below are not considered to be significant. Those effects to be Major and over are considered to be significant.

Limitations of the Assessment

10.5.30 The visual assessment is based on analysis of OS mapping of the site and surrounding area, and on field survey and analysis of views towards the Site from publicly accessible viewpoints in the surrounding landscape. Although every effort has been made to include viewpoints in sensitive locations and locations from which the proposed development would be most visible, not all public viewpoints from which the proposed development would potentially be seen have necessarily been included in the assessment.

10.6 Baseline Conditions

Landscape Baseline

Introduction

10.6.1 The landscape of the Site and the study area has been assessed at various levels of detail, from national to local landscape character, to the site specific (i.e. physical landscape features). Notwithstanding the 10 km extent of the LVIA study area, the focus of assessment is on sensitive landscape receptors lying within the Zone of Theoretical Visibility (ZTV) in proximity to the Site (Figure 10.3).

10.6.2 Relevant published landscape character assessments are reviewed below in paragraphs 10.6.4 to 10.6.13, with the site-specific assessment at paragraphs 10.6.14 to 10.6.32 (Site Description).

10.6.3 The section should read in conjunction with to Figure 10.2, Landscape Character Areas, Figure 10.4 District Landscape Character Types, Figure 10.5 Topography and Figure 10.6 CPRE Tranquillity Mapping.

National Character

10.6.4 At the national level, the Site is located within National Character Area (NCA) 108: Upper Thames Clay Vales (Figure 10.2).

NCA 108: Upper Thames Clay Vales

10.6.5 The key characteristics of NCA 108 relevant to the Site and the Study Area include:

- *"Low-lying clay-based flood plains encircle the Midvale Ridge. Superficial deposits, including alluvium and gravel terraces, spread over 40 per cent of the area, creating gently undulat*ing topography. The Upper Jurassic and Cretaceous clays and the wet valley bottoms give rise to enclosed pasture, contrasting with the more settled, open, arable lands of the gravel.
- The large river system of the River Thames drains the Vales, their headwaters emitting from the spring line along the Chilterns and Downs escarpments.
- Woodland cover is low at only about 3 per cent, but hedges, hedgerow trees and field trees are frequent. Watercourses are often marked by lines of willows and, particularly in the Aylesbury Vale, native black poplar.
- Wet ground conditions and heavy clay soils discourage cultivation in many places, giving rise to livestock farming. Fields are regular and hedged.
- Brick and tile from local clays, timber and thatch are traditional building materials across the area.
- Settlement is sparse on flood plains, apart from at river crossings, where there can be large towns, s*uch as Bicester. Major routes include mainline rail, canals, a network of roads including the M40."*

10.6.6 The Site occupies a small part of the extensive NCA. Given the existing landscape character and the proposed development, there is no potential for the NCA to experience a significant landscape effect. Bearing in mind these and other factors the NCA is considered to have a Negligible sensitivity to the Proposed Development and it is not considered further in this assessment.

Oxfordshire Character Assessment

10.6.7 The Site lies within the Oxfordshire Wildlife and Landscape Study (OWLS) Upper Thames Vale Character Area (Figure 10.2).

Upper Thames Vale Regional Character Area

10.6.8 The Clay Vale Landscape Type (LCT) includes the Upper Thames Vale Regional Character Area (RCA). The overview of the LCT describes the landscape as *"a low-lying vale landscape associated with small pasture fields, many water courses and hedgerow trees and well defined nucleated villages."* The key characteristics relevant to the land surrounding the Site are:

- A flat, low-lying landform.
- Mixed land uses, dominated by pastureland, with small to medium-sized hedged fields.
- Many mature oak, ash and willow hedgerow trees.

10.6.9 While it lies within this LCT, the Site itself is, for the most part, atypical of the description of the LCT, in that it is located on a hill, is not farmland, is a former Ministry of Defence site.

10.6.10 The Upper Thames Vale RCA is itself further divided into Landscape Types (LTs). The Site includes LT 22: Wooded Hills, which includes Graven Hill. The key characteristics relevant to the Site and its immediate surroundings, are:

- Steep-sided, isolated hills in an otherwise low-lying landscape.
- Large interlocking blocks of ancient woodland.
- Mixed land uses, but dominated by pastureland.

10.6.11 The central and eastern part of the Site lies within LT3. Clay Vale. The key characteristics of relevance to the Site and its immediate surroundings are the same as those for the RCA (paragraph 10.6.8) above:

10.6.12 The southern and western part of the Site lies within LT1. Alluvial Lowlands. The key characteristics relevant to the Site and its immediate surroundings, are:

- Broad alluvial plains.
- Mixed farming pattern with regular fields with both arable cropping and pasture.
- Densely scattered hedgerow trees of ash and willow.

Cherwell District Landscape Character Types

10.6.13 The Site includes three district Landscape Types (LTs). The higher land falls within the Wooded Hills LT, part of the central and eastern area falls within the Clay Vale LT and the southern and western areas (those of the lowest elevation) fall within the Alluvial Lowlands LT, descriptions, as paragraphs 10.6.8 to 10.6.12, above and illustrated on Figure 10.4.

Site Description

10.6.14 To illustrate the character of the site and the surrounding landscape panoramic character photographs are included within this LVIA. The photographs are Figures 10.8 to 10.19 and the Character Viewpoint Location Plan is Figure 10.7.

Topography and Hydrology

10.6.15 At its lowest point, the south, the Site lies at approximately 61.5 m Above Ordnance Datum (AOD). The land slopes up to the north (Graven Hill lies at an elevation of 113 m AOD) the steeper slopes in the northern part of the Site(Character Viewpoints 1a, Figure 10.8, Character Viewpoint 2a, Figure 10.9, Character Viewpoint 18a, Figure 10.17 and Character Viewpoint 19a, Figure 10.18). The highest point of the site is approximately 71 m AOD on the northern boundary. Within the Site itself there are local variations, where the MoD have created bunds around car parks and levelled land along the routes of internal railway tracks (Character Viewpoints 3a, 3b and 4a, Figure 10.10). A water tank has been excavated in a central-western area of open ground, which provides a reservoir to be used in the event of a fire (Character Viewpoint 16b, Figure 10.16). Another reservoir of water is located in a more central location, a third in a central-east area of the Site and a fourth (now infilled) on the northern boundary of the Site. Smaller circular water tanks are also located on the Site.

10.6.16 The drainage of the Site is via a system of ditches which exit under the railway, in the southwest and run south into an un-named watercourse which joins the River Ray to the east of Astley Bridge Farm, to the east of Merton. The River Ray drains this part of the vale and is itself a tributary of the River Cherwell, which it joins immediately to the south of Islip.

10.6.17 Detailed information on the hydrology and topography of the Site is included in ES **Chapter 11** Hydrology and Flood Risk and ES **Chapter 12** Hydrogeology, Geology and Ground Conditions.

Land Cover and Land Use

10.6.18 The MoD warehouses and ancillary buildings on the Site, date back to the early 1940s (Character Viewpoints 6b, Figure 10.12, Character Viewpoint 8b, Figure 10.13 and Character Viewpoints 16a and 16b, Figure 10.16). The warehouses were connected by a system of internal railway tracks, most of which have been removed, but the track beds, within the Site remain in situ (Character Viewpoints 3a, 3b and 4a, Figure 10.10). There are several areas of hardstanding, which were used as car parks.

10.6.19 The most southerly car park has been abandoned and has returned to woodland (Character Viewpoint 9, Figure 10.13). Other car parks are similarly being encroached by regenerating vegetation. In the south, the area surrounding the car park woodland is a mix of plantation woodland and naturally occurring, mature woodland. Another area of plantation woodland is located on the south-eastern boundary of woodland (Character Viewpoint 5b, Figure 10.11) and another in the southwestern part of the Site (Character Viewpoint 10a, Figure 10.13).

10.6.20 There are small copses, tree belts, lines of trees and individual trees within the central area (Character Viewpoint 19b, Figure 10.18 and Character Viewpoints 19c, 20a and 20b, Figure 10.19). There are intermittent trees and scrub along the southern boundaries (Character Viewpoints 2b and 2c, Figure 10.9and Character Viewpoints 3a, 3b and 4a, Figure 10.10). However, the woodland within the Site provides most of the screening from the surrounding land. The woodland to the west and indeed that of Graven Hill itself contains a mix of both deciduous and coniferous species, while that within the Site is predominantly deciduous. Scot's pine (*Pinus sylvestris*) is the locally predominant coniferous species (Character Viewpoints 13, 14 and 15, Figures 10.15 and Character Viewpoints 17b, 17c and 18a, Figure 10.17).

10.6.21 The remaining areas of the Site that are not hardstanding are laid to grass, which is mown to a short height (Character Viewpoints 16b, Figure 10.16, Character Viewpoint 17c, Figure 10.17 and Character Viewpoint 18b, Figure 10.18).

10.6.22 More information on land cover is included ES **Chapter 8** Ecology and Nature Conservation.

Settlement and Communication

10.6.23 The town of Bicester lies to the north of the Site, beyond Graven Hill. The town is expanding rapidly, with strategic developments located surrounding the original core of the town. As described in paragraph 10.2.16 the Site lies within Strategic Development site Bicester 2: Graven Hill.

10.6.24 To the east, south and west, the rural landscape is punctuated with individual farmsteads and villages, such as Ambrosden, Blackthorn, Arncott, Merton, Weston-on-the-Green and Wendlebury. Immediately to the south and west of the Site is a railway line linking to the MoD facilities at Arncott. Beyond this line, is a solar farm, to the north of Home Farm.

10.6.25 The Site will be directly accessed by a newly constructed roundabout on the A41, to the east. There were internal railway tracks that were connected to the mainline on the western side of the Site. However, the tracks have been removed and there are no immediate plans to reconnect the Bicester 2: Graven Hill strategic site to the railway network.

Landscape Value

Designated Landscapes

10.6.26 The Site does not include and is not part of a designated landscape. No designated landscapes lie adjacent to it (Figure 10.1).

10.6.27 An area of ancient woodland is located on the upper parts of Graven Hill, to the north of, but not abutting, the Site (Character Viewpoint 18a, Figure 10.17).

Value of Non-designated Landscapes

10.6.28 The Site does not lie within a nationally or locally designated landscape. This does not mean that the Site has no value. The European Landscape Convention (Council of Europe, ratified 2006) (ELC) requires that each party (member state) *"establish and implement landscape policies aimed at landscape protection, management and planning…"* through the adoption of specific measures (Article 5). Landscape Protection is defined in Article 1d as *"actions to conserve and maintain the significant or characteristic features of a landscape, justified by its heritage value derived from its natural configuration and/or from human activity."* The specific measures set out at Article 6 require, amongst other matters, each party to undertake an analysis of the characteristics and the forces and pressures on its landscapes (Article 6C, 1a (ii)) and *"to assess the landscapes identified taking into account the specific values assigned to them by the interested parties and the population concerned"* (Article 6C, 1b).

10.6.29 The ELC requires that account should be taken of all landscapes, designated or not. GLVIA Box 5.1 and the complimentary Landscape Institute *Technical Guidance Note 02/21: Assessing landscape value outside national designations* (26th May 2021) (TGN 02/21) Table 1 set out a range of factors that can help in the identification of valued landscapes. An analysis of TGN 02/21, has concluded that the site is of ordinary landscape value

10.6.30 While the woodland on Graven Hill, to the north of the site is a distinct feature, the Site contains no out-of-the-ordinary landscape attributes (e.g. designations, scenic qualities, special interests or uses which would confer above average landscape value. Overall, it is considered that the Site itself is an ordinary landscape of Low to Medium landscape value.

Tranquillity

10.6.31 Tranquillity is a perceptual aspect of the Landscape. Tranquillity is defined differently by different organisations. The Landscape Institute defines it as *"a state of calm and quietude associated with peace"* (Glossary, GLVIA). The Countryside Agency (now Natural England) and Scottish

Natural Heritage described it as *"a composite feature related to low levels of built development, traffic, noise and artificial lighting"* (paragraph 7.23, Landscape Character Assessment: Guidance for England and Scotland, 2002). The Campaign to Protect Rural England (CPRE) prefers to define it as 'undisturbed land'.

10.6.32 The CPRE have produced a Tranquillity Map for England. The tranquillity map for the Site and surrounding areas is included in this chapter as Figure 10.6. As can be seen, the Site lies within an area that is towards the middle to higher (more tranquil) range of the spectrum. However, as discussed in paragraph 10.2.4 of this chapter, the CPRE mapping was undertaken in 2007 and does not take account of any development since then, including the strategic development allocations, some of which are being built out, or the East-West rail link.

Visual Baseline

Zone of Theoretical Visibility

10.6.33 Areas from which views of any part of the Proposed Development would theoretically be possible were determined by generating a Zone of Theoretical Visibility (ZTV) (Figure 10.20). The ZTV does not indicate how much of the proposed development would be visible. It takes account of the screening effect of major woodland blocks (at 12 m high) and buildings (at 9 m high). While Figure 10.20 is a more accurate representation of what might be seen, than a 'bare Earth' ZTV, it does not take account of smaller blocks of woodland or hedgerows and associated / incidental tree cover, which add to the amount of screening provided by vegetation. Therefore, the ZTV is an over-estimation of theoretical visibility.

10.6.34 Representative viewpoints, located within the ZTV and likely to experience visual change, were identified through desk study and fieldwork. An overview of the views and the potential visibility of the Site is set out in paragraphs 10.6.36 to 10.6.48 below.

10.6.35 The methodology for assessing the sensitivity of the visual receptors is detailed in section 10.5.

Visual Receptor Groups

Public Rights of Way and Access Land

10.6.36 Due to the predominantly flat landscape, vertical elements, such as buildings and vegetation are important in determining whether or not there are views towards the Site, from public rights of way (PRoWs). Similarly, railway lines or roads on embankments can screen views. Most open views are gained from higher elevations, such as the hills to the southeast and south of the Site. Other views are available from PRoWs routed on man-made structures, such as road and rail over-bridges.

10.6.37 There are very few areas of Access Land within the study area. Of those that fall within the ZTV, any available views are screened by existing vertical elements, such as vegetation or buildings. People using areas of Access Land within the study area do not have the potential to be significantly affected and so these receptors have not been taken forward to the assessment stage.

10.6.38 The sensitivity of the people using the local PRoW network for informal recreation, be it walking, horse-riding or cycling, is considered to be High because appreciation of the surrounding environment is a primary concern.

People involved in recreational activities

10.6.39 There are MoD sports pitches located between Anniversary Avenue and Circular Road (part of the MoD internal road network) adjacent to St. David's Barracks. The pitches lie at a higher elevation than the Site, further up Graven Hill, at approximately 75 m AOD. An area of small

trees and scrub lies to the south of the pitches. Those views south that are available, over the vegetation, are of the existing warehouses and associated infrastructure, set within the MoD Bicester site.

10.6.40 People involved in sports and other formal recreational activities in this undesignated location are considered to have a Medium sensitivity to the Proposed Development. This is because the focus of their attention would generally on the activity in question, appreciation of the surrounding environment is secondary.

People at work

10.6.41 There are a number of agri-businesses in the surrounding area, e.g. Wretchwick Farm and Home Farm, to the south and southeast. There is a new warehouse development at Symmetry Park and small businesses within settlements, such as Ambrosden. Those people that have the potential to have the most open views are farm workers, to the southeast, south and southwest.

10.6.42 People at their places of work are considered to have a Low sensitivity to the Proposed Development because the focus of attention is on their work not on the surroundings. Due to the amount of vegetation surrounding the site, and the existing views of the large MoD warehouse buildings, people don't have the potential to experience significant effects. As such, this group of visual receptors are not taken forward to the assessment stage.

Dynamic receptors

10.6.43 People travelling by rail have a slightly elevated, oblique view towards the Site on trains travelling north on the main line between Oxford and Bicester. The Haddenham to Bicester railway line runs southeast to northwest and is more elevated than the line from Oxford. As with the other main line route, those people travelling north have the least restricted views towards the Site. However, new development surrounds this line, including the buildings on Symmetry Park. The railway line that runs along the southwestern boundary of the site is a line serving the MoD site at Arncott, it is not used by the general public. People travelling by rail are considered to have a Medium to Low sensitivity to changes in view. Due to the amount of vegetation surrounding the site, and the existing views of the large MoD warehouse buildings, people travelling on these railway lines don't have the potential to experience significant effects. As such, this group of visual receptors are not taken forward to the assessment stage.

10.6.44 People travelling in motor vehicles have limited views towards the Site, as no public roads pass close to it. In the flat land, immediately surrounding Graven Hill, vertical elements, such as tree belts and woodlands, as well as hedgerows and hedgerow trees provide screening. Further from the Site the land rises and there are views from areas such as Muswell Hill to the southeast and Beckley to the south. However, as the areas from which elevated views can be gained are distant, people travelling within motor vehicles have very limited views of the Site. As people in motor vehicles are considered to have Low sensitivity to the proposed change in views, there is not the potential for these receptors to be significantly affected. Therefore, people travelling in motor vehicles have not been taken forward to the assessment stage of this LVIA.

10.6.45 Cyclists travelling along roads have a slightly raised sensitivity to the proposals, namely Medium. This is due to the fact that they are generally higher than people in motor vehicles, travelling more slowly and are more aware of their surroundings. The availability of views is generally the same as other road users. As they have an increased sensitivity to change, cyclists using roads have been taken forward to the assessment stage.

Private views

10.6.46 In the planning system no individual has the right to a view. The Landscape Institute has provided guidance on residential visual amenity in Landscape Institute *Technical Guidance Note 2/19 Residential Visual Amenity Assessment* (LI TGN 2/19).

10.6.47 Views of the proposed development would neither overwhelm existing properties within the study area or the proposed residential development at Burderop Park, nor render these properties so *"unattractive a place to live that planning permission should be refused"* (Inspector Kingaby, Burnthouse Farm Wind Farm, APP/D0515/A/10/2123739, Inspector's Report, paragraph 119) (also at paragraph A1.6 of LI TGN 2/19). Inspector Kingaby noted that *"There needs to be a degree of harm over and above identified substantial effect to take a case into the category of refusal in the public interest. Changing the outlook from a property is not sufficient"* (Inspector's Report, paragraph 120) (also at paragraph A1.7, LI TGN 2/19). The Inspector, in the Langham Wind Farm decision, noted that *"The planning system controls development in the public interest, and not in the private interest. The preservation of open views is a private interest"* (Langham Wind Farm Appeal Decision APP/D2510/A/10/2130539) (also at LI TGN 2/19, paragraph A1.11).

10.6.48 Very few parts of the existing buildings are visible from surrounding residential properties. All but the upper sections of the proposed development would be screened from residential properties within the study area. The distance to the closest property that lies within the ZTV is approximately 300 m (Wretchwick Farm). As such, no residential properties have the potential to experience a degree of harm over and above substantial (as set out in paragraph 10.6.47, above) to make considering private views a public interest matter. As such, private views are not considered further in this LVIA.

Representative Viewpoints

10.6.49 Therefore, representative viewpoints were chosen by RPS in consultation with CDC, as being representative of a range of views from key receptors in the study area. The chosen representative viewpoint locations are shown on Figure 10.20 Representative Viewpoint Location Plan. Panoramic baseline photographs looking towards the Site for each of the viewpoints are presented in Figures 10.21 to 10.56, together with photomontages of the Proposed Development in Figures 10.57 to 10.69. The effects on the setting of Wretchwick Farm, and other historic assets are assessed in **Chapter 9:** Historic Environment.

Representative Viewpoint 1: View southwest from public right of way Stratton Audley Footpath 371/3/10 at junction with minor road

10.6.50 Representative Viewpoint 1 (Figures 10.21 and 10.22) lies approximately 7 km northeast of the Site, at an elevation of approximately 98 m Above Ordnance Datum (AOD). It is a view across predominantly flat, farmland, laid to pasture. Hedgerows, hedgerow trees and small areas of woodland screen views towards the Site, which lies on the lower slopes of Graven Hill. The high land at Muswell Hill and Brill is seen in the view.

10.6.51 Due to the distance from the Site, the siting of the Proposed Development and the screening of intervening vegetation, there is no potential for receptors in the vicinity to experience significant effects. Consequently, this viewpoint has not been taken forward to the impact assessment stage.

Representative Viewpoint 2: View southwest from the Cross Bucks Way, northwest of Marsh Gibbon

10.6.52 Representative Viewpoint 2 (Figures 10.23 and 10.24) lies approximately 5.6 km northeast of the Site, at an elevation of approximately 75 m AOD. It is a view across predominantly flat, farmland, laid to pasture. Hedgerows, hedgerow trees and small areas of woodland screen views towards the Site, which lies on the lower slopes of Graven Hill. The high land at Muswell Hill and Arncott Hill is seen in the view.

10.6.53 Due to the distance from the Site, the siting of the Proposed Development and the screening of intervening vegetation, there is no potential for receptors in the vicinity to experience significant effects. Consequently, this viewpoint has not been taken forward to the impact assessment stage.

Representative Viewpoint 3: View west-southwest from the Bernwood Jubilee Way at a junction with a minor road, southwest of Oakapple Farm

10.6.54 Representative Viewpoint 3 (Figures 10.25 and 10.26) lies approximately 4.6 km east of the Site, at an elevation of approximately 62 m AOD. It is a view across predominantly flat, farmland. Hedgerows, hedgerow trees and small areas of woodland screen views towards the Site.

10.6.55 Due to the distance from the Site, the siting of the Proposed Development and the screening of intervening vegetation, there is no potential for receptors in the vicinity to experience significant effects. Consequently, this viewpoint has not been taken forward to the impact assessment stage.

Representative Viewpoint 4: View west from a field gate on public right of way on Sharp's Hill, south of Grendon Underwood

10.6.56 Representative Viewpoint 4 (Figures 10.27 and 10.28) lies approximately 8.5 km east of the Site, at an elevation of approximately 75 m AOD. Sharp's Hill is a small are of elevated land with several public rights of way crossing it. However, limited views east are afforded by the highest footpaths, as they run to the east of substantial hedgerows. Representative Viewpoint 4 is taken from a field gate. The view is across the flat vale farmland. The higher land at Brill and Muswell Hill are seen within the view, as are Arncott Hill and in the distance Graven Hill, the lower slopes of which are partly screened by intervening field boundaries and small areas of woodland.

10.6.57 Due to the distance from the Site, the siting of the Proposed Development and the screening of intervening vegetation, there is no potential for receptors in the vicinity to experience significant effects. Consequently, this viewpoint has not been taken forward to the impact assessment stage.

Representative Viewpoint 5: View west-northwest from public right of way Arncott 110/1/10, north of Arncott

10.6.58 Representative Viewpoint 5 (Figures 10.29 and 10.30) lies approximately 2.7 km east-southeast of the Site, at an elevation of approximately 60 m AOD. The view is across the flat vale farmland, with field boundaries of hedgerows and some post and wire fence. Small areas of woodland are also visible, as is the rising land at Arncott. The woodland on the higher land at Graven Hill is visible within the view, however, the lower slopes of the hill are partly screened by intervening field boundaries and small areas of woodland and the roofs of the existing MoD warehouses are not visible.

10.6.59 Due to the distance from the Site, the siting of the Proposed Development and the screening of intervening vegetation, there is no potential for receptors in the vicinity to experience significant effects. Consequently, this viewpoint has not been taken forward to the impact assessment stage.

Representative Viewpoint 6: View southwest from public right of way Ambrosden 105/1/20, north of Little Wretchwick Farm

10.6.60 Representative Viewpoint 6 (Figures 10.31 and 10.32) lies approximately 1.6 km northeast of the Site, at an elevation of approximately 65 m AOD. The area of farmland within which this viewpoint is located is undergoing may changes, with Symmetry Park currently being developed. The first buildings in the park are seen within this view, with the roofs of Little Wretchwick Farm partly visible in the middle distance. The woodland on the upper slopes of Graven Hill is visible, as are the fields on the eastern side of the hill. The lower slopes are partly screened from view by intervening hedgerows and hedgerow trees. The roofs of the existing MoD warehouse buildings are not visible.

Representative Viewpoint 7: View north-northwest from junction of public right of way Merton 295/7/10 with minor road, southwest of Ambrosden

10.6.61 Representative Viewpoint 7 (Figures 10.33 and 10.34) lies approximately 660 m south of the Site, at an elevation of approximately 60 m AOD. The view towards the Site from this public right of way is across flat farmland. The medium-sized field is divided by low hedgerows. The tree belt around the Bicester Solar Farm and the vegetation along the tributary of the River Ray screen the lower slopes of Graven Hill. While the woodland on the upper slopes is visible, the existing MoD warehouses on the Site are not visible from this location.

Representative Viewpoint 8: View north-northeast from public right of way Merton 295/2/2, north of Merton

10.6.62 Representative Viewpoint 8 (Figures 10.35 and 10.36) lies approximately 1.6 km southwest of the Site, at an elevation of approximately 60 m AOD. The view from the public right of way is of flat arable farmland, divided by hedgerows and hedgerow trees. There are some tree belts in the view, such as those surrounding the Bicester Solar Farm, as well as small areas of woodland at Merton Grounds and associated with Langford Lane. Parts of the roofs of buildings at Merton Grounds are visible. The existing MoD warehouses are not visible. While the wooded areas of Graven Hill are visible, the fields to the east and the lower slopes are not, as they are screened by the intervening vegetation.

Representative Viewpoint 9: View northeast from the junction of Langford Lane with public right of way Merton 295/4/20, north of Merton Grounds

10.6.63 Representative Viewpoint 9 (Figures 10.37 and 10.38) lies approximately 640 m west of the Site, at an elevation of approximately 62 m AOD. The view is across flat arable farmland, towards Graven Hill. The wooded upper slopes of the hill are visible and from this location the MoD buildings on the western side of the hill are visible amongst woodland, on the middle slopes. The roof of the most westerly MoD warehouse is partly visible between intervening vegetation. This building is not within the Site. None of the existing warehouses on the Site are visible from this location.

Representative Viewpoint 10: View north from public right of way Fencott and Murcott 205/6/10 on road bridge north of Murcott

10.6.64 Representative Viewpoint 10 (Figures 10.39 and 10.40) lies approximately 3.2 km south of the Site, at an elevation of approximately 65 m AOD. The public right of way crosses the M40 on a track (not a public road). Wither side of the bridge and on either side of the track is vegetation and so only limited views are available. This open view is on the northern side of the bridge, as the track descends. The view is across flat, farmland, with clipped hedgerows and post and rail field boundaries. The farmland closer to Graven Hill changes to fields with more mature, substantial hedgerows, tree belts and small areas of woodland. This vegetation screen views to the Site and none of the existing MoD warehouses, or other buildings on Graven Hill, are visible.

10.6.65 Due to the distance from the Site, the siting of the Proposed Development and the screening of intervening vegetation, there is no potential for receptors in the vicinity to experience significant effects. Consequently, this viewpoint has not been taken forward to the impact assessment stage.

Representative Viewpoint 11: View north from Ragnall's Lane, public right of way Horton-cum-Studley 257/15/10, north of Horton-cum-Studley

10.6.66 Representative Viewpoint 11 (Figures 10.41 and 10.42) lies approximately 6.3 km south of the Site, at an elevation of approximately 64 m AOD. The view towards the Site is across flat open farmland divided by hedgerows with individual and groups of mature trees. The views from the

public right of way are limited and only through field entrances. The vegetation in the landscape and the low elevation of the viewpoint screen Graven Hill.

10.6.67 Due to the distance from the Site, the siting of the Proposed Development and the screening of intervening vegetation, there is no potential for receptors in the vicinity to experience significant effects. Consequently, this viewpoint has not been taken forward to the impact assessment stage.

Representative Viewpoint 12: View northwest from B4027, southwest of Islip

10.6.68 Representative Viewpoint 12 (Figures 10.43 and 10.44) lies approximately 8.5 km southwest of the Site, at an elevation of approximately 89 m AOD. This viewpoint is from the rising land to the south, on the southern edge of the flat, vale farmland. The fields in the foreground are large, as they slope down, the views afforded are wide and open. Graven Hill is visible in the distance, as are Arncott Hill and Muswell Hill. The wooded upper slopes of Graven Hill are visible on the skyline, the lower slopes are screened by vegetation. The Site is not distinguishable.

10.6.69 Due to the distance from the Site, the siting of the Proposed Development and the screening of intervening vegetation, there is no potential for receptors in the vicinity to experience significant effects. Consequently, this viewpoint has not been taken forward to the impact assessment stage.

Representative Viewpoint 13 View northwest from The Oxfordshire Way, public right of way Oddington 318/5/60 on railway bridge, northwest of Oddington

10.6.70 Representative Viewpoint 13 (Figures 10.45 and 10.46) lies approximately 6.7 km southwest of the Site, at an elevation of approximately 66 m AOD. This is an elevated view of the flat vale farmland landscape. The medium to small-sized fields are divided by hedgerows and hedgerow trees. Small areas of woodland and more substantial areas of linear vegetation are associated with ponds and watercourses. The wooded upper slopes of Graven Hill are visible on the skyline, as is the rising land at Arncott and Muswell Hill. However, the lower slopes of Graven Hill are screened by vegetation and none of the MoD buildings are visible.

10.6.71 Due to the distance from the Site, the siting and orientation of the Proposed Development and the screening of intervening vegetation, there is no potential for receptors in the vicinity to experience significant effects. Consequently, this viewpoint has not been taken forward to the impact assessment stage.

Representative Viewpoint 14: View east from junction of public right of way Weston-on-the-Green 404/19/10 with the B430, north of Weston-on-the-Green

10.6.72 Representative Viewpoint 14 (Figures 10.47 and 10.48) lies approximately 5.7 km west of the Site, at an elevation of approximately 79 m AOD. The view from the junction of the public right of way with the B430 is through a gappy hedgerow and across a large arable field (part of former RAF Weston-on-the-Green airfield. While the open field allows clear views to the middle distance, hedgerow boundaries and vegetation prevent further views towards the Site.

10.6.73 Due to the distance from the Site, the siting and orientation of the Proposed Development and the screening of intervening vegetation, there is no potential for receptors in the vicinity to experience significant effects. Consequently, this viewpoint has not been taken forward to the impact assessment stage.

Representative Viewpoint 15: View northwest from public right of way Piddington 321/7/40 at Muswell Hill

10.6.74 Representative Viewpoint 15 (Figures 10.49 and 10.50) lies approximately 6.1 km southeast of the Site, at an elevation of approximately 195 m AOD. This elevated location gives panoramic views over the vale landscape. The patchwork of fields, in the midground becomes obscured by layers of hedgerows, tree belts and woodland. Arncott Hill is distinguishable in the middle-ground and the pale roofs of the MoD buildings to the south and west of the hill are visible around the semi-wooded hilltop. Graven Hill is also visible against a backdrop of the vale landscape. The wooded upper slopes and the fields on the eastern edge are distinguishable. Less visible are the roofs of the existing MoD warehouses. However, from this elevated location, the paler roofs are seen as pale, thin patches in a darker landscape.

Representative Viewpoint 16: View northwest from public right of way Arncott 110/10/10 at Arncott Hill

10.6.75 Representative Viewpoint 16 (Figures 10.51 and 10.52) lies approximately 3.3 km southeast of the Site, at an elevation of approximately 95 m AOD. Arncott Hill is considerably lower than Muswell Hill, but, is closer to the Site than Muswell Hill. The public right of way is reached by means of permissive paths through woodland. The footpath runs along a hedge-line, rather than the brow of the hill, resulting in views towards the Site being restricted by topography. The wood and the fields on the upper slopes are visible as is part of the woodland on the lower slopes. The pale roofs of the existing MoD buildings are seen as thin lines amongst the darker areas of woodland.

Representative Viewpoint 17: View northwest from public right of way Arncott 110/9/10 on Patrick Haugh Road, Arncott Hill

10.6.76 Representative Viewpoint 17 (Figures 10.53 and 10.54) lies approximately 3 km southeast of the Site, at an elevation of approximately 84 m AOD. This viewpoint, from a lower elevation on Arncott Hill, affords a less constrained view of Graven Hill. The MoD buildings around Arncott Hill are visible in the view. The existing MoD warehouses on Graven Hill are screened by vegetation, due to the lower elevation of the viewpoint. The edge of one of the warehouses may be visible, but it is difficult to distinguish at this distance.

Representative Viewpoint 18: View west from footpath on Ploughley Road, south of Ambrosden

10.6.77 Representative Viewpoint 18 (Figures 10.55 and 10.56) lies approximately 1.4 km southeast of the Site, at an elevation of approximately 62 m AOD. Views from this location towards the Site is screened by the dense vegetation, including small areas of woodland, on the western side of the road. The woodland surrounding sheds at Wretchwick Farm provides a substantial secondary layer of vegetation. None of the existing MoD warehouses are visible.

10.6.78 Due to the siting and orientation of the parameters extent of the Proposed Development and the screening of intervening vegetation, there is no potential for receptors in the vicinity to experience significant effects, despite the proximity to the Site. Consequently, this viewpoint has not been taken forward to the impact assessment stage.

Existing Light Sources

10.6.79 The *Lighting Impact Assessment* (BWB, May 2022) (LIA) notes that with regard to on-site lighting *"Artificial light sources are very limited. The access roads and disused railway are unlit. The warehouse buildings are provided with sporadic floodlighting, likely providing limited local illumination"* (paragraph 4.6 of the LIA).

10.6.80 With regard to off-site lighting sporadic lighting columns are noted on Pioneer Road, but will be ungraded to adoptable standards along the new access road (paragraph 4.7). Similarly, there is sporadic street lighting at Ambrosden (paragraph 4.8).

10.6.81 The Site is currently classified as a rural area in lighting terms (a low district lighting area) (paragraph 4.10).

Baseline Evolution

10.6.82 Having established the existing baseline character of the area, it should be noted that landscapes are dynamic and all subject to change.

Climate Change

10.6.83 The Met Office UK Carbon Projections ('UKCP09') dataset provides probabilistic projections of change in climatic parameters over time for 25 km grid squares across the UK. Projected changes during low, medium and high future global greenhouse gas emissions scenarios have been reviewed for the period from 2020 up to 2069, encompassing the potential construction and operational periods of the proposed development.

10.6.84 The likely ranges of change in climatic parameters including precipitation, temperature, wind speed, humidity and frequency of extreme weather may affect the native flora. However, while this would not increase the sensitivity of receptors, it may affect the magnitude of impact, e.g. the proposed development may be more visible to people who only have semi-screened views at present, or it may increase the number of receptors, where tree-cover loss could enable views not currently possible. As this aspect of the effects of climate change is uncertain, it is difficult to predict the significance of effects.

Land-use Change

10.6.85 The landscape is always changing to accommodate new development or removal of old. There is a need to accommodate change while maintaining and enhancing the quality of the landscape where possible. New development should respect the environment and its location by way of scale, design and landscape treatment. The Site itself has had various uses, from the mid-part of the 20th Century to the current day, detailed in ES, **Chapter 9**: Historic Environment.

10.7 Primary Mitigation

Development Components

10.7.1 The Proposed Development is described in ES **Chapter 3:** Proposed Development and the parameter plans show Green Infrastructure and ecological habitat connectivity achieved by the establishment of 'Green Fingers' across and through the proposed development.

10.7.2 As shown on the Illustrative Landscape Strategy (Figure 10.72) an assumption has been made that structural planting is proposed along the northern boundary. The detail of which would be secured by condition.

Demolition and Construction

10.7.3 The operations for construction of the proposed development is set out in ES **Chapter 4** Construction and Site Management. An outline Construction Environment Management Plan accompanies this Application. Construction work will only take place during daylight hours. No night-time working is proposed.

Lighting

10.7.4 A lighting strategy for the proposed development is set out in section 5 of the LIA, which would provide a *"modern external lighting installation"* (LIA, paragraph 5.2). BWB have prepared a lighting design layout which is included in Appendix 3 to the LIA.

10.7.5 The design parameters for the lighting design are set out at paragraphs 5.5 to 5.10 of the LIA. In summary, *"the proposed luminaires are LED light source to provide optimum energy efficiency and accurate targeting of light output to keep light pollution effects to the absolute minimum"* (LIA, paragraph 5.5). While column and wall-mounted lights form part of the design the lighting *"shall be arranged to maximise the amount of light reaching trafficked hard surfacing while minimising light spill onto adjacent areas"* (LIA, paragraph 5.7). The details of the lighting types proposed for different areas of the development are at paragraphs 5.11 to 5.25 of the LIA.

10.7.6 All luminaires comply with the relevant ecological requirements (LIA, paragraphs 5.26 to 5.30).

10.7.7 With regard to lighting perceived by human receptors, the LIA concludes that although some lit areas of the development will be visible, views of the proposed development will be generally screened by existing woodland and the proposed buildings. The impact of the new lighting is judged to be Negligible (LIA, paragraphs 5.36 and 5.37).

10.7.8 The most noticeable effect of the proposed lighting would be a slight increase in sky glow (LIA, paragraph 6.7).

Landscape Proposals

10.7.9 Landscape mitigation will be embedded in the overall project design and will be formulated to minimise potential landscape and visual impacts and maximise enhancement of landscape features, landscape character and biodiversity of the Site. Indicative landscape proposals are presented on Figure 10.76 Indicative Landscape Strategy and have been informed by guidance detailed in the Design and Access Statement. The landscape proposals will be worked-up for the Reserved Matters Application. The design principles are summarised below.

Summary of Landscape Mitigation

10.7.10 The areas within which the development will be located are illustrated on Drawing no. 410_S-51 Proposed Layout Parameter Plan.

10.7.11 The design principles include:

- Buildings set within a high-quality landscape framework;
- Retention of most of the existing boundary vegetation and wooded areas located adjacent to the southern and eastern boundaries of the Site;
- Green Infrastructure and ecological habitat connectivity achieved by the establishment of 'Green Fingers' across and through the proposed development; and
- Use of native and locally native planting.
- Structural planting is proposed along the northern boundary.

10.7.12 The final layout and species mixes will be agreed with the relevant planning and landscape officers and secured by suitable planning conditions.

10.7.13 The Applicant will also prepare a Landscape Environmental Management Plan to accompany the landscape proposals once the proposal has had the benefit of expert and local consultation inputs following submission of the planning application.

10.8 Assessment of Likely Effects

10.8.1 The assessment of likely effects has considered the potential effects at the demolition and construction phase as well as the operation and maintenance phase. As the Proposed Development is considered permanent there is no assessment of a decommissioning phase.

10.9 Construction Effects

10.9.1 A summary of construction works is provided in ES **Chapter 4** Construction and Site Management.

10.9.2 Working hours will be regulated by CDC and this is expected to include no night-time working (after 18.00) during the demolition and construction phase, of the proposed development.

Potential Landscape Effects

Oxfordshire and Cherwell Character Assessments

Upper Thames Vale Regional Character Area and Landscape Character Types

10.9.3 Barring the topographic description, few of the key characteristics of the Upper Thames Vale RCA and its subsidiary Landscape Types (LTs) that the Site consists of (LT1: Alluvial Lowlands, LT3: Clay Vale and LT22: Wooded Hills) (Figure 10.4) are not present at the Site. It is, as described in section 10.6, of this chapter, an ex-MoD site, with large warehouses set in part of the MoD managed estate, parts of which have regenerating woodland, but are not ancient woodland.

10.9.4 The land to the east, and west is currently being redeveloped, with several of the MoD buildings in the east having been demolished. Site offices, construction compounds and haul roads have been constructed and heavy plant passes through the northern part of the Site. A new access roundabout from the A41 has already been constructed. As such, the Site is considered to have a Low sensitivity to the construction of the proposed development.

10.9.5 The impact of the construction works on the Site will be Large. The temporary significance of the direct effects of the proposed development on the RCA and the LTs is judged to be **Moderate adverse**, which is not significant.

Adjacent RCAs, LCAs and LTs

10.9.6 Those RCAs and LTs in which the Site is not located, but can be seen from, have the potential to be indirectly affected by the demolition and construction works at the Site. The Oxfordshire and Aylesbury Vale Landscape Character Areas with the ZTV are illustrated on Figure 10.3.

10.9.7 The magnitude of the impact on the adjacent RCAs and LTs is lessened by the amount of ongoing development around Bicester, not only the residential development, but the commercial and infrastructure development, such as Symmetry Park and East-West Rail. The Site is also relatively well-screened from adjacent areas, both by topography, and by the many layers of vegetation in the surrounding flat landscape.

10.9.8 The exception being from the high land at Muswell Hill, which lies within Aylesbury Vale Landscape Character Area (LCA) Brill and Muswell Hill. Topography prevents nearly all views beyond Muswell Hill, within this LCA. The sensitivity of this part of the LCA is considered to be Medium. Due to the distance from the Site, the demolition and construction works would be barely noticeable, particularly as they would not break the skyline and are seen amongst other ongoing construction works. The magnitude of impact is considered to be Negligible. The temporary effects of the demolition and construction phase of the proposed development is judged to be **Negligible adverse**, which is not significant.

Site Specific Landscape Characteristics

10.9.9 The character of the existing MoD development is that of large warehouses and ancillary buildings set amongst car parks, access roads and the beds of a former internal railway network. Several of the car parks are surrounded by raised grass bunds some with individual trees. The outer hedges of the Site have more mature and regenerating woodland. Currently the northern part of the Site is busy, with construction traffic travelling from east to west, around the hill, while the southern area is quieter. The demolition and construction work will necessarily bring the noise and movement into the central and southern areas of the Site. While the outer areas of woodland in the south and east will be retained, the central area will be reconfigured.

10.9.10 The magnitude of impact on the grassed areas and individual trees in the centre of the Site will be Large. A total of 138 no. 'arboricultural features' would be removed, (4 no. BS5837 Grade A, 35 no. Grade B and 93 no. Grade C, a further 6 no. were Grade U and would be removed for reasons of sound arboricultural management (Arboricultural Impact Assessment, Watermans, May 2022). The sensitivity of these landscape elements varies from High to Negligible. The temporary significance of effects on these elements during the demolition and construction phase would be **Major adverse to Negligible adverse**, which are significant to not significant.

10.9.11 The most sensitive elements on the Site are the areas of mature and regenerating woodland. For the most part these are being retained and so will only experience a Small magnitude of impact. The temporary significance of effect on these High sensitivity landscape elements will be **Moderate adverse**, which is not significant.

Night-time Effects

10.9.12 Working hours will be regulated by CDC and this is expected to include no night-time working (after 18.00) during the demolition and construction phase, of the proposed development.

Potential Visual Effects

Visual Receptor Groups

People Using Public Rights of Way

10.9.13 As noted in section 10.6 of this chapter, due to the predominantly flat landscape, the presence of vertical elements, such as buildings and vegetation will be important in determining whether or not there are views of the demolition and construction works at the Site from Public Rights of Way (PRoW). Most open views are gained from PRoW at higher elevations, such as from the hills to the southeast and south of the Site, or those PRoW routed on man-made structures, such as road and rail over-bridges.

10.9.14 The sensitivity of the people using the local PRoW network for informal recreation, be it walking, horse-riding or cycling, is considered to be High. The magnitude of impact of the demolition and construction phase on these receptors depends not only on elevation and screening, but also on distance from the Site, orientation of the PRoWs and the direction that the user is travelling along it. The impact magnitude ranges from Negligible to Small.

10.9.15 The temporary effects of the demolition and construction phase on these receptors varies, according to the magnitude of impact. Those closest to the Site will tend to experience the more adverse effects. The effects range from **Negligible adverse**, to **Moderate adverse**, which are not significant.

People involved in recreational activities

10.9.16 Those users of the Ministry of Defence (MoD) sports pitches located between Anniversary Avenue and Circular Road (part of the MoD internal road network) adjacent to St. David's

Barracks, will have elevated views of parts of the demolition and construction works at the Site, as they have of the current works.

10.9.17 People involved in sports and other formal recreational activities in this undesignated location are considered to have a Medium sensitivity to the Proposed Development. This is because the focus of their attention would generally on the activity in question, appreciation of the surrounding environment is not a primary concern.

10.9.18 The impact magnitude could be Large in those areas of the pitch closest to the Site. The temporary significance of effects experienced by the people using the sports pitches would be **Moderate adverse**, which is not significant.

Dynamic receptors

10.9.19 Cyclists travelling along roads have a slightly raised sensitivity to the proposed demolition and construction works, namely Medium.

10.9.20 The magnitude of the impact of the demolition and construction works varies. As well as the screening of vegetation, the change in views is dependent on the distance from the Site, as well as orientation of the road and direction of travel of the cyclists. The closest roads are the minor roads from Ambrosden to the A41 and between Ambrosden to Merton. Available views from both these locations are restricted by vegetation either by roadside vegetation, or by vegetation within the farmland between the roads and the Site. However, there will be views of the taller elements of plant during the construction phase. The impact on cyclists in both these locations is considered to be Small, to Negligible. The temporary significance of the demolition and construction phase on cyclists is judged to be **Negligible adverse** to **Minor adverse**, which is not significant.

Representative Viewpoints

Representative Viewpoint 6: View southwest from public right of way Ambrosden 105/1/20, north of Little Wretchwick Farm

10.9.21 Representative Viewpoint 6 (Figures 10.57, 10.58 and 10.59) is located on a PRoW and walkers using the public footpath are of a High sensitivity.

10.9.22 Due to the footpath's situation, to the northeast of the of the Site, with Graven Hill and vegetation obscuring it views, of the works being undertaken during the demolition and construction phase, would be limited. The tallest elements of the construction plant might be visible from this location, seen on the skyline, beyond the buildings at Symmetry Park. All low-level demolition and construction work, including the site compounds, site offices and car-park will be screened by the existing vegetation. The magnitude of impact from this PRoW is considered to be Negligible to Small, dependent on the location of the visual receptor.

10.9.23 The temporary significance of effect is judged to be **Minor adverse**, which are not significant.

Representative Viewpoint 7: View north-northwest from junction of public right of way Merton 295/7/10 with minor road, southwest of Ambrosden

10.9.24 Representative Viewpoint 7 (Figures 10.60, 10.61 and 10.62) is located at a high point of this public footpath, walkers using it are of a High sensitivity to the proposed demolition and construction works.

10.9.25 Due to the vegetation surrounding the Bicester Solar Farm and along the tributary of the River Ray, views towards the Site from this public right of way are limited. In the main, only the tallest plant used during the demolition and construction phase would be visible from this footpath, seen with Graven Hill as a backdrop, for the most part. However, work at the western edge of

the site, will break the skyline and work in the eastern part of the site will be seen on the skyline behind vegetation. The magnitude of impact from this location is considered to be Small, dependent on the location of the visual receptor.

10.9.26 The temporary significance of effect is judged to be **Minor adverse to Moderate adverse**, dependent on the walker's location on the PRoW, which are not significant effects.

Representative Viewpoint 8: View north-northeast from public right of way Merton 295/2/2, north of Merton

10.9.27 Representative Viewpoint 8 (Figures 10.63, 10.64 and 10.65) is located at on a public footpath. Walkers have a High sensitivity to the demolition and construction work at the Site.

10.9.28 Due to the vegetation surrounding the Bicester Solar Farm, Merton Grounds and that along the tributary of the River Ray, immediately to the south of the Site, views of the demolition and construction work would be limited. Only the tallest plant used during the demolition and construction phase would be visible from this footpath, seen with Graven Hill as a backdrop. The magnitude of impact from this location is considered to be Negligible to Small, dependent on the location of the visual receptor.

10.9.29 The temporary significance of effect is judged to be **Negligible adverse** to **Minor adverse**, which are not significant effects.

Representative Viewpoint 9: View northeast from the junction of Langford Lane with public right of way Merton 295/4/20, north of Merton Grounds

10.9.30 Representative Viewpoint 9 (Figures 10.66, 10.67 and 10.68) lies at a high point on this public bridleway. Users of the bridleway have a High sensitivity to the proposed demolition and construction work at the Site.

10.9.31 Due to the footpath's situation, to the northwest of the of the Site, with Graven Hill and vegetation limiting available views, the demolition and construction phase would be limited. The tallest elements of the construction plant in the western part of the Site would be visible from this location, seen on the skyline. All low-level demolition and construction work, including the site compounds, site offices and car-parking will be screened by existing, intervening vegetation. The magnitude of impact from this location is considered to be Small, dependent on the location of the visual receptor on the PRoW.

10.9.32 The temporary significance of effect is judged to be **Minor adverse**, which is not a significant effect.

Representative Viewpoint 15: View northwest from public right of way Piddington 321/7/40 at Muswell Hill

10.9.33 The visual receptors at Representative Viewpoint 15 (Figures 10.69, 10.70 and 10.71) are considered to have a High sensitivity to the proposed demolition and construction work, as they are on a PRoW.

10.9.34 Despite the distance from the Site, the elevation of this viewpoint would mean that the demolition and construction works would be noticeable from this location. The works would be seen with the backdrop of Graven Hill and even the tallest plant would not break the skyline. The magnitude of this potential change in view would be Negligible.

10.9.35 The temporary significance of effect is judged to be **Minor adverse**, which is not significant.

Representative Viewpoint 16: View northwest from public right of way Arncott 110/10/10 at Arncott Hill

10.9.36 Walkers using the public footpath at Representative Viewpoint 16 (Figures 10.51 and 10.52) are considered to have a High sensitivity to the proposed demolition and construction work at the Site. No photomontages have been completed for this viewpoint, as Representative Viewpoint 17 is closer to the Site and more open.

10.9.37 The footpath, reached by using permissive paths through private woodland, is located beyond the brow of Arncott Hill. The topography restricts the depth of the distant view, as most is taken up with the foreground hill. The tallest plant involved in the demolition and construction work will be visible from this location, but seen against the backdrop of Graven Hill. The magnitude of impact would be Negligible, as only glimpses of the land northwest of the hill are possible.

10.9.38 The temporary significance of effect is judged to be **Minor adverse**, which is not significant.

Representative Viewpoint 17: View northwest from public right of way Arncott 110/9/10 on Patrick Haugh Road, Arncott Hill

10.9.39 Walkers using the PRoW on which Representative Viewpoint 17 (Figures 10.72, 10.73 and 10.74) is located have a High sensitivity to the proposed demolition and construction work at the Site.

10.9.40 Although at a lower elevation than Representative Viewpoint 16, the views are less restricted by topography. The magnitude of impact at this more open location is considered to be Small. The tallest elements of the plant undertaking the demolition and construction works would be visible against the backdrop of Graven Hill and would break the skyline where work takes place on the southern and western parts of the Site.

10.9.41 The temporary significance of effect is judged to be **Minor Adverse**, which is not significant.

Night-time Effects

10.9.42 Working hours will be regulated by CDC and this is expected to include no night-time working (after 18.00) during the demolition and construction phase of the proposed development unless agreed with CDC.

Further mitigation

10.9.43 Proposed planting should be incorporated where possible within the first phase of construction to allow it to have the best chance to mature and offer screening as early as possible within the development programme. No further mitigation is proposed.

Future Monitoring

10.9.44 Landscape management would be required for a period of five years following completion of the development to ensure that the newly planted areas become well established and meet their landscape potential. Management would include the replacement of dead, dying or damaged stock or those that fail to establish satisfactorily. Pruning that would be beneficial for plant growth, form and plant health would be promoted. A detailed Landscape and Ecological Management Plan (LEMP) will be agreed with CDC.

Accidents and/or Disasters

10.9.45 With respect to landscape, and visual matters, potential accidents/disasters relevant to the construction phase of the proposed development are unlikely.

10.10 Operational Effects

10.10.1 A summary of the Proposed Development operational components is provided in ES **Chapter 3** Proposed Development. A parameter plan is included within this chapter as Figure 10.71

10.10.2 A worst-case/maximum design scenario in landscape character terms would be one building. The worst-case/maximum design scenario in visual impact terms would be buildings around the edge of the Site.

Potential Landscape Effects

Oxfordshire and Cherwell District Character Assessments

Upper Thames Vale Regional Character Area and Landscape Character Types

10.10.3 Due to the lack of key characteristics and the amount of new development under construction in and around Bicester, the sensitivity of the RCA and LTs to the proposed development is considered to be Low. The Oxfordshire RCAs within the ZTV are illustrated on Figure 10.3 and the Cherwell LTs are illustrated on Figure 10.4.

10.10.4 The direct impact of the proposed development on the RCA and LTs within the Site will be Medium, as the Site character is already one of large sheds set in a wider, maintained landscape. However, there will be an intensification of this character. The significance of the direct effects of the proposed development on the RCA and the LTs is judged to be **Minor adverse**, which is not significant.

Adjacent RCAs, LCAs and LTs

10.10.5 Those RCAs, LCAs and LTs in which the Site is not located, but can be seen from, have the potential to be indirectly affected by the proposed development. The Oxfordshire and Aylesbury Vale Landscape Character Areas with the ZTV are illustrated on Figure 10.3.

10.10.6 The magnitude of the impact on the adjacent RCAs and LTs is lessened by the amount of ongoing development around Bicester,

10.10.7 The proposed development is also relatively well-screened from adjacent areas, both by topography, and by the many layers of vegetation in the surrounding flat landscape. The exception being from the high land at Muswell Hill, which lies within Aylesbury Vale Landscape Character Area (LCA) Brill and Muswell Hill. Topography prevents nearly all views beyond Muswell Hill, within this LCA. The sensitivity of this part of the LCA, to the proposed development is considered to be Medium. Due to the distance the proposed development would be barely noticeable.

10.10.8 The magnitude of the indirect impacts on adjacent RCAs, LCAs and LTs is considered to be Negligible. The significance of effects of the proposed development is judged to be **Negligible adverse**, which is not significant.

Site Specific Landscape Characteristics

10.10.9 The character of the existing MoD development is that of large warehouses and ancillary buildings set amongst car parks, access roads and the beds of a former internal railway network. The proposed development will intensify this character, with larger buildings and less open space, but with green fingers/corridors (Green Infrastructure providing ecological habitat connectivity) crossing through the built development. The proposed development will bring movement into an area that has recently been abandoned, but currently has much movement and noise in the northern part of the Site.

10.10.10 The magnitude of impact on the grassed areas and individual trees in the centre of the Site will be Large, but the sensitivity of these landscape elements is Low to Negligible, due to the condition and utilitarian/managed nature of the grassed areas. The exception to this is the higher category trees, which have a High sensitivity (Arboricultural Assessment, Watermans, May 2022). The proposed development would include the planting of trees within the car parks and green fingers/corridors, replacing those that would be removed and increasing the numbers of trees within the developed area. The significance of effects on these elements due to the proposed development would be **Major adverse** (reducing over time) to **Neutral (changing to Minor beneficial** over time) which are significant to not significant, due to the anticipated quality of the landscape that will replace the existing landscaped areas, over time.

10.10.11 The most sensitive elements on the Site are the areas of mature and regenerating woodland. For the most part these are being retained and will be supplemented with additional planting. Overall, these areas will only experience a Small, reducing to Negligible, magnitude of impact. The significance of effect on these High sensitivity landscape elements will be **Moderate adverse** reducing to **Minor adverse**, at most, which is not significant.

Night-time Effects

10.10.12 There will be an increase in the number of light sources at the Site (LIA, Watermans, May 2022). However, due to the amount of screening provided by vegetation and proposed buildings, the most noticeable effect of the proposed lighting would be a slight increase in sky glow (LIA, paragraph 6.7). The significance of effects on the landscape resources and receptors is considered to be **Negligible adverse** to **Minor adverse**, which are not significant.

Potential Visual Effects

Visual Receptor Groups

People using Public Rights of Way

10.10.13 As noted in section 10.6 of this chapter, due to the predominantly flat landscape, the presence of vertical elements, such as buildings and vegetation will be important in determining whether, or not, there are views of the proposed development from Public Rights of Way (PRoW). The most open views would be from PRoW at higher elevations, such as from the hills to the southeast and south of the Site, or those PRoW routed on man-made structures, such as road and rail over-bridges.

10.10.14 The sensitivity of the people using the local PRoW network for informal recreation, be it walking, horse-riding or cycling, is considered to be High. The magnitude of impact of the proposed development on these receptors depends not only on elevation and screening, but also on distance from the Site, orientation of the PRoWs and the direction that the user is travelling along it. The impact magnitude would range from Negligible to Medium.

10.10.15 The visual effects of the proposed development (illustrated on Figure 10.76 Indicative Landscape Strategy Plan) on these receptors varies, according to the magnitude of impact. Those closest to the Site will tend to experience the more adverse effects. The significance would range from **Negligible adverse**, to **Moderate adverse** effects in Winter Year 1, which are not significant. The effects would lessen over time, and by Summer Year 10, the proposed planting would be established and, where it is proposed between the built form and the PRoW, would assist in softening it.

10.10.16 However, as a worst case/maximum design scenario for visual impact, where the built form is located around the edge of the development zones shown on the parameter plan (Figure 10.75) with little visual permeability between the buildings, there would be no planting on the boundaries (other than the retained woodland areas) and so no softening of the built form. The significance of effects experienced by users of the PRoW network in this scenario would be **Moderate adverse**, which is not significant.

People involved in recreational activities

10.10.17 Those users of the MoD sports pitches located between Anniversary Avenue and Circular Road (part of the MoD internal road network) adjacent to St. David's Barracks, will have elevated views of parts of the proposed development, as they have of the current buildings. However, the density of the built form would increase, as would the height of the buildings.

10.10.18 People involved in sports and other formal recreational activities in this undesignated location are considered to have a Medium sensitivity to the proposed development.

10.10.19 The visual effect shown on the Indicative Landscape Strategy Plan (Figure 10.76) at Winter Year 1, the impact magnitude would be Large in those areas of the pitches closest to the Site. The significance of effects experienced by the people using the sports pitches would be **Moderate adverse**, which is not significant. The effects would lessen over time, and by Summer Year 10, the proposed planting would be established and, where it is proposed between the built form and the pitches, along the road, would assist in softening it.

10.10.20 However, as a worst case/maximum design scenario for visual impact, where the built form is located around the edge of the development zones shown on the parameter plan (Figure 10.75) with little visual permeability between the buildings, there would be no planting on the northern boundary and no corresponding softening of the built form. The significance of effects experienced by people using the sports pitches in this scenario would be **Major adverse**, which is significant.

Dynamic receptors

10.10.21 Cyclists travelling along roads have a slightly raised sensitivity (Medium) than other road users, to the proposed development.

10.10.22 The magnitude of the impact of the proposed development (as shown on the Indicative Landscape Strategy Plan, Figure 10.76) would vary. As well as the screening provided by vegetation, the change in views is dependent on the distance from the proposed development, the orientation of the road and direction of travel of the cyclists. The closest roads are the minor roads from Ambrosden to the A41 and between Ambrosden to Merton. Available views from both these locations are restricted by vegetation, either by roadside vegetation, or by vegetation within the farmland between the roads and the Site. However, there will be views of the upper part of the buildings. At Winter Year 1 the impact on cyclists in both these locations is considered to be Small to Medium. The significance of effects of the proposed development on cyclists is judged to be **Minor adverse** to **Moderate adverse**, which are not significant. The effects would lessen over time, and by Summer Year 10, the proposed planting would be established and, where it is proposed between the built form and the pitches, along the road, would assist in softening the built form and lessening the impacts.

10.10.23 However, as a worst case/maximum design scenario for visual impact, where the built form is located around the edge of the development zones shown on the parameter plan (Figure 10.75) with little visual permeability through the development, there would be no planting on the eastern and southwestern boundaries other than the retained planting and no corresponding softening of the built form. The significance of effects experienced by cyclists on roads in this scenario would be **Moderate adverse**, which is not significant.

Representative Viewpoints

Representative Viewpoint 6: View southwest from public right of way Ambrosden 105/1/20, north of Little Wretchwick Farm

10.10.24 Representative Viewpoint 6 (Figures 10.57, 10.58 and 10.59) is located on a PRoW and walkers using the public footpath are of a High sensitivity.

10.10.25 Due to the footpath's situation, to the northeast of the of the Site, with Graven Hill and vegetation, all but obscuring views of the proposed development (as shown on the Indicative Landscape Strategy Plan, Figure 10.76) the impact would be limited. The upper parts of the easternmost proposed buildings might be visible from this location, potentially seen on the skyline, beyond the buildings at Symmetry Park. The magnitude of impact from this location is considered to be Negligible to Small, dependent on the location of the visual receptor on the PRoW. At Winter Year 1 the impact on walkers at this representative viewpoint location is considered to be Small. The significance of effects of the proposed development on walkers, using the PRoW network in this area is judged to be **Minor adverse**, which is not significant. As only the upper parts of the built form would be visible the impact would not be lessened by any proposed planting becoming established over time.

10.10.26 In the worst case/maximum design scenario for visual impact, where the built form would be located around the edge of the development zones shown on the parameter plan (Figure 10.75) with little visual permeability through the development, the significance of effect is judged to be **Minor adverse**, which is not significant.

Representative Viewpoint 7: View north-northwest from junction of public right of way Merton 295/7/10 with minor road, southwest of Ambrosden

10.10.27 Representative Viewpoint 7 (Figures 10.60, 10.61 and 10.62) is located at a high point of this public footpath, walkers using it are of a High sensitivity to the proposed development.

10.10.28 Due to the vegetation surrounding the Bicester Solar Farm and along the tributary of the River Ray, views towards the proposed development (as shown on the Indicative Landscape Strategy, Figure 10.76) from this PRoW are limited. Only the upper parts of the built form would be visible from this footpath, seen with Graven Hill as a backdrop. The magnitude of impact from this location is considered to be Negligible to Small, dependent on the location of the visual receptor. At Winter Year 1 the significance of effect is judged to be **Minor adverse**, which is not significant. As only the upper parts of the built form would be visible the impact would not be lessened by any proposed planting becoming established over time.

10.10.29 In the worst case/maximum design scenario for visual impact, where the built form would be located around the edge of the development zones shown on the parameter plan (Figure 10.75) with little visual permeability through the development, the significance of effect is judged to be **Minor adverse** to **Moderate adverse**, dependent on where the visual receptor is on the PRoW, which are not significant effects.

Representative Viewpoint 8: View north-northeast from public right of way Merton 295/2/2, north of Merton

10.10.30 Representative Viewpoint 8 (Figures 10.63, 10.64 and 10.65) is located at on a public footpath. Walkers have a High sensitivity to the proposed development.

10.10.31 Due to the vegetation surrounding the Bicester Solar Farm, Merton Grounds and that along the tributary of the River Ray, immediately to the south of the Site, views of the proposed development (as shown on the Indicative Landscape Plan, Figure 10.76) would be limited. Only the upper parts of the built form would be visible from this footpath, seen with Graven Hill to the north. The magnitude of impact from this location is considered to be Negligible to Small, dependent on the location of the visual receptor along the PRoW. At Winter Year 1 the significance of effect is judged to be **Minor adverse**, which is not significant. As only the upper parts of the built form would be visible the impact would not be lessened by any proposed planting becoming established over time.

10.10.32 In the worst case/maximum design scenario for visual impact, where the built form would be located around the edge of the development zones shown on the parameter plan (Figure 10.75) with little visual permeability through the development, the significance of effect is judged to be **Minor adverse**, which is not a significant effect.

Representative Viewpoint 9: View northeast from the junction of Langford Lane with public right of way Merton 295/4/20, north of Merton Grounds

10.10.33 Representative Viewpoint 9 (Figures 10.66, 10.67 and 10.68) lies at a high point on this public bridleway. Users of the bridleway have a High sensitivity to the proposed development.

10.10.34 Due to the footpath's situation, to the northwest of the of the Site, with Graven Hill and vegetation limiting available views, the impact of the proposed development (as shown on the Indicative Landscape Strategy Plan, Figure 10.76) would be limited. Only the upper parts of the built form would be visible from this footpath, seen with Graven Hill to the north. The magnitude of impact from this location is considered to be Negligible to Small, dependent on the location of the visual receptor along the PRoW. At Winter Year 1 the significance of effect is judged to be **Minor adverse**, which is not significant. As only the upper parts of the built form would be visible the impact would not be lessened by any proposed planting becoming established over time.

10.10.35 In the worst case/maximum design scenario for visual impact, where the built form would be located around the edge of the development zones shown on the parameter plan (Figure 10.75) with little visual permeability through the development, the significance of effect is judged to be **Minor adverse** to **Moderate adverse**, dependent on where the user is on the PRoW, which are not significant effects.

Representative Viewpoint 15: View northwest from public right of way Piddington 321/7/40 at Muswell Hill

10.10.36 The visual receptors at Representative Viewpoint 15 (Figures 10.69, 10.70 and 10.71) are considered to have a High sensitivity to the proposed development, as they are on PRoW.

10.10.37 Despite the distance from the Site, the proposed development (as shown on the Indicative Landscape Plan, Figure 10.76) would be visible at this location, due to the elevation of the location. It would be seen with the backdrop of Graven Hill, but would not break the skyline. The magnitude of this potential change in view would be Negligible. At Winter Year 1 the significance of effect is judged to be **Minor adverse**, which is not significant. As only the upper parts of the built form would be visible the impact would not be lessened by any proposed planting becoming established over time.

10.10.38 In the worst case/maximum design scenario for visual impact, where the built form would be located around the edge of the development zones shown on the parameter plan (Figure 10.75) with little visual permeability through the development, the significance of effect is also judged to be **Minor adverse**, which is not significant.

Representative Viewpoint 16: View northwest from public right of way Arncott 110/10/10 at Arncott Hill

10.10.39 Walkers using the public footpath at Representative Viewpoint 16 (Figures 10.51 and 10.52) are considered to have a High sensitivity to the proposed development. No photomontages have been undertaken from this viewpoint, as Representative Viewpoint 17, is closer and more open).

10.10.40 The footpath, reached by using permissive paths through private woodland, is located beyond the brow of Arncott Hill. The topography restricts the depth of the distant view, as most is taken up with the foreground hill. The magnitude of this potential change (as shown on the Indicative Landscape Plan, Figure 10.76) in view would be Negligible. At Winter Year 1 the significance of effect is judged to be **Minor adverse**, which is not significant. As only the upper parts of the built form would be visible the impact would not be lessened by any proposed planting becoming established over time.

10.10.41 In the worst case/maximum design scenario for visual impact, where the built form would be located around the edge of the development zones shown on the parameter plan (Figure 10.75) with little visual permeability through the development, the significance of effect is judged to be **Minor adverse**, which is not significant.

Representative Viewpoint 17: View northwest from public right of way Arncott 110/9/10 on Patrick Haugh Road, Arncott Hill

10.10.42 Walkers using the PRoW on which Representative Viewpoint 17 (Figures 10.72, 10.73 and 10.74) is located have a High sensitivity to the proposed development.

10.10.43 Although at a lower elevation than Representative Viewpoint 16, the views are less restricted by topography. The magnitude of impact of the Proposed Development (as shown on Figure 10.76) at this more open location is considered to be Small. At Winter Year 1 the significance of effect is judged to be **Minor adverse**, which is not significant. As only the upper parts of the built form would be visible the impact would not be lessened by any proposed planting becoming established over time.

10.10.44 In the worst case/maximum design scenario for visual impact, where the built form would be located around the edge of the development zones shown on the parameter plan (Figure 10.75) with little visual permeability through the development, the significance of effect is judged to be **Moderate adverse**, which is not significant.

Night-time Effects

10.10.45 With regard to lighting perceived by human receptors, the LIA concludes that although some lit areas of the development will be visible, views of the proposed development will be generally screened by existing woodland and the proposed buildings. The impact of the new lighting is judged to be Negligible (LIA, paragraphs 5.36 and 5.37).

10.10.46 The most noticeable effect of the proposed lighting would be a slight increase in sky glow (LIA, paragraph 6.7).

10.10.47 The effects on the Medium to High sensitivity visual receptors is judged to be **Negligible adverse** to **Minor adverse**, which are not significant.

Further mitigation

10.10.48 The proposed development would incorporate a landscape strategy as an integral part of the design (Figure 10.76 Indicative Landscape Strategy) and would be implemented as part of the proposals. No additional mitigation requirement has been identified.

Future Monitoring

10.10.49 Landscape management would be required for a period of five years following completion of the development to ensure that the newly planted areas become well established and meet their landscape potential. Management would include the replacement of dead, dying or damaged stock or those that fail to establish satisfactorily. Pruning that would be beneficial for plant growth, form and plant health would be promoted. A detailed LEMP would be provided as part of a reserved matters approval application.

Accidents and/or Disasters

10.10.50 With respect to landscape, townscape and visual matters, potential accidents/disasters relevant to the operation phase of the proposed development are unlikely. There is a potential risk of introduced diseases affecting vegetation, for example ash dieback disease

(*Hymenocyphus fraxineus*). In this case, and as a precautionary measure, ash would not been specified within proposed planting mixes.

Summary of Effects

10.10.51 As explained in section 10.3, GLVIA only requires that those potentially significant effects are assessed. and section 6 explains why there is not the potential for certain landscape and visual resources and receptors to be significantly affected and that they therefore have been excluded from the assessment.

Summary of landscape character effects

10.10.52 The Site is atypical of the published national, county or district landscape character areas and landscape types, in most respects, in that it is an area of land that has been occupied by the MoD since the middle of the Twentieth Century. The most accurate, published description of the Site is within the text of Cherwell Local Plan at Strategic Policy Bicester 2 – Graven Hill and paragraphs C.51 to C.57. In which it is described as previous developed land – a major logistics and distribution hub for the MoD. The proposal for the Site, in the Local Plan, is for a Rail Freight Interchange (paragraphs C.58 to C.59).

10.10.53 Due to the current landscape character of the Site, and the fact that it is such a small part of the National Character Area (NCA) there is no potential for there to be any significant adverse effects on the NCA. As a larger part of the county/regional character areas (RCA) and district landscape types (LTs), the potential for significant effects on these resources was assessed. However, it was judged that there would be no significant effects either at the demolition and construction phase, or the operational phase of the proposed development, on either those areas in which it was located, or adjacent RCAs). Although it is noted that the effects would be greater at the demolition and construction phase of the project.

10.10.54 The direct effects on the landscape features, elements and characteristics present on the Site itself will be mitigated, in part, by the proposal to set the new buildings within a high-quality landscape, which includes green fingers providing connectivity through the proposed development, linking to retained areas of woodland on the southern and south-eastern boundaries and beyond (Figure 10.75 Parameters Plan). Due to this mitigation, which will be built into the final design of the project, there would be no significant effects on the landscape receptors on the Site itself, at either phase. Although it is noted that the effects would be greater at the demolition and construction phase of the project.

Summary of visual effects

10.10.55 Due to the lack of public access in and around the immediate environs of the Site, publicly accessible vantage points are limited. The low-lying vale landscape, surrounding most of the Site is farmland, divided by hedgerows, with hedgerow trees, tree belts, copses and small areas of woodland. These vertical features assist in screening the existing buildings, even in winter. More distant locations where the ZTV indicates that there is theoretical visibility (Figure 10.20) often have many layers of vegetation between publicly accessible areas and the Site, from these locations the proposed development will be substantially screened. Where the land is higher than the flat vale landscape, the views can be panoramic. However, these areas are more distant from the Site and the proposed development will not significantly affect people at these locations.

10.10.56 In close views, those with no or little vegetation between the viewer and the proposed development there will be a larger magnitude of impact and there is the potential for significant effects, during the construction phase. With the worst case/maximum design parameter scenario, the potential for significant effects increases, particularly if lighting is proposed on the Site boundaries.

Table 10.6: Summary of Likely Environmental Effects on Landscape and Visual Resources

Resource - receptor	Sensitivity of resource / receptor to the proposed development	Description of impact	Short / long-term	Magnitude of impact	Significance of effect	Significant / not significant	Notes
Demolition and construction phase							
Landscape resources and receptors							
Oxfordshire Regional Character Area: Upper Thames Vale	Low	Direct	Short-term, temporary	Large	Moderate adverse	Not significant	
Cherwell District Landscape Type 1: Alluvial Lowlands	Low	Direct	Short-term, temporary	Large	Moderate adverse	Not significant	
Cherwell District Landscape Type 3 Clay Vale	Low	Direct	Short-term, temporary	Large	Moderate adverse	Not significant	
Cherwell District Landscape Type 22: Wooded Hills	Low	Direct	Short-term, temporary	Large	Moderate adverse	Not significant	
Adjacent character areas and landscape types	Aylesbury Vale LCA Brill and Muswell Hill – Medium Other LCAs – Low	Indirect	Short-term, temporary	Negligible	Negligible adverse	Not significant	
Landscape features, elements, characteristics on the Site	Woodlands - High	Direct	Short-term, temporary	Large	Major adverse to Negligible adverse	Significant to not significant	

Resource - receptor	Sensitivity of resource / receptor to the proposed development	Description of impact	Short / long-term	Magnitude of impact	Significance of effect	Significant / not significant	Notes
	Other elements / characteristics - Negligible						
Night-time effects	No night-time demolition or construction working is proposed						
Visual receptors							
Users of Public Rights of Way	High	Direct	Short-term, temporary	Negligible to Medium	Negligible adverse to Moderate adverse	Not significant	
Participants in other recreational activities – MoD sports pitches	Medium	Direct	Short-term, temporary	Large	Moderate adverse	Not significant	
Cyclists using the road network	Medium	Direct	Short-term, temporary	Negligible to Small	Negligible to Minor adverse	Not significant	
Representative Viewpoint 6	High	Direct	Short-term, temporary	Negligible to Small	Minor adverse	Not significant	
Representative Viewpoint 7	High	Direct	Short-term, temporary	Small	Minor to Moderate adverse	Not significant	
Representative Viewpoint 8	High	Direct	Short-term, temporary	Negligible to Small	Minor adverse	Not significant	
Representative Viewpoint 9	High	Direct	Short-term, temporary	Small	Minor adverse	Not significant	

Resource - receptor	Sensitivity of resource / receptor to the proposed development	Description of impact	Short / long-term	Magnitude of impact	Significance of effect	Significant / not significant	Notes
Representative Viewpoint 15	High	Direct	Short-term, temporary	Negligible	Minor adverse	Not significant	
Representative Viewpoint 16	High	Direct	Short-term, temporary	Negligible	Minor adverse	Not significant	
Representative Viewpoint 17	High	Direct	Short-term, temporary	Small	Minor adverse	Not significant	
Night-time effects	No night-time demolition or construction working is proposed						
Operational phase							
Landscape resources and receptors							
Oxfordshire Regional Character Area: Upper Thames Vale	Low	Direct	Long-term permanent	Medium	Minor adverse	Not significant	
Cherwell District Landscape Type 1: Alluvial Lowlands	Low	Direct	Long-term permanent	Medium	Minor adverse	Not significant	
Cherwell District Landscape Type 3 Clay Vale	Low	Direct	Long-term permanent	Medium	Minor adverse	Not significant	
Cherwell District Landscape Type 22: Wooded Hills	Low	Direct	Long-term permanent	Medium	Minor adverse	Not significant	

Resource - receptor	Sensitivity of resource / receptor to the proposed development	Description of impact	Short / long-term	Magnitude of impact	Significance of effect	Significant / not significant	Notes
Adjacent character areas and landscape types	Aylesbury Vale LCA Brill and Muswell Hill – Medium Other LCAs – Low	Indirect	Long-term permanent	Negligible	Negligible adverse	Not significant	
Landscape features, elements, characteristics on the Site	Woodlands - High Other elements / characteristics - Negligible	Direct	Long-term permanent	Woodlands – Negligible. Other elements / characteristics – Medium	High quality trees and woodland edge (if impacted) – Moderate adverse to Negligible adverse. Other elements / characteristics – Minor adverse to Neutral	Not significant	
Night-time effects	Low to High	Direct and indirect	Long-term permanent	Negligible	Negligible adverse to Minor adverse	Not significant	
Visual receptors							
Users of Public Rights of Way	High	Direct	Long-term permanent	Medium	Moderate adverse	Not significant	Maximum design scenario
Participants in other recreational activities – MoD sports pitches	Medium	Direct	Long-term permanent	Large	Major adverse	Significant	Maximum design scenario
Cyclists using the road network	Medium	Direct	Long-term permanent	Medium	Moderate adverse	Not significant	Maximum design scenario

Resource - receptor	Sensitivity of resource / receptor to the proposed development	Description of impact	Short / long-term	Magnitude of impact	Significance of effect	Significant / not significant	Notes
Representative Viewpoint 6	High	Direct	Long-term permanent	Small	Minor adverse	Not significant	Maximum design scenario
Representative Viewpoint 7	High	Direct	Long-term permanent	Small	Minor to Moderate adverse	Not significant	Maximum design scenario
Representative Viewpoint 8	High	Direct	Long-term permanent	Negligible to Small	Minor to Moderate adverse	Not significant	Maximum design scenario
Representative Viewpoint 9	High	Direct	Long-term permanent	Small	Minor to Moderate adverse	Not significant	Maximum design scenario
Representative Viewpoint 15	High	Direct	Long-term permanent	Negligible	Minor adverse	Not significant	Maximum design scenario
Representative Viewpoint 16	High	Direct	Long-term permanent	Negligible	Minor adverse	Not significant	Maximum design scenario
Representative Viewpoint 17	High	Direct	Long-term permanent	Small	Moderate adverse	Not significant	Maximum design scenario
Night-time effects	Medium to High	Direct	Long-term permanent	Negligible	Negligible adverse to Minor adverse	Not significant	Maximum design scenario

Potential Changes to the Assessment as a Result of Climate Change

10.10.57 The likely ranges of change in climatic parameters including precipitation, temperature, wind speed, humidity and frequency of extreme weather may affect the native flora. However, while this would not increase the sensitivity of receptors, it may affect the magnitude of impact, e.g. the proposed development may be more visible to people who only have semi-screened views at present, or it may increase the number of receptors, where tree-cover loss could enable views not currently possible. Other species may thrive and replace any loss of vegetation. As this aspect of the effects of climate change is uncertain, it is difficult to predict the significance of effects.

10.11 Secondary Mitigation and Enhancement

10.11.1 No secondary mitigation is proposed, as the landscape proposals form part of the project design.

10.12 Residual Effects

10.12.1 The assessment of significance of the Proposed Development on the existing landscape and visual resources and receptors has been made with the landscape mitigation proposals in place. No further landscape mitigation is proposed.

10.13 Monitoring

10.13.1 Any proposed planting would be monitored for five years. Any dead, or dying, plants would be replaced and any defects made good. A LEMP would be submitted as part of a detailed reserved matters approval application. This would be a 'live' document, to guide the maintenance and long-term management of the proposed landscape.

10.14 Cumulative Landscape and Visual Effects

10.14.1 The cumulative assessment considers the landscape and visual effects associated with the Graven Hill D1 Site project together with other proposed developments. More specifically, the assessment considers the significance of additional effects arising on the existing landscape character and visual resources of the study area in combination with other proposed developments that are allocated, consented, or for which planning permission is currently being sought, within a 10 km radius of the Proposed Development. Excluded from the cumulative assessment are those projects that are already built and in operation which form part of the landscape and visual baseline and which therefore have already been considered in the LVIA.

10.14.2 **Table 10.7,** below lists the planned developments agreed with Cherwell District Council to be considered within the Cumulative Impact Assessment. The locations of the schemes within the planning system are shown in **Appendix 6.1.**

Table 10.7: Cumulative Schemes

Application	Status	Distance from Site	Cumulative impact on landscape and visual resources and receptors – overview
A separate planning application has been submitted for the demolition of the existing buildings within the Site (yet to be determined).	Submitted	0 m	Demolition forms part of the application for the planning permission, so is not considered as a separate cumulative development.
Application Reference: 20/02415/F Employment Access Road (EAR)	Permitted	Detailed permission, for road improvements on the route of Anniversary Avenue, St. David's Barracks at Graven Hill MoD site, Bicester. 0 m, adjacent to part of the northern boundary of the Site.	**Landscape resources and receptors:** During the demolition and construction phase the main effect that might occur is a temporal one – if the demolition and construction of the proposed development at the Site (programmed for Q3 2022 to 2024) overlaps with the construction of the road improvements along Anniversary Avenue. The cumulative development lies within the same National Character Area (NCA 108: Upper Thames Clay Vales) Oxfordshire Landscape Character Area (Upper Thames Clay Vale) and Cherwell District Landscape Types (Wooded Hills). There would be the potential for a temporary impact on these LCAs and LT, primarily through an increase in construction traffic, noise and movement in the landscape. This temporary effect is not considered to be significant. During the operational phase the impact of the road improvements will be a slight increase in the infrastructure on Graven Hill. However, the road will be replacing an existing road, as the proposed development is, in part, replacing existing buildings and so both are on land that has been previously developed. The effect on landscape receptors of the two projects is not considered to be significant. During the operational phase the impact of the built development would be to increase the amount of development. However, both projects are in part replacing existing infrastructure buildings and so are on land that has been previously developed. The effect on landscape receptors of the two projects is not considered to be significant.

Application	Status	Distance from Site	Cumulative impact on landscape and visual resources and receptors – overview
			Visual receptors: During the demolition and construction phase, if there is a temporal overlap of construction programmes there will be a temporary impact on road users, from construction traffic and on those people using the sports pitches at St. David's Barracks. The significance of the temporary effect on visual receptors is not considered to be significant on road users, but will be significant on those people using the sports pitches. During the operational phase of the proposed development the effect on visual receptors is judged to be not significant, as not all of the developments would be visible in one view, due to the fact that they are divided by woodland and will be substantially screened by the woodland and tree belts that surround them. During the demolition and construction phase
The master plan for Graven Hill The planning application at the wider Graven Hill site (11/01494/OUT as amended under 19/00937/OUT). Excluding the employment element of the permission which forms the basis of the Site.	Permitted	The residential element is located to the north of Graven Hill adjoining and to the north of the Site. The employment uses are located to the south of Graven Hill (Sites D1 and EL1) at the Site 0 m.	Specifically, variation of conditions and amending applications (via S.73 MMA and S.96 NMA) have been made to planning application 11/01494/OUT and subsequent consents. The residential element of the 2011 application and any amendments **Landscape resources and receptors:** During the demolition and construction phase the main effect that might occur is a temporal one – if the demolition and construction of the proposed development at the Site (programmed for Q3 2022 to 2024) overlaps with the construction of the residential element at Graven Hill. The cumulative development lies within the same National Character Area (NCA 108: Upper Thames Clay Vales) Oxfordshire Landscape Character Area (Upper Thames Clay Vale) and Cherwell District Landscape Types (Wooded Hills, Clay Vale and Alluvial Lowland) There would be the potential for a temporary impact on these LCAs and LTs, primarily through an increase in

Application	Status	Distance from Site	Cumulative impact on landscape and visual resources and receptors – overview
			construction traffic, noise and movement in the landscape. This temporary effect is not considered to be significant. During the operational phase the impact of the built development would be to increase the amount of development. However, both projects are in part replacing existing buildings and so are on land that has been previously developed. The effect on landscape receptors of the two projects is not considered to be significant. **Visual receptors:** During the demolition and construction phase, if there is a temporal overlap of construction programmes there will be a temporary impact on road users, from construction traffic. The significance of the temporary effect on visual receptors is not considered to be significant. During the operational phase of the proposed development the effect on visual receptors is judged to be not significant, as not all of the developments would be visible in one view, due to the fact that they are divided by woodland and will be substantially screened by the woodland and tree belts that surround them.
Application Reference: 19/00388/F Warehouse development at Symmetry Park, Bicester Site.	Permitted	Outline and Detailed permission, at Symmetry Park, A41, Bicester. Approximately 0.5 km from the Site.	**Landscape resources and receptors:** During the demolition and construction phase the main effect that might occur is a temporal one – if the demolition and construction of the proposed development at the Application Site (programmed for completion 2024) overlaps with the construction of the warehouses at Symmetry Park. The cumulative development lies within the same National Character Area (NCA 108: Upper Thames Clay Vales) Oxfordshire Landscape Character Area (Upper Thames Clay Vale) and in part, Cherwell District LT (Clay Vale). There would be the potential for a temporary impact on these LCAs and LT, primarily through an increase in construction traffic noise and movement in the landscape. This temporary effect is not considered to be significant.

Application	Status	Distance from Site	Cumulative impact on landscape and visual resources and receptors – overview
			During the operational phase the impact of the built development would be to increase the amount of development. However, the effect on landscape receptors of the two projects is not considered to be significant. **Visual receptors:** During the demolition and construction phase, if there is a temporal overlap of construction programmes there will be a temporary impact on road users, from construction traffic. The significance of the temporary effect on visual receptors is not considered to be significant. During the operational phase of the proposed development the effect on visual receptors is judged to be not significant, as not all of the development would be visible in one view, due to the fact that they are divided by woodland and will be substantially screened by the woodland and tree belts that surround them
Application Reference 16/01268/OUT Residential Development on land off Wretchwick Way (Wretchwick Way Site)	In Planning	Outline planning application for 1,500 homes, employment and community uses, by Redrow Wates, on land off A4421 Wretchwick Way, Bicester. Approximately 0.5 km from the Site.	**Landscape resources and receptors:** During the demolition and construction phase the main effect that might occur is a temporal one – if the demolition and construction of the proposed development at the Application Site (programmed for Q3 2022 to 2024) overlaps with the construction of this project. The cumulative development lies within the same National Character Area (NCA 108: Upper Thames Clay Vales) Oxfordshire Landscape Character Area (Upper Thames Clay Vale) and in part one of the Cherwell District LTs (Clay Vale). There would be the potential for a temporary impact on these LCAs and LT, primarily through an increase in construction traffic, noise and movement in the landscape. This temporary effect is not considered to be significant.

Application	Status	Distance from Site	Cumulative impact on landscape and visual resources and receptors – overview
			During the operational phase the impact of the built development would be to increase the amount of development. However, the effect on landscape receptors of the two projects is not considered to be significant. **Visual receptors:** During the demolition and construction phase, if there is a temporal overlap of construction programmes there will be a temporary impact on road users, from construction traffic. The significance of the temporary effect on visual receptors is not considered to be significant. During the operational phase of the proposed development the effect on visual receptors is judged to be not significant, as not all of the development would be visible in one view, due to the fact that they are divided by woodland and will be substantially screened by the woodland and tree belts that surround them

10.14.3 The potential effects on the landscape and visual resources and receptors are described in **Table 10.7**, above.

10.14.4 None of the cumulative developments identified in **Table 10.7,** above, would have a significant adverse effect taken together with the proposed development at the Site, either at the construction or operational phases.

10.14.5 In addition, the consideration of cumulative effects has considered the various infrastructure upgrade works. These upgrades and infrastructure enhancements would be undertaken by the various statutory and licenced utility providers and would follow industry-standard construction methodologies and guidelines.

10.14.6 The main potential landscape and visual impacts associated with the infrastructure upgrade works would be related to the construction period for such works. No impacts on landscape character and visual receptors are predicted once the upgraded infrastructure is operational.

10.14.7 Works to install the upgrades would be undertaken by the utility providers and would follow standard construction methodologies. The works would be primarily underground therefore, there would be no long-term cumulative effects on landscape character or visual impacts.

Inter-relationships

10.14.8 Inter-relationships are considered to be the impacts and associated effects of different aspects of the construction and operation of the proposed development on the same receptor. The following assessments have been made.

Project lifetime effects

10.14.9 The assessment of project lifetime effects is the assessment of the potential for effects that occur during more than one stage of the development's lifetime (demolition, construction or operation) to interact such that they may create a more significant effect on a receptor than when assessed in isolation for each stage.

10.14.10 With regards to the proposed development, there will be no additional effects on landscape and visual resources over the lifetime of the project. Indeed, as the planting matures any adverse effects will reduce.

Receptor-led effects

10.14.11 The assessment of receptor-led effects is the assessment of the potential for effects via multiple environmental or social pathways to interact, spatially and temporally, to create a greater inter-related effect on a receptor than is predicted for each pathway individually.

10.14.12 With regards to the proposed development, the replacement of the MoD warehouses with larger warehouses on the same site, will not significantly change the overall character of the LCA and LTs in which it is located, or those adjacent to the Site. There will be an increase in the amount of built development seen by people from public viewpoints, who may also experience an increase in traffic movements in the area. This increasing urbanisation is part of the evolving landscape around Bicester. The acceptance of these changes is implicit in the allocation of sites around the town for built development and infrastructure projects.

10.15 Comparison to the Baseline

Comparative Landscape Effects

10.15.1 While the same LCA and LTs will be directly affected by the proposed development as the existing development on the Site, a comparative ZTV has been undertaken, which illustrates

the increase in indirect impacts on the surrounding LCAs and LTs with the proposed development. A review of the comparative ZTV with LCAs and LTs at (Figure 10.77) reveals that to the north and east, in particular, there are additional areas of land that have the potential to be affected. In all other directions there are smaller additional areas of the LCAs and LTs that have the potential to be affected. These areas are generally distant and the effects on these additional LCAs and LTs do not have the potential to experience significant effects, as they are generally large tracts of land.

Comparative Visual Effects

10.15.2 The comparative ZTV (10.77) also highlights areas where there is the potential for additional visual receptors to have views of the Proposed Development. A review of the visual receptors within the expanded ZTV illustrate that most visual receptors would not experience significant effects from the proposed development. For those people at publicly accessible locations within the ZTV for the 2014 Planning Permission and the ZTV for the Proposed Development, there will be an increased magnitude of impact, due to the taller buildings, and in the worst case/maximum design scenario, a different layout and therefore more visible built form. From certain, close locations, for Medium and High sensitivity receptors, this would result in potentially significant effects.

10.16 Comparison to 2014 Planning Permission

Comparative Landscape Effects

10.16.1 While the same LCA and LTs will be directly affected by the Proposed Development as the 2014 Planning Permission, a comparative ZTV has been undertaken, which illustrates the increase in indirect impacts on the surrounding LCAs and LTs with the proposed development. A review of the comparative ZTV (Figure 10.78) reveals that to the northeast, the southeast, south, southwest and west, the areas covered by the ZTV are broadly similar. However, the increase in height of the proposed development means that areas of land not previously affected now are, that is the east, the northwest and the north. These areas are generally distant and the effects on these additional LCAs and LTs do not have the potential to experience significant effects, as they are large tracts of land.

Comparative Visual Effects

10.16.2 The comparative ZTV also highlights additional visual receptors (Figure 10.78). A review of the visual receptors within the expanded ZTV illustrate that visual receptors would not experience significant effects from the Proposed Development. For those people at publicly accessible locations within the ZTV for the 2014 Planning Permission and the ZTV for the proposed development, there will be an increased magnitude of impact, due to the taller buildings, and in the worst case/maximum design scenario, a different layout and therefore more visible built form. From certain, close locations, for Medium and High sensitivity receptors, this would result in potentially significant effects.

Summary of Additional Effects

10.16.3 The additional effects on landscape resources and receptors would not be significant. The additional effects on a small number of close visual receptors have the potential to be significant.

10.17 References

Publications

- Council of Europe (2000, ratified 2006) European Landscape Convention.

- Landscape Institute, 2019, Technical Guidance Note 2/19 Residential Visual Amenity Assessment.
- Landscape Institute, 2019, Technical Guidance Note 06/19 Visual Representation of Development Proposals.
- Landscape Institute, 2021, Technical Guidance Note 02/21: Assessing landscape value outside national designations.
- Landscape Institute and Institute of Environmental Management and Assessment, 2013, Guidelines for Landscape and Visual Impact Assessment: Third Edition.
- Ministry of Housing, Communities and Local Government, July 2021, National Planning Policy Framework.
- Natural England, 2014, *An Approach to Landscape Character Assessment.*

Online Resources

- Natural England (accessed May 2022) National Landscape Character Areas, National Character Area (NCA) 108: Upper Thames Clay Vale. http://publications.naturalengland.org.uk/publication/5865554770395136?category=587130
- Oxfordshire County Council (accessed May 2022) Oxfordshire Wildlife and Landscape Study. https://owls.oxfordshire.gov.uk/wps/wcm/connect/occ/OWL

11 Hydrology and Flood Risk

11.1 Introduction

11.1.1 This chapter, prepared by RPS, reports on the assessment of the effects of the Proposed Development with regard to water resources and flood risk. The key issues identified to be addressed within this assessment relate to the potential effects of the Proposed Development on local flood risk (including effects of site drainage), and effects on water resources, including water quality, flow regimes and availability of water supply.

11.1.2 The chapter describes the assessment methodology; the baseline conditions currently existing at the site and in the surrounding area; the mitigation measures implemented as part of the Proposed Development to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed. Any further mitigation or monitoring requirements are identified.

11.1.3 This chapter should be read in conjunction with the Flood Risk Assessment (FRA) "HLEF78162_ Graven Hill Flood Risk Report" which has also been prepared by RPS and which is enclosed at **Appendix 11.1** and the Graven Hill Site D1, Bicester, Outline Sustainable Drainage Systems, (SuDS) Strategy (Alan Baxter, April 2022) is enclosed at **Appendix 11.2.**

11.2 Policy Context, Legislation, Guidance and Standards

European Legislation

Water Framework Directive

11.2.1 The European Water Framework Directive (WFD) came into force in December 2000 and became part of UK law in December 2003. The Directive is designed to help protect and enhance the quality of surface water (including lakes, streams and rivers), groundwater, groundwater dependant ecosystems, estuaries and coastal waters out to one mile from lowwater.

National Planning Policy

11.2.2 Relevant national policy is set out within Section 2 of **Appendix 11.1** and includes policy set out within the following documents:

- The National Planning Framework (NPF) (July 2021);
- National Planning Practice Guidance (June 2021)
- EA (2016) River Basin Management Plans

Local Planning Policy

11.2.3 Relevant local policy is set out within Section 2 of **Appendix 11.1.** Current local planning policy is set out in:

- Adopted Cherwell Local Plan 2011-2031 (Part 1).

11.2.4 The assessment work has taken into account the flood risk information and policy outlined within Local Plan.

11.2.5 Details of the relevant European, national, regional and local planning policy context, in addition to other relevant guidance, can be found in **Appendix 11.1.**

11.3 Consultation

11.3.1 Consultations have been undertaken during the course of this assessment. **Table 10.1** sets out consultation responses received in relation to water resources and flood risk.

Table 1: Consultation Responses

Consultee	Issue	How This Has Been Addressed in the ES
Cherwell District Council	Consultation has been undertaken with the Council in October 2020 regarding surface water management schemes and acceptable surface water run-off rates. The Building Control Manager at Cherwell District Council, (Tony Brummell) has advised the following: • *The ground in this locality is highly impermeable and there is clearly a surface water flood risk. When operating as a military establishment this risk was reduced by cutting deep wide drainage ditches. As far as the Council is aware these were generally well maintained by the military and they are not aware of any historic flooding. That said, Graven Hill was a restricted site and the Council would probably not have known if there had been flooding.* • *It is essential that these drainage ditches are retained, or if needing to be diverted, are replaced by ditches or culverts with no less conveyance capacity.* • *It is suggested that the flood risk assessment is approached on an incremental basis. A comparison of the proposed impermeable area with the existing at the site would inform the approach to the Flood Risk Assessment. If impermeable area is increasing, the Council would expect attenuation to be provided according to the greenfield rate.* • *The Council is not aware of any hydraulic modelling that has been done for this site, and they would expect one to support your Flood Risk Assessment.*	**This has been considered in the SuDS Report, see Appendix 11.2.**
	In addition, there are two watercourses/drains designated as Ordinary Watercourses which flow along the south west and south east boundary of the site, and join	Addressed in the Hydraulic Modelling Report – Appendix D of the FRA report

	upstream the culvert under the railway. The Lead Local Flood Authority (LLFA) was consulted, and they have confirmed that the watercourses should be hydrologically modelled in order to assess the risk of flooding to the site from this source.	
	The site is located within an area which is defined as being at >=50%,<75% susceptibility of groundwater flooding.	Reviewed in FRA Appendix 11.1.
	The site is in an area with no reported historic flooding incidents by the EA or the Canal and River Trust.	Reviewed in FRA Appendix 11.1.
Oxfordshire Council	The design team met with OCC's Senior LLFA Engineer on 14/02/2022 to review the emerging proposals and agree the key principles of the strategy to be taken forward to outline planning. The agreed principles are: • *Infiltration of surface water is not feasible. This has been verified by infiltration testing undertaken as part of the SI, which found the soil to be completely impermeable* • *Surface water discharged from the proposed site should be drained to the same location as existing. Sites D1 and EL1 should continue to drain southwards towards outfall 'SW4' which drains to a tributary of the River Ray.* • *The discharge of surface water from the site should be limited to Q_BAR greenfield rate for all rainfall events up to the 1:100 + 40% climate change, unless this is shown to be unfeasible. In order to achieve these discharge rates during periods of heavy rainfall, on-site surface water attenuation will be required.* • *Surface water attenuation should, wherever possible, be provided in the following SuDS features: Swales and ditches, filter drains and perforated pipes, filter strips and rills, open attenuation basins* • *Where space is restricted such that the measures noted above are not practical, belowground*	This has been considered in the SuDS Report, see Appendix 11.2.

	storage may be used to attenuate surface water runoff.	
Environment Agency	Although the site is located within Flood Zone 1, the EA has been contacted with request for information for the flood history in the area and any other flood related issues at the site. In their response from November 2020 the EA have confirmed that they do not have any detailed flood risk modelling in this location and therefore they are unable to provide modelled flood levels and extents for the site.	The full response including the map are provided in Appendix D of the FRA report
Thames Water	Thames Water was consulted for any available flood history and drainage network information at the site. TW have confirmed that according to their flooding records there have been no incidents of flooding in the requested area as a result of surcharging public sewers.	Reviewed in FRA Appendix 11.1.

11.4 Scope of the Assessment

Likely Significant Effects

11.4.1 The Likely Significant Effects are identified in the following sections of this chapter and include:

- Flood Risk
- Water Resources
- Water Quality

11.5 Methodology

Study Area

11.5.1 This assessment focuses on land within the site boundary. However, a wider area extending up to 1 km from the site boundary has been considered where relevant to the assessment of hydrological effects (for example, where a pathway may exist). The 1 km buffer was chosen primarily to identify any existing assets, infrastructure or receptors that have the potential to be affected by the long-term presence of infrastructure constructed above ground in terms of flood risk.

Baseline Data Collection

11.5.2 The baseline characterisation defines how baseline conditions have been assessed (e.g. site visits/surveys/review of publicly available data) and which sources of data have been used.

11.5.3 The baseline assessment has included the review of available historical information, available data and technical reports relating to the Site, the surroundings and environmental sensitivity. The baseline assessment is based on data sourced from a number of different organisations / authorities including:

- Ordnance Survey;

- British Geological Survey;
- Environment Agency;
- Natural England;
- Thames Water; and
- Groundsure Ltd.

11.5.4 The following baseline studies have been used to inform the baseline conditions:

- Flood Risk Assessment for MOD Graven Hill, reference HLEF83418, RPS (see **Appendix 11.1**); and
- Graven Hill Site D1, Bicester, Outline Sustainable Drainage Systems, (SuDS) Strategy (Alan Baxter, April 2022) (see **Appendix 11.2**).

11.6 Assessment

Significance Criteria

11.6.1 The significance of the potential effects of the proposed development takes into account the sensitivity of potential receptors to effects and the likely magnitude of the impact. The assessment methodology has been developed based on RPS's experience as the competent expert of carrying out assessments for a range of developments, reference to policy, legislation and best practice guidance, and reference to environmental designations (for example river quality, aquifer and ecological designations).

Receptor Sensitivity / Value

11.6.2 The sensitivity of the receiving environment is defined in **Table 2**. This table also provides examples of the characteristics that define receptor sensitivity.

Table 2: Example of Definitions of Sensitivity or Value

Sensitivity	Sensitivity / Typical Descriptors
Very High	Very high importance and rarity, national scale, and very limited potential for substitution, e.g. watercourse in use for potable supply, 'other' abstractions, good cyprinid fisheries and natural ecosystems, or those corresponding to good cyprinid ecosystems; watercourse of 'high' chemical or ecological quality under the River Basin Management Plans; Principal Aquifers within groundwater Source Protection Zones; and geological features of national importance.
High	High importance and rarity, national scale, and limited potential for substitution, e.g. watercourse suitable for potable supply, 'other' abstractions, good cyprinid fisheries and natural ecosystems, or those corresponding to good cyprinid ecosystems; watercourse of 'high' chemical or ecological quality under the River Basin Management Plans; Principal Aquifers outside groundwater Source Protection Zones; geological features of regional importance; and human users of residential dwellings.
Medium	Medium importance and rarity, regional scale, limited potential for substitution, e.g. watercourses abstracted for non-potable use; watercourse of 'moderate' chemical or ecological quality under the River Basin Management Plans; Secondary Aquifers; catchments locally important for fisheries; watercourses not widely used for recreation, or recreation use not directly related to watercourse quality; geological features of local importance; and human users of commercial property or construction workers.

Sensitivity	Sensitivity / Typical Descriptors
Low	Low or medium importance and rarity, local scale, e.g. watercourses not subject to abstractions; watercourse of 'poor' or 'bad' chemical or ecological quality under the River Basin Management Plans, receptors not used for recreation; Unproductive Strata; geological features without specific designations.

Magnitude of Impact

11.6.3 The magnitude of impact takes into account the timing, scale, size and duration of the impact. For the purposes of this assessment the magnitude criteria are defined as follows in **Table 3**.

Table 3: Significance Thresholds

Magnitude	Typical Descriptors
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Minor	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

11.6.4 The sensitivity of the receiving environment together with the magnitude of the impact has been taken into account in defining the significance of the effect as outlined in **Table 4**. Where more than one significance level is provided within the table, professional judgement has been used to determine the likely significance of effect.

Table 4: Significance of Effect Matrix

Sensitivity / Value of Receptor	Magnitude of Effect or Impact			
	Major	Moderate	Minor	Not Significant
Very High	Substantial	Major	Moderate	Minor
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Not Significant

Sensitivity / Value of Receptor	Magnitude of Effect or Impact			
	Major	Moderate	Minor	Not Significant
Low	Moderate	Minor	Not Significant	Not Significant
Negligible	Minor	Not Significant	Not Significant	Not Significant

11.6.5 Effects of moderate significance and above are considered significant in EIA terms.

11.6.6 Following their identification, it is proposed that significant effects are classified on the basis of their nature and duration as follows:

- Beneficial – effects that have a positive influence on receptors and resources;
- Adverse – effects that have a negative influence on receptors and resources;
- Temporary – effects that persist for a limited period only (due for example, to particular activities taking place for a short period of time);
- Permanent – effects that result from an irreversible change to the baseline environment (e.g. land-take) or which persist for the foreseeable future (e.g. noise from regular or continuous operations or activities);
- Direct – effects that arise from the impact of activities that form an integral part of the scheme (e.g. direct employment and income generation);
- Indirect – effects that arise from the impact of activities that do not explicitly form part of the scheme (e.g. off-site infrastructure upgrades to accommodate the development);
- Secondary – effects that arise as a consequence of an initial effect of the scheme (e.g. induced employment elsewhere); and
- Cumulative – effects that can arise from a combination of different effects at a specific location or the interaction of different effects over different periods of time.

Limitations

11.6.7 This assessment comprises a desk study with no sampling or testing of water quality undertaken as part of this work as existing information from the Environment Agency is available.

11.7 Baseline Conditions

The Site

11.7.1 A topographical survey of the Site was undertaken in May 2020. The survey indicates that ground levels along Anniversary Avenue to the north of the Site are between 69m AOD and 71m AOD. The site is sloping southwards with an elevation of approximately 65m AOD in the centre of the Site, dropping down to 61.5m AOD in the south corner of the Site.

Geology

11.7.2 Geological maps and initial site investigations indicate that the Site geology consists of made ground and topsoil over sandy Oxford Clay. From nearby borehole logs, the bottom of the Oxford Clay strata appears to be approximately 20-30m below site ground level. Soakaway tests undertaken during the Site investigation have confirmed that the underlying Oxford Clay

has a very low permeability with no infiltration recorded at any of the test locations. The Site Ground Investigation report is presented in the Appendix B of the Drainage Strategy report (**Appendix 11.2**).

11.7.3 The topography and impermeable nature of the underlying soil means that in its natural condition, water falling on the Site would likely have permeated through the top soils and run south, following the contours of the hill, before eventually joining streams and ditches which drain into the River Ray (a tributary of the River Cherwell). The River Ray is approximately 1.5km to the south of the Site.

Water Resources and Hydrology

11.7.4 Reference to OS Mapping indicates that the nearest surface water feature is Langford Brook (the reach Bicester to Ray including Gagle Brook), which flows in southerly direction at about 800m to the west of the Site. The Brook joins Oxon Ray at about 3.5 km south west of the Site. The Brook is classified as 'Main River' (regulated by the Environment Agency).

11.7.5 There are few drains/watercourses located to the south of the Site. One of the drains is flowing along the south west boundary of the Site. An Unnamed watercourse is parallel to the south east border of the Site, situated at a distance of about 200m in the north east and getting closer, at about 60m towards the south corner of the Site. These drains/watercourses are classed as 'Ordinary Watercourses' (regulated by the Local Authority). This was confirmed by the Building Control Manager of CDC. The full response and the associated map are presented in Appendix D of the Floor Risk Assessment Report (**Appendix 11.1)**.

11.7.6 A small pond is present approximately 500 m to the south east of the Site.

11.7.7 No significant artificial watercourses (e.g. canals) have been identified within 1 km of the Site.

Flood Risk

11.7.8 According to the EA Flood Map (EA, 2018b) the Site is located entirely in Flood Zone 1, which is classified as being at low risk of fluvial flooding.

11.7.9 The two peripheral ordinary watercourses have been modelled by the RPS (Graven Hill hydraulic modelling report reference HLEF82585). The modelling results predict that whilst the water will backup at the location of the railway culvert and overtop the banks of the Unnamed watercourse during the 1 in 100 and 1 in 100+15% climate change event, the floodplain will not extend to the site boundaries.

11.7.10 The Site is in an area with no reported historic flooding incidents by the EA of the Canal and River Trust.

11.7.11 The EA's updated Flood Map for Surface Water, which is available online, indicates that a large area in the south east of the Site is at high risk of surface water flooding. In addition, there are several localised linear areas, associated with existing rail tracks within the site, which are at low to high risk of flooding from surface water.

Existing Drainage

11.7.12 The sewer network in the wider area surrounding the Site is operated by Thames Water (TW). According to the information provided by TW foul sewer trunk are running along the south west and south east periphery of the Site. There are three connections from the buildings within the Site to the foul sewer network. It is likely that the remaining buildings within the site boundary are served by a local drainage system but no drainage plans were available at the time of the assessment.

11.7.13 According to the information provided by the CDC, the current owners of the Site (MoD) have cut deep wide drainage ditches across the Site to mitigate the risk of surface water flooding. The Council are not aware of any historic flooding at the Site; however, as military site, Graven Hill is a restricted site and it is possible that even if flooding had occurred in the past, this information has not been provided to the authorities.

Water Quality

11.7.14 As part of the EA's River Basin Management Plan (EA, 2016), the Langford Brook in the vicinity of the Site is classified as having 'Poor' current ecological quality. The chemical quality was 'Good' during the years 2015 and 2016, however, the current status (2019) is "Fail". The Ordinary Watercourses in the vicinity of the site were not classified.

11.7.15 The Envirocheck report for the Site from February 2021 states that one pollution incidents was recorded on 569m distance of the site near Ambrosden. This is reported as Category 3 – Minor incident. The pollution was defined as unknown sewage.

Discharge Consents

11.7.16 According to the Envirocheck report for the Site from February 2021, there are four active discharge consents to surface water from the Site. They relate to the discharge of sewage from a pumping station of a water company. Two of them ultimately discharge into River Ray and the other two flow into Langford Brook. In addition, there are two more discharge consents which are located approximately 289m from the Site. They are related to discharge of sewerage form a domestic and undefined properties respectively and ultimately discharge into a tributary of Langford Brook. Another discharge consent is located approximately 910m from the Site. It is related again to discharge of sewerage form a domestic property and flows into a tributary of River Ray.

Abstraction Licenses

11.7.17 According to the Envirocheck report there are no surface water or groundwater abstraction licences recorded within 1 km of the Site. Abstractions for potable water were recorded 1010m and 1040m southeast of the Site (upstream) for 'drinking, cooking, sanitary, washing, (small garden) - commercial/industrial/public services'.

Other Designations

11.7.18 According to EA online groundwater Source Protection Zone (SPZ) mapping the Site is not located within a groundwater SPZ. The mapping also indicates that there are no designated sensitive areas e.g. Special Area of Conservation (SAC), Special Protection Area (SPA) or Site of Special Scientific Interest (SSSI) within 1km of the Site.

11.8 Baseline Evolution

11.8.1 The FRA (see **Appendix 11.1**) includes consideration of the effects of climate change on flood risk at the Site over the lifetime of the Proposed Development. The frequency and severity of flood events could increase with the predicted increase in the frequency and intensity of rainfall events. Attenuation for the surface water runoff from the Site was provided for all events up to 1 in 100 year + 40% climate change. The 15% climate change allowance, as required for the Cherwell and Ray Management catchment was used in the hydraulic model for the two ordinary water courses.

11.8.2 The FRA includes mitigation measures to ensure the Proposed Development will remain safe over its lifetime (based on available data assessed to date), and the Sustainable Drainage Strategy takes into account projected increases in rainfall over the lifetime of the development.

11.9 Primary Mitigation

11.9.1 This section details the mitigation measures that are proposed during both the construction and operational phases of the development as part of the Proposed Development.

Construction Phase

11.9.2 A Construction Environmental Management Plan (CEMP) will be produced in order to ensure good practice guidance is adhered to throughout the construction phase and to ensure that likely effects during the construction phase are mitigated as far as reasonably possible. Firstly, the existing buildings, roads, railways and hardstanding will be demolished, with the demolition arisings to be cleaned, graded and stored on site for later reuse. Clearing the Site will significantly reduce the area of hardstanding, which will in turn result in reduced surface water runoff rates during the demolition phase. The CEMP will specify pollution prevention / construction best practice methods including:

- Wheel washing facilities at the entrance to the construction compounds;
- Ensuring construction vehicles are properly maintained to prevent hydrocarbon leaks;
- Covers for lorries transporting materials to / from the site to prevent releases of dust / sediment to watercourses;
- Bulk storage areas to be secured and provided with secondary containment (in accordance with the Oil Storage Regulations and best practice);
- Storage of oils and chemicals will be sited away from existing surface watercourses;
- Concrete to be stored and handled appropriately to prevent release to watercourses;
- Temporary drainage infrastructure to be installed at an early stage of construction to ensure appropriate drainage measures are in place throughout the construction phase to mitigate against increased runoff rates and pollution of watercourses. Discharges including runoff / groundwater collecting in excavations to be routed via settling tanks or ponds to remove any sediment prior to discharge to Swalecliffe Brook (under the appropriate consents);
- A spill procedure will be documented and spill kits kept in the vicinity of chemical / oil storage;
- A procedure will be in place to notify the EA in the event of the release of suspended solids or pollutants to surface water drains or watercourses during construction;
- A Water Management Plan will be implemented in case of flooding on-site during construction works;
- Storage of stockpiled materials should be on an impermeable surface to prevent leaching of contaminants and covered when not in use to prevent materials being dispersed and to protect from rain; and
- Stockpiles would be kept to minimum possible size with gaps to allow surface water runoff to pass through.

Completed Development

11.9.3 The surface water drainage strategy for the Proposed Development is detailed in the Graven Hill Site D1, Bicester Outline Sustainable Drainage Systems (SuDS) Strategy Report from April 2022 (see **Appendix 11.2**). It is proposed to restrict the surface water runoff rates from the Proposed Development to QBAR greenfield rate for all rainfall events up to the 1:100 + 40%

climate change, to ensure there is no increase in flood risk within and outside the site boundaries as a result of the Proposed Development and to provide a reduction in surface water discharge rates. The surface water strategy includes collection of surface water in permeable paving, swales and open basins.

11.9.4 The quality of surface water runoff would be ensured through the discharge of runoff via permeable paving, and open basins, which would offer natural removal of limited contaminants / sediments.

11.9.5 The Proposed Development would incorporate water efficiency measures such as water efficient fixtures and fittings (dual flush WCs, white goods with low demand), and use of greywater or rainwater harvesting likely to be suitable for use in site irrigation. This will reduce potable / mains water consumption.

11.9.6 The Site is in Flood Zone 1 (low risk of fluvial flooding). In addition, the hydraulic modelling of the ordinary watercourses to the south east and south west of the Site respectively demonstrates that there is not risk of flooding to the Site form these sources.

11.9.7 The EA's map for surface water flooding indicates that there is a risk of surface water flooding at the Site. However, the proposed drainage strategy would alleviate this risk and provide adequate flood attenuation volume in forms of open basins, swales and permeable paving.

11.9.8 The applicant will work with TW to establish any requirements for upgrade of the existing mains foul sewer system.

11.10 Assessment of Likely Effects

Demolition and Construction Phase Effects

11.10.1 This section identifies and assesses the potential effects that are predicted to occur during demolition and construction stage, taking into account the primary mitigation measures proposed as part of the Proposed Development.

Water Resources and Hydrology

11.10.2 The CEMP is considered to adequately control potential releases of contaminant or sediment-laden runoff during the construction phase. These measures would also limit the potential for spills or releases of materials to surface water or groundwater. Surface waterbodies are considered to be of a medium sensitivity given that they are tributaries of Lanford Brook, which ultimately discharges into Oxon Ray and these waterbodies have "poor" and "bad" ecological quality respectively. There are additionally no abstractions from the Ordinary watercourses for potable use in close proximity to the Site. The groundwater is also considered to be of a medium sensitivity as the bedrock beneath the superficial deposits in the area of the site are characterised as being unproductive strata defined as soluble rock. There are no groundwater abstractions in the vicinity of the Site.

11.10.3 The potable water network is considered to be of medium sensitivity as it is of significant local importance. Although there would be an increase in water demand during construction, the potential effects on water availability to the surrounding area would be negligible given the temporary nature of the construction works. Water efficiency measures and good practice on site would limit water usage during construction.

11.10.4 Overall, following implementation of the adopted mitigation measures, the magnitude of impact on water resources arising from the construction works is deemed to be 'negligible'. Hydrological receptors are considered to be of a medium sensitivity, therefore the effect on water resources is considered to be of 'not significant' to 'minor adverse' significance, which is not significant in EIA terms.

Flood Risk and Drainage

11.10.5 The CEMP is considered to provide appropriate mitigation against the input of materials into local surface watercourses and any changes to the surface water flow regime across the Site. In order to mitigate against surface water flooding during construction activities, the existing swales will be maintained and used as long as possible during the construction. The temporary drainage system would be installed at an early stage of construction to ensure there would be no increase in flood risk during construction works. The watercourses are not subject to abstractions, they have 'poor' ecological quality under the River Basin Management Plans and in addition, the underlying geology is classed as Unproductive Strata. Therefore, whilst the overall objective is to achieve a 'good' ecological status for all watercourses, the subject watercourses are of local scale and the local area is considered to be of a low sensitivity.

11.10.6 Construction workers are considered to be of a 'medium' sensitivity as they would not be sleeping on site and therefore could promptly respond to changes. The risk of flooding to the site is pluvial only and the temporary drainage strategy will alleviate this risk. In addition, clearing the site will significantly reduce the area of hardstanding, which will in turn result in reduced surface water runoff rates during the demolition phase.

11.10.7 Overall, due to the proposed mitigation measures, the magnitude of impact on flood risk is deemed to be 'negligible' and the receptors to any increase in flood risk are of a 'medium' sensitivity. Therefore, the effect on flood risk during the construction phase is considered to be 'not significant' to 'minor adverse', which is not significant in EIA terms.

Operational Phase Effects

11.10.8 This section identifies and assesses the potential effects that are predicted to occur during the operational phase, taking into account the primary mitigation measures proposed as part of the Proposed Development.

Water Resources and Hydrology

11.10.9 Water quality impacts during the operational phase are anticipated to be limited to minor hydrocarbon releases from vehicles. The proposed surface water drainage strategy would provide natural removal of contaminants as surface water would flow through permeable paving and will be attenuated in swales and open basins prior to its ultimate release to the Unnamed Watercourse. The magnitude of impact on surface water and groundwater quality is considered to be 'negligible'.

11.10.10 The foul sewerage network is considered to be of medium sensitivity due to its significant local importance. Upgrades to the foul sewerage network may be required to cater for the increased loading from the proposed development, but the phasing of the development, and the agreed upgrade works, would be agreed in consultation with TW to ensure demands at each stage of development could be met.

11.10.11 Overall, following the implementation of the sustainable drainage strategy and the completion of any required upgrade works to the foul sewerage / water supply network, it is considered that the impact of the operational stage on water resources would be of a 'negligible' magnitude. Hydrological receptors are of a medium sensitivity. Therefore, the effect on water resources is considered to be 'not significant' to 'minor beneficial', which is not significant in EIA terms.

Flood Risk and Drainage

11.10.12 The Flood Risk Assessment (see **Appendix 11.1**) demonstrates that the Proposed Development would be safe over its lifetime. The proposed drainage strategy will contribute to the reduction of the surface water flood risk to the site and the occupants. In addition, considering the nature of the development, which will be used as logistics floor space, the

occupants will not reside at the Site and are considered as of a medium sensitivity. The magnitude of impact is therefore considered to be 'negligible'.

11.10.13 The Drainage Strategy demonstrates that there would be a reduction in surface water flood risk within the area, as discharge rates would be restricted to greenfield rates through the use of Sustainable Drainage Systems (SuDS) including permeable paving, open basins and swales. The inclusion of surface water attenuation and a flow control device will slow the rate at which rainfall enters the adjacent watercourses (considered as of a medium sensitivity), preventing a sudden deluge of rainfall into the fluvial network. The magnitude of this impact is therefore considered to be 'minor (beneficial)'.

11.10.14 There would be no negative impact on floodplain storage capacity or floodwater conveyance as a result of the Proposed Development, as the adjacent ordinary watercourses are not considered to have an associated fluvial floodplain which encroaches the site boundary.

11.10.15 Overall, it is considered that the impact of the operational stage on flood risk is of a negligible to minor (beneficial) magnitude. Flood risk receptors are of a medium sensitivity. Therefore, the effect on flood is considered to be permanent of 'minor (beneficial)' significance.

11.11 Secondary Mitigation and Enhancement

11.11.1 No secondary mitigation or monitoring is required as no adverse likely significant effects were identified.

11.12 Residual Effects

11.12.1 It is not considered that there will be residual effects from a Water Resources and Flood Risk perspective as the necessary primary mitigation has been embedded within the scheme and no secondary mitigation is required as no adverse likely significant effects were identified.

Construction Phase Residual Effects

11.12.2 None anticipated.

Operational Phase Residual Effects

11.12.3 None anticipated.

Table 6: Summary of Likely Environmental Effects on Water Resources and Flood Risk

Receptor	Sensitivity of receptor	Description of impact	Short / medium / long term	Magnitude of impact	Significance of effect	Significant / Not significant
Construction phase						
Surface and groundwater bodies	Medium (surface water)	Reduction in surface water quality.	Short term	Negligible	Negligible to minor adverse	Not significant
Potable water network	Medium	Reduction in availability of local mains water supply.	Short term	Negligible	Negligible to minor adverse	Not significant
Construction workers	Medium	Flood risk to construction workers.	Short term	Negligible	Negligible to minor adverse	Not significant
Local area	Medium	Limited increase in local flood risk during demolition stage due to temporary increased surface water runoff rates	Short term	Negligible	Negligible to minor adverse	Not significant
Operational phase						
Surface and groundwater bodies	Medium (surface water groundwater)	Water quality impact (from vehicle hydrocarbon releases).	Medium to long term	Negligible	Negligible to minor adverse	Not significant
Sewerage and potable water networks	Medium	Water quality impact due to insufficient capacity.	Medium to long term	Negligible	Minor beneficial	Not significant
Surface watercourses	Medium	Slowing of surface water flows to receiving watercourses through using SuDS (which also provide water quality benefits).	Medium to long term	Minor (beneficial)	Minor (beneficial)	Not significant
Site occupants / employees	Medium	Flood risk to future occupants.	Medium to long term	Negligible	Minor (beneficial)	Not significant

11.13 Assessment of Cumulative Effects

11.13.1 The cumulative assessment has considered a number of committed developments in and around MOD Graven Hill Site as identified in **Appendix 6.1**. Without mitigation, these schemes have the potential to result in significant effects on flood risk and water resources.

Water Resource and Flood risk during Construction Phase

11.13.2 No significant effects have been identified associated with the other committed developments during the construction phase. Other developments within the area would be subject to the same mitigation requirements as the proposed MOD Graven Hill development, to protect the quality of water resources and restrict surface water runoff during the construction phase. In addition, it is important to bear in mind that other projects and plans under consideration will have differing potential for proceeding to an operational stage and hence a differing potential to ultimately contribute to a cumulative impact alongside Graven Hill development. Therefore, although some of the schemes result in surface water discharges to the Langford Brook (which is the ultimate receptor for the discharges from the MOD site), they would not cumulatively result in a significant adverse effect on flood risk or water quality.

11.13.3 Should construction work for a number of development schemes run concurrently, there is the potential for a high demand for water supply. In this situation, the water supplier is likely to impose restrictions on water use. Good practice on site would help minimise water usage during the construction phase. Given the temporary nature of the impact and given that it can be managed through restrictions on water usage and phasing of works, the cumulative effect is not considered to be significant.

Water Resource and Flood risk during Completed Development

11.13.4 All developments will be required to comply with similar planning obligations as the proposed MOD development, which would ensure there is no increase in flood risk or significant impact on water quality or water resources for any of the individual developments. Relevant planning conditions have been placed on each of the nearby schemes to ensure that an appropriate surface water drainage scheme is implemented. The fundamental requirement of the NPPF is that there is no increase in flood risk as a result of a development, and consent will not be granted where this has not been adequately demonstrated. The cumulative impact on flood risk and water quality would therefore be negligible.

11.13.5 With all new developments there would be an increased demand for potable water. The effects can be minimised through the adoption of water saving measures as part of all new developments and through upgrades such as booster stations. Additionally, schemes will result in an increased demand on the foul capacity network. Conditions will be applied to all schemes to ensure the developments are not operational until any required sewer upgrade works are completed.

11.14 Conclusions

11.14.1 During construction works, the best practice measures described in the Outline CEMP are considered to control any risks associated with accidental releases of materials and contaminated runoff, and the temporary drainage system would ensure that there would be no increase in flood risk during the construction phase. Water usage during construction would be minimised through water efficiency measures and given the temporary nature of associated impacts the effect is not considered to be significant. The FRA identifies a surface water flood risk at the Site. However, the areas indicated to be at risk of flooding are associated with water ponding in lower topographical spots, and redevelopment of the site including the installation of the proposed surface water drainage scheme will alleviate this. The risk to construction workers

would be managed through the implementation during construction works of a Water Management Plan forming part of the CEMP.

11.14.2 During the operational phase, the proposed SuDS would restrict surface water runoff to greenfield rates through provision of on-site storage within permeable paving and open basins and swales. The strategy would mitigate the surface water flood risk at the Site and would ensure that there would be no increase in flood risk elsewhere as a result of the Proposed Development It would also provide water quality treatment prior to discharge to the watercourses. The developer will work with Thames Water to ensure the Proposed Development is phased to enable any required upgrade works to the water supply and foul sewer systems to be completed prior to occupation. Flood risk mitigation measures described in the FRA would enable the appropriate management of flood risk over its lifetime.

11.15 References

- BRE (2016) Digest 365, DG365
- CIRIA (2015) SuDS Manual, C753
- DCLG (2014) National Planning Practice Guidance.
- DEFRA (2015) Non-Statutory Technical Standards for Sustainable Drainage Systems
- EA (2016) River Basin Management Plans
- EA (2018a) EA Aquifer Designation Maps, https://magic.defra.gov.uk/magicmap.aspx
- EA (2018b) EA Flood Map for Planning, https://flood-map-for-planning.service.gov.uk/
- EA (2018c) EA Flood Risk from Surface Water, https://flood-warning-information.service.gov.uk/long-term-flood-risk/map
- Groundsure (2018) Enviroinsight database, Reference HMD-377-4970250
- Commission of the European Communities (2000) Directive 2000/60/EC 'The Water Framework Directive'
- HMSO, 1995; 'Environment Act'
- HMSO, 1991; 'The Water Resources Act'
- HMSO, 2003; 'The Water Act'
- HMSO, 1991; 'The Land Drainage Act'
- HMSO, 2009; 'The Groundwater (England and Wales) Regulations
- HMSO, 2010; 'The Flood and Water Management Act'
- LBB (2012) Core Strategy
- LBB (2010) Strategic Flood Risk Assessment, Level 1
- LBB (2014) Strategic Flood Risk Assessment, Level 2

12 Hydrology, Geology and Ground Conditions

12.1 Introduction

12.1.1 The chapter describes the assessment methodology, the baseline conditions at the Site and surroundings and the likely significant effects the Proposed Development may have on the hydrogeology, geology and ground conditions at the Site, taking into account the mitigation measures required to reduce and minimise any adverse effects.

12.1.2 Further information regarding potential surface water receptors in the vicinity of the Site is presented in **Chapter 11: Hydrology and Flood Risk**. In addition, **Appendix 11.2** provides information regarding the proposed surface water management measures and drainage strategy.

12.1.3 This chapter has been prepared by RPS and should be read in conjunction with the Ground Conditions Summary Report, presented as **Appendix 12.1**.

12.2 Policy Context, Legislation, Guidance and Standards

12.2.1 This section sets out the legislation, planning policy context and guidance that is relevant to this chapter and the assessment methodologies and baseline forecasting methods employed.

Planning Policy Context

National Planning Policy

National Planning Policy Framework

12.2.2 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021a) sets out the planning policies for England, with those relevant to this chapter summarised below.

Conserving and Enhancing the Natural Environment

12.2.3 Paragraph 174 of the NPPF states that planning policies and decisions should contribute to and enhance the natural and local environment by:

- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of pollution including soil and water or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality; and
- remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land.

12.2.4 Furthermore, paragraph 183 requires that planning policies and decisions ensure that:

- a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination;
- after remediation, land should not be capable of being determined as contaminated land under Part IIA of the EPA 1990; and
- adequate site investigation information is available to inform the assessments.
- Facilitating the Sustainable Use of Materials

12.2.5 Paragraph 210 of the NPPF states that planning policies should include:

- safeguarding of mineral resources by defining Mineral Safeguarding Areas, and adopting appropriate policies so that known locations of specific mineral resources of local and national importance are not sterilised by non-mineral development where this should be avoided.

National Planning Policy Guidance

12.2.6 The National Planning Practice Guidance (NPPG) (Ministry of Housing, Communities and Local Government, 2021b) supports the NPPF and provides guidance across a range of topic areas. The NPPG includes guidance on the following topics relevant to this chapter:

- land affected by contamination;
- land stability;
- minerals;
- natural environment; and
- water supply, wastewater and water quality.

Local Planning Policy

Cherwell District Council

12.2.7 The Adopted Cherwell Local Plan 2011 – 2031 (Cherwell District Council, 2015) identifies saved Policy ENV12 Development on Contaminated Land is to be retained. This policy states that development on land which is known or suspected to be contaminated will only be permitted if:

- Adequate measure can be taken to remove any threat of contamination to future occupiers of the site.
- The development is not likely to result in contamination of surface or underground water resources.

12.2.8 The remediation of contaminated land forms part of key site specific design and place shaping principles of strategic development policy Bicester 2: Graven Hill.

Oxfordshire County Council

12.2.9 The Oxfordshire Minerals and Waste Core Strategy (Oxfordshire County Council, 2017) provides the planning strategies and policies for the development that will be needed for the supply of minerals and management of waste in Oxfordshire over the period to the end of 2031.

Legislation

- Environment Act 1995.
- Environmental Protection Act (EPA) 1990 (as amended).
- Contaminated Land (England) Regulations 2006, as amended 2012.
- Water Act 2014.
- Water Resources Act 1991, as amended 2009.

- Water Supply (Water Quality) Regulations 2016, as amended 2018.
- Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.
- Contaminated Land (England) Regulations 2006, as amended 2012.
- Environment Damage (Prevention and Remediation) (England) Regulations 2015, as amended 2019.
- Environmental Permitting (England and Wales) Regulations 2016, as amended (EU Exit) 2019.
- Control of Substances Hazardous to Health (COSHH) 2002 (as amended).
- Control of Pollution (Oil Storage) (England) Regulations 2001.

Guidance

- Land Contamination: Risk Management (LCRM) (Environment Agency, 2020).
- British Standard BS 10175 Investigation of Potentially Contaminated Sites (BS10175, 2011+A2: 2017) (BSI, 2011).
- British Standard BS8485 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (BS8485:2015+A1:2019) (BSI, 2015).
- Construction Industry Research and Information Association (CIRIA) Document C665: Assessing Risks Posed by Hazardous Ground Gases to Buildings (CIRIA, 2007).
- Defra Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (Defra, 2012).
- CIRIA Document C552 -Contaminated Land Risk Assessment: A Guide to Good Practice (CIRIA, 2001a).
- CIRIA Document C532 -Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors (CIRIA, 2001b).
- CIRIA Document C681 - Unexploded Ordnance (UXO): A guide for the construction industry (CIRIA, 2009).

12.3 Consultation

12.3.1 The applicant informally agreed the scope of the EIA with CDC in March 2022 and this included the preparation of an ES chapter on Hydrogeology, Geology and Ground Conditions.

12.3.2 No specific technical consultations have been undertaken by RPS with CDC or the Environment Agency to inform this chapter which is based on professional judgement by RPS as the competent expert.

12.4 Scope of Assessment

Not Significant Effects

12.4.1 The Site does not fall within a Mineral Consultation Area, Mineral Strategic Resource Area or Mineral Safeguarding Area and therefore minerals is scoped out of this assessment.

Likely Significant Effects

12.4.2 The Site is located within the former Ministry of Defence (MoD) Graven Hill site and therefore land contamination may pose a potentially significant effect for the Proposed Development to future and adjacent site users and other environmental receptors based upon historical activities undertaken at the Site.

12.5 Methodology

Study Area

12.5.1 The study area includes the Site and a buffer of up to 500 metres surrounding the Site. This is considered to be sufficient based on professional judgment to enable the identification of off-site potential sources of contaminants of concern, and other factors which may have influenced site conditions and/or sensitive off-site receptors that require consideration. Beyond this buffer impacts are considered unlikely.

Baseline Data Collection

12.5.2 The description of baseline conditions is informed by desk based information and a review of site-specific ground investigation information. The Ground Conditions Summary Report (GCSR) is provided as **Appendix 12.1** and the locations of the exploratory holes is provided as Drawing JER9528-003 within the GCSR.

12.5.3 The GSCR utilises information from publicly available records, data provided by an Envirocheck Report and also previous ground conditions studies undertaken for the Site (see **Appendix 12.1**). This includes data provided from the following sources:

- Environment Agency (EA) - regarding groundwater quality mapping, landfill sites and waste facilities, environmental permits, pollution incidents;
- British Geological Survey (BGS) - geology, radon risk and borehole records; and
- Ordnance Survey (OS) - historical mapping.

12.5.4 Phase 2 ground investigations of the Site were undertaken in 2010 and more recently in July and August 2020. The 2020 investigation included the drilling of fifteen boreholes and excavation of 39 trial pits with six rounds of ground gas and groundwater monitoring.

12.5.5 The framework presented in LCRM (Environment Agency, 2020) forms the basis of the risk assessment approach adopted in this chapter. The baseline characterisation of the Site in relation to ground contamination enables the development of a conceptual site model ('CSM'), which uses the source-pathway-receptor (pollutant linkage) approach as follows.

- Source: Referring to the potential source of contamination.
- Pathway: The mechanism by which a contaminant could move/migrate to a receptor.
- Receptor: Identified features that could be affected by a contaminant, based on the sensitivity of the site.

12.5.6 The CSM examines these elements for the Site in its current form and use. Following this approach, the likelihood of contamination to exist has been considered based on all these elements being present and forming a pollutant hazard, pathway and receptor linkage.

Assessment

12.5.7 The following section describes the approach taken to identifying the magnitude of an impact and the sensitivity/value of the receptor. The definitions used for sensitivity and magnitude are presented in **Table 12.1** and **Table 12.2**. These are based on descriptors presented within the DMRB methodology documents LA 109 and LA 113 (Highways England et al, 2019 and 2020). This guidance produced by Highways England, Transport Scotland, Welsh Government and the Department for Infrastructure Northern Ireland provides robust assessment principles for infrastructure developments and is used in the absence of more definitive assessment methodologies.

Table 12.1 Definitions of Sensitivity or Value

Sensitivity	Definition
Soils (superficial geology. topsoil and subsoils)	
Very High	Soils supporting an EU designated site (e.g. Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar site).
High	Soils directly supporting a UK designated site (e.g. Site of Special Scientific Interest (SSSI)).
Medium	Soils supporting non-statutory designated sites (e.g. Local Nature Reserves, Site of Nature Conservation Importance, mineral safeguarded area).
Low	Soils supporting non-designated notable or priority habitats.
Negligible	Previously developed land formerly in 'hard uses' with little potential to return to agriculture.
Hydrogeology (aquifers)[should wording be inserted here?]	
Very High	Principal aquifer providing a regionally important resource and/or supporting a site protected under EC or UK legislation. Groundwater locally supports groundwater dependent terrestrial ecosystems (GWDTE)). Source Protection Zone (SPZ) 1.
High	Principal aquifer providing a locally important resource or supporting a river ecosystem. Groundwater locally supports a GWDTE. SPZ2.
Medium	Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ3.
Low	Unproductive strata.
Negligible	N/A
Surface Water[should wording be inserted here?]	
Very High	Watercourse having a Water Framework Directive (WFD) classification in a River Basin Management Plan (RBMP) and $Q_{95} \geq 1.0$ m^3/s. Site protected/designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water).
High	Watercourse having a WFD classification in a RBMP and $Q_{95} < 1.0$ m^3/s. Site protected under EC or UK legislation.
Medium	Watercourses not having a WFD classification in a RBMP and $Q_{95} > 0.001$ m^3/s. Site protected under EC or UK legislation.
Low	Watercourses not having a WFD classification in a RBMP and $Q_{95} \leq 0.001$ m^3/s.
Negligible	N/A

Sensitivity	Definition
HumaHuman Health	
Very High	Human health: very high sensitivity land use scenario (e.g. residential or allotments).
High	Human health: high sensitivity land use such as public open space or construction workers.
Medium	Human health: medium sensitivity land use such as commercial or industrial.
Low	Human health: low sensitivity land use such as highways and rail.
Negligible	Human health: undeveloped surplus land/no sensitive land use proposed.

Table 12.2 Definitions of Magnitude

Magnitude	Definition
Soils (superficial geology. topsoil and subsoils)	
High	Physical removal or permanent sealing of soil resource (Adverse).
	Highly beneficial impact on soils resource of the area (Beneficial).
Medium	Permanent loss/reduction of one or more soil function(s) and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resources) (Adverse).
	Moderate benefit to soils resource of the area (Beneficial).
Low	Temporary loss/reduction of one or more soil function(s) and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource) (Adverse).
	Minor benefit to soils resource (Beneficial).
Negligible	No discernible loss/reduction of soil function(s) that restrict current or approved future use (Adverse).
	The Project Development would be of minor benefit or positive addition to local areas of soils resource, by potentially providing protection (Beneficial).
No change	No loss/reduction of soil function(s) that restrict current or approved future use.
Hydrogeology (aquifers)	
High	Loss of, or extensive change to, an aquifer. Loss of regionally important water supply. Loss of, or extensive damage to Groundwater Dependent Terrestrial Ecosystems (GWDTE) or baseflow contribution to protected surface water bodies. Reduction in water body WFD classification (Adverse).
	Highly beneficial impact on hydrogeological environment (e.g. removal of existing polluting discharge to aquifer, or removing the likelihood of pollution discharges occurring to an aquifer, improvement in water body WFD classification) (Beneficial).
Medium	Partial loss or change to an aquifer. Partial loss of the integrity of GWDTE. Contribution to reduction in water body WFD classification (Adverse).
	Moderate benefit to the hydrogeological environment (e.g. contribution to improvement in water body WFD classification, support to significant improvements in damaged GWDTE) (Beneficial).

Magnitude	Definition
Low	Minor impact on the aquifer, GWDTEs, abstractions and structures (Adverse).
	Minor benefit to the hydrogeological environment (Beneficial).
Negligible	Results in impact on groundwater but is of insufficient magnitude to affect the use or integrity (e.g. no measurable impact upon groundwater receptors) (Adverse).
	The Project would be of minor benefit or positive water quality (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.
Surface Water	
High	Loss of regionally important public water supply. Loss or extensive change to a designated nature conservation site. Reduction in water body WFD classification (Adverse).
	Highly beneficial impact on water environment (e.g. removal of existing polluting discharge to watercourse, or removing the likelihood of pollution discharges occurring to a watercourse, improvement in water body WFD classification) (Beneficial).
Medium	Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. Contribution to reduction in water body WFD classification (Adverse).
	Moderate benefit to the water environment (e.g. contribution to improvement in water body WFD classification) (Beneficial).
Low	Minor impact on water supplies (Adverse).
	Minor benefit to the water environment (Beneficial).
Negligible	Results in impact on surface water but is of insufficient magnitude to affect the use or integrity (e.g. no measurable impact upon surface water receptors) (Adverse).
	The Project Development would be of minor benefit or positive water quality (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.
Human Health	
High	Human health: significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria with potential for significant harm to human health. Contamination heavily restricts future use of land (Adverse).
	Highly beneficial impact on soil chemical quality (Beneficial).
Medium	Human health: contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria. Significant contamination can be present. Control/remediation measures are required to reduce risks to human health/make land suitable for intended use (Adverse).
	Moderate benefit to the soil chemical quality of the area (e.g. the Project results in a brownfield contaminated site that is, or is likely to be determined as Contaminated Land being remediated) (Beneficial).
Low	Human health: contaminant concentrations are below relevant screening criteria. Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health (Adverse).

Magnitude	Definition
	Minor benefit to the soil chemical quality (Beneficial).
Negligible	Human health: contaminant concentrations substantially below levels outline in relevant screening criteria. No requirements for control measures to reduce the risks to human health/make land suitable for intended use (Adverse).
	The Project would be of negligible benefit to the soil chemical quality (Beneficial).
No change	No reduction in soil chemical quality that restricts current or approved future use.

12.5.8 The significance of predicted effects has been determined taking into account the sensitivity of the receptor and magnitude of impact. **Table 12.3** below is used to inform the evaluation of the significance of effects. Where the matrix offers more than one significance option, evidence based professional judgement is used to decide which option is most appropriate.

Table 12.3 Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	**Negligible**	**Low**	**Medium**	**High**
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very High	No change	Minor	Moderate or Major	Major or Substantial	Substantial

12.5.9 The overall significance of an effect is expressed as negligible, minor, moderate, major or substantial based on the definitions in **Table 12.4**.

Table 12.4 Significance Criteria

Level of Effect	Criteria
Major	These effects are assigned this level of significance as they represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites and features of national or regional importance. A change at a borough scale site or feature may also enter this category.
Moderate	These effects, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.
Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in enhancing the subsequent design of the project and consideration of mitigation or compensation measures.
Negligible or No Effect	Either no effect or effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error. Such effects should not be considered by the decision-maker.

Limitations

12.5.10 The baseline data set out in this assessment are based on information collated and assessed as part of the Ground Conditions Summary Report (see **Appendix 12.1**). Assumptions and limitations relevant to this assessment are as follows:

- This chapter is based on available factual and interpretative data for the Site obtained from the sources described in the text and related to the Site. There has been no direct consultation response from EA, however publicly available EA data have been reviewed in addition to standing advice and planning guidance. This is considered to be sufficient to inform the assessment.
- The accuracy of maps cannot be guaranteed, and it should be recognised that different conditions on the Site may have existed between, and subsequent to, the various map surveys.
- Any borehole data from British Geological Survey sources is included on the basis that: "The British Geological Survey accept no responsibility for omissions or misinterpretation of the data from their Data Bank as this may be old or obtained from non-BGS sources and may not represent current interpretation".
- Where any data supplied by other sources, including that from previous Phase 2 intrusive investigations, it has been assumed that the information is correct. No responsibility can be accepted by RPS for inaccuracies in the data supplied by any other party.
- Data relating to the ground investigation is applicable to the time of the investigation. Site conditions, and hence the validity of the information pertaining to this, have the potential to change with time.

12.5.11 Notwithstanding the above, a moderate to high level of certainty has been applied to the baseline and assessment presented in this chapter. The information which was available is considered sufficient to establish a baseline within the study areas for the purposes of EIA.

Therefore, there are no data limitations that affect the robustness of the conclusions of this assessment.

12.6 Baseline Conditions

12.6.1 Baseline conditions of the Site are detailed within the Ground Conditions Summary Report presented in **Appendix 12.1** and a summary provided in the following sections.

The Site

Site Description

12.6.2 The Site currently comprises five large former MoD warehouse buildings, surrounded by areas of hardstanding, roads, soft landscaping and trees. Railway lines connect the warehouse buildings with a railway line that runs to the north from the north-east corner of the Site. A number of other smaller outbuildings and storage containers (overground and underground) are present throughout the Site. All the buildings on Site are disused and a number of the buildings and hardstanding are in various states of disrepair.

12.6.3 The Site slopes gently to the south and rises to the north towards Graven Hill Wood.

Site History

12.6.4 Historical mapping and previous ground conditions studies indicate the Site was first developed between 1941 and 1943 as a military depot, including the storage of vehicles and equipment prior to the D Day landings in 1944. Prior to this, the Site comprised agricultural land and woodland. Following the end of the Second World War, the Site was used for the storage of military hardware and the processing of ammunition containers and the Site layout is believed to have remained similar since.

Geology

12.6.5 British Geological Survey (BGS) information indicates that the bedrock underlying the Site comprises mudstones of the Peterborough Member, part of the Oxford Clay Formation. BGS information also indicates that the Peterborough Member is underlain by sandstone and siltstone of the Jurassic Kellaway Sand Member.

12.6.6 Superficial deposits are recorded to be absent from much of the Site with Alluvium (comprising clay, silt, sand and gravel) recorded to be present close to the south-western boundary.

Hydrogeology

12.6.7 The Peterborough Member is classified by the Environment Agency as an Unproductive stratum. These are formations that are generally regarded as containing insignificant quantities of groundwater. The presence of a substantial thickness of Peterborough Member mudstones will likely act as an aquitard and severely inhibit the downward migration of groundwater present within the shallow Made Ground / superficial deposits. The underlying Kellaway Sands Member is classified as a Secondary A aquifer and comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers.

12.6.8 The Alluvium indicated close to the south-western boundary is classified as a Secondary A Aquifer by the Environment Agency.

Groundwater Source Protection Zones

12.6.9 The Site does not lie within a groundwater Source Protection Zone (SPZ).

Groundwater Abstractions

12.6.10 Licenced groundwater abstractions are not reported within 1 km of the Site.

Hydrology

12.6.11 The nearest surface water feature is reported to be the Langford Brook, situated approximately 1.5 km to the north of the Site. The surface water quality of the Langford Brook at two locations at the closest points to the Site is reported to be rated by the EA as chemical grade 'D' (fair) and biological grade 'B' (good) at one location and chemical grade 'C' (fairly good) and biological grade 'B' (good) at the second location.

12.6.12 A series of field drains are also recorded to be present approximately 1 km to the west of the Site. A number of surface water drains are reported to be present along the southern boundary of the Site and further drains lying close to the south-eastern boundary. Furthermore, additional surface water drains are recorded approximately 1 km to the south-west of the Site and Gagle Brook is recorded approximately 1 km to the west.

Surface Water Abstractions

12.6.13 Licenced surface water abstractions are not reported within 1 km of the Site.

Waste Management Facilities

12.6.14 There are no records of landfill sites within the vicinity of the Site, although an area of potentially infilled land is indicated to be present 27 m to the north. A review of the Ordnance Survey maps suggest that this feature is likely to be a backfilled pond and it is considered unlikely that this will impact on land quality at the Site.

Potential Contamination Sources

12.6.15 A review of the available reports, supplemented by a site walkover undertaken by RPS in June 2020, suggests that there are limited historical and current potential contamination sources present at the Site. The relevant contamination sources identified from the available information sources within the Site boundaries are:

- Two small diesel / oil tanks and associated pipework to the north of D2.
- Railway lines present throughout the site that historically allowed rail access to the larger buildings present at the site (D1, D2, D4, D7 and D5).
- A stockpile of ash ballast present to the south-east of D7, derived from the upgrade of the substantial portion of the railway network in 2007 – it is understood that this stockpile is to be removed from site during site development.
- Substations / transformers situated adjacent to the larger site buildings (D1, D2, D4, D7 and D5).
- Forklift maintenance and washdown areas (D11 / D12).
- Several small ‘old’ and ‘new’ fuel tanks located in the vicinity of the fire station, D1, D2, D4 and D7.
- Residual asbestos lagging to be present in shallow soils in close proximity to the above ground heating system, as a consequence of potentially poor asbestos removal practices.

Previous Desk Based Assessment

12.6.16 An Unexploded Ordnance (UXO) report for the Site identified a low-level risk from German high explosive unexploded bombs, British anti-aircraft artillery, German incendiaries and anti-personnel bombs and a low / medium level of risk from land service and small arms ammunition.

12.6.17 A radiological assessment indicated that there was a moderate likelihood of radiological contamination being present across the former MoD site, however a further assessment, considered potential development risks for a commercial / industrial end use to be moderate / low.

Ground Investigation - Ground Conditions

12.6.18 A summary of the ground conditions encountered during previous ground investigations is provided below:

Made Ground

12.6.19 Made Ground was encountered over much of the Site. The thickness of the stratum was typically of the order of 0.5 – 1.0 m in thickness, but locally reported to be up to 1.8 m in thickness. The composition of the Made Ground was noted to be variable across the Site, comprising:

- Hardstanding construction (tarmac or concrete) ranging in thickness between 0.2 – 0.55 m;
- Ballast over ash comprising coarse gravel underlain by soft and firm clay with some ash and granite, ranging in thickness between 0.3 – 0.7 m;
- Topsoil comprising firm dark brown slightly sandy clay with occasional brick and clinker fragments, ranging in thickness between 0.1 – 0.4 m;
- Made Ground soils comprising black slightly sandy clayey gravel of ash, clinker and brick, ranging in thickness between 0.3 – 0.45 m; and
- Made Ground soils comprising firm brown mottled grey slightly sandy slightly gravelly clay with occasional rootlets and gypsum crystals, ranging in thickness between 0.15 – 0.2 m.

Alluvium

12.6.20 Underlying the Made Ground, localised areas of soft organic clay including occasional pockets of peat were identified during the ground investigation, ranging in thickness between 0.15 - 1.1 m. It is considered that these deposits may be indicative of localised areas of Alluvium.

Peterborough Member

12.6.21 Stratum consistent with the Peterborough Member was encountered directly underlying the Made Ground, or Alluvium (where identified), typically comprising firm and stiff, locally soft, orangish brown mottled grey clays underlain by firm to stiff and stiff dark green-grey slightly sandy clay.

12.6.22 The base of the Peterborough Member was not proven and a maximum thickness of 6.4 m was recorded. Available BGS borehole logs indicate the Peterborough Member to be at least 9.5 m in thickness in the vicinity of the Site.

Groundwater

12.6.23 Groundwater strikes were encountered at variable depths ranging between 0.45 and 4.8 meters below ground level (mbgl), either within the Made Ground or within the upper horizons of the

Peterborough Member. The majority of the strikes were recorded as seepages although a fast inflow was noted within borehole BH813 at a depth of 4.8 mbgl, rising to 3.3 mbgl in 15 minutes, suggesting a lens of more granular material to be present at this location.

12.6.24 A programme of groundwater monitoring undertaken within boreholes BH812, BH813 and BH815 following completion of the ground investigation, encountered standing water at depths ranging between 1.05 and 2.73 mbgl, with BH815 noted to be dry during one monitoring visit.

12.6.25 It was concluded that the variability in groundwater strikes and levels was suggestive of a discontinuous perched groundwater system within the Made Ground and near surface clays (Peterborough Member) due to the presence of low permeability cohesive clays within the upper horizons of the Peterborough Member. The natural groundwater table is considered likely to lie at depth within the Kellaway Sands.

Soil Contamination

12.6.26 Laboratory chemical analysis of soil samples from the previous ground investigations identified elevated concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) within six of 44 samples tested. These samples were obtained from shallow depth and were attributed to coal tars within surface macadam samples of soils directly underlying macadam.

12.6.27 Asbestos (amosite) fibres were identified within a single sample of railway ballast.

Groundwater contamination

12.6.28 Concentrations of Total Petroleum Hydrocarbons (TPH) analysed from a groundwater sample obtained from a trial pit were all below the laboratory limit of detection.

Ground Gas

12.6.29 Ground gas monitoring undertaken following completion of the previous ground investigations identified a maximum carbon dioxide concentration of 9.9% by volume. Concentrations of methane and hydrogen sulphide were all recorded below the detection limit of the gas analyser used and no measurable gas flows were detected within the monitoring wells. A maximum carbon monoxide concentration of 7 parts per million (ppm) was also identified during the monitoring.

Unexploded Ordnance

12.6.30 No suspected items of Unexploded Ordnance (UXO) are known to have been encountered during ground investigations.

Radiological Contamination

12.6.31 In situ radiological surveys of the D6 / D9 Made Ground area, to the north of the EL1 area did not indicate elevated levels of radioactivity within the soil.

12.6.32 Radiological monitoring during previous ground investigations at the Site did not identify any elevated levels of radioactivity within the soil.

Conceptual Site Model

12.6.33 A Conceptual Site Model is presented within the Ground Conditions Summary Report and takes consideration of information obtained from the desk-based sources, including the ground investigation information, and the site walkover undertaken by RPS in June 2020. The CSM has been developed to assess potential contamination sources, pathways, receptors and potential contaminant linkages identified at the Site.

12.6.34 **Table 12.5** provides a summary of the CSM, detailing potential contaminant linkages present at the Site taking into account all of the sources, pathways and receptors detailed above. The table also provides a contamination risk level to the identified receptors for each contaminant linkage, taking into account the known ground conditions at the Site and the proposed commercial development. Low to moderate risk or moderate risk has been assigned to future site users and potable water supply pipes based on localised sources of contamination. Levels of risk have been assigned on the basis of the definitions provided below:

- **Low risk** - it is considered unlikely that issues within the category will give rise to significant harm to identified receptors
- **Moderate risk** - it is possible, but not certain that issues within the category will give rise to significant harm to receptors
- **High risk** - there is a high potential that issues within the category will give rise to significant harm to identified receptors

Table 12.5 Conceptual Site Model and Risk Assessment

Potential Contamination Source	Contaminants of Concern	Potential Pathway	Receptor	Qualitative Risk Rating	Comments
On site sources • Localised sources from historical activities • Known localised areas of PAH and asbestos contamination	Metals, hydrocarbons, solvents	Inhalation / dermal contact / ingestion of soil / dust	Future Site Users	Low / Moderate	A number of sources of potential contamination have been identified at the Site and available ground investigation information has typically identified low concentrations of contaminants with respect to a commercial end use. Several localised areas of PAH contamination have been identified that potentially pose a risk to human health without the implementation of remedial measures.
		Leaching of contamination / direct migration	Groundwater (within the Kellaway Sands Member)	Low	No areas of gross contamination have been identified at the Site, and laboratory analysis indicates that the potential for soil to act as a contamination source to impact groundwater is limited. A substantial thickness of low permeability mudstone (Peterborough Member) is present underlying the Assessment Site and will likely afford protection to the underlying Kellaway Sands Member. Furthermore, available information also indicates that the Assessment Site is of low sensitivity, given the lack of stratum that could be considered as holding large quantities of groundwater and the absence of groundwater abstractions in the vicinity of the Assessment Site.
		Migration of contaminated groundwater	Surface Water	Low	Shallow perched groundwater has been identified at the Site, however ground investigation information suggests it may be discontinuous in nature and therefore has limited migration potential. Furthermore, no areas of gross contamination have been identified at the Site, and laboratory analysis indicates that the potential for soil to act as a contamination source is limited.
	Hydrocarbons, solvents	Indoor inhalation of vapours from soil / groundwater	Future Site Users	Low	No elevated concentrations of volatile hydrocarbons / solvents have been identified during the ground investigations undertaken at the Site. Naphthalene contamination has been identified in soil samples, believed to be associated with coal tars in the road construction, however the very localised nature of these occurrences is considered unlikely to pose a risk to human health.

Potential Contamination Source	Contaminants of Concern	Potential Pathway	Receptor	Qualitative Risk Rating	Comments
		Permeation into potable water supply pipes		Moderate	Concentrations of volatile hydrocarbons / solvents identified during the ground investigations undertaken at the Assessment Site are typically low. Elevated naphthalene concentrations have however been identified in soil samples, believed to be associated with coal tars in the road construction, albeit in localised areas. The potential for water supply pipes to be impacted by hydrocarbons / solvents will require a more detailed assessment and agreement with the local water service provider.
	Asbestos	Inhalation of fibres	Future Site Users	Moderate	Asbestos has been identified within a single sample of ballast at the Site and without remediation is considered to pose a potential risk to future end users. Made Ground is known to be present across the Site and given the industrial history and RPS' experience of similar sites, there is a possibility that asbestos could be present within the shallow soils at other locations.
Made Ground – Generation of Ground Gas	Harmful ground gas including methane and carbon dioxide	Migration and accumulation in new structures	Future Site Users	Low / Moderate	No significant sources of ground gas generation have been identified at the Site, although localised areas of peaty Alluvium have been identified. The ground gas risk assessment indicates a Characteristic Situation 2 should be considered for the Site and basic ground gas protection measures would be required within new structures.

The Surrounding Area

Site Description

12.6.35 The Site is bound to the north by Graven Hill Wood, to the east by agricultural land with the village of Ambrosden beyond, the west by MoD barracks and land believed to be under the ownership of the MoD, and to the south by railway lines and a solar farm.

12.6.36 No further information with respect to the surrounding area is considered relevant to this chapter.

Baseline Evolution

12.6.37 The assessment considers how the future baseline may evolve in the absence of the Proposed Development. The primary sources of future change with respect to the baseline conditions, in the absence of any redevelopment, are changes arising due to climate change.

12.6.38 Generally, there is a potential for climate change to lead to increased leaching of contaminants from soil as a result of longer and more frequent periods and intensity of rainfall. In addition, there is a potential for increased land instability as a result of longer and more frequent periods and intensity of rainfall.

12.6.39 Increased ambient temperatures may result in the warming of soils and groundwater beneath the Site, which could have the following impacts:

- accelerated breakdown of natural organic matter beneath the Site leading to increased rates of carbon dioxide and methane generation; and
- accelerated breakdown of putrescible material in Made Ground, resulting in increased rates of carbon dioxide and methane production. Increased volumes of leachate would also be produced with the accelerated breakdown of this material.

12.6.40 Prolonged dry spells or increased rainfall, along with increased temperatures may impact soil with a high volume change potential, which could result in settlement / heave of foundations and earthworks, in particular when located within the influence of trees and vegetation.

12.6.41 These factors are not considered to be pronounced for the future year 2024 though nonetheless are taken into consideration in the assessment of effects, where practicable, and will be taken into account within the design of the Proposed Development. For further information on both the impact of climate change upon the Proposed Development and the impact of the Proposed Development upon climate change, see **Chapter 15 of the ES**.

12.7 Primary and Tertiary Mitigation

Primary Mitigation - Construction

12.7.1 Construction will be managed through the Construction and Environmental Management Plan (CEMP). An outline CEMP has been submitted alongside this ES (RPS, 2022) and will form the basis of the more detailed CEMP, plans and method statements, to be prepared during the pre-construction period once a Principal Contractor is appointed. The final CEMP will be agreed with CDC prior to the commencement of construction.

12.7.2 The outline CEMP sets out standard good practice construction mitigation measures that the construction workforce would be required to implement. This includes the following:

- Implementation of a Discovery Strategy in relation to previously unidentified contamination.

- Implementation of measures to prevent and control spillage of oil, chemicals and other potentially harmful liquids. This would include, for example:
  - avoidance of oil / chemical storage within 50 m of a spring, well or borehole;
  - avoidance of oil / chemical storage within 10 m of a watercourse;
  - avoidance of oil / chemical storage where oil could run over hard ground into a watercourse;
  - implementation of a secondary containment system that can hold at least 110% of the oil / chemical volume stored; and
  - avoidance of storage of oil / chemicals in areas at risk of flooding.
- Refuelling of machinery would be undertaken within designated areas where spillages can be easily contained. Machinery would be routinely checked to ensure it is in good working condition and any tanks and associated pipe work containing oils and fuels will be double skinned and be provided with intermediate leak detection equipment.
- Implementation of measures to protect groundwater during construction, including good environmental practices based on legal responsibilities and guidance on good environmental management in: CIRIA C532 Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors (CIRIA, 2001).
- Stockpiling of contaminated materials on site would be avoided where practicable. Soils would be stored away from surface watercourses and placed within suitably constructed bunded areas and covered to prevent migration of contaminants via rainwater run-off.
- Industry standard dust suppression measures would be implemented during construction to minimise nuisance dust during the works.
- Implementation of control measures, including the use of appropriate personal protective equipment and welfare facilities. Health and Safety risk assessments will be completed prior to construction works in line with the Construction (Design and Management) Regulations 2015.

Primary Mitigation - Operation

12.7.3 A new surface water drainage network would be constructed as part of the Proposed Development design which would incorporate proprietary pollution interceptors. This is shown in Figure 7, Appendix A of the SuDS Strategy for Planning (**Appendix 11.1 of Chapter 11**).

Tertiary Mitigation - Construction

12.7.4 During construction of the Proposed Development, workers may be exposed to ground gases that may accumulate in confined spaces, and in exceptional circumstances lead to a risk of explosion (organic vapours) or asphyxiation (carbon dioxide). Standard construction protocols will be adopted during demolition and construction in accordance with the requirements of CDM Regulations 2015. Protocols will include those outlined below:

- recognition of confined spaces, and use of safe entry procedures;
- appropriate use of standard personal protective equipment; and
- appropriate training and briefing of site staff.

Tertiary Mitigation - Operation

12.7.5 During operation of the Proposed Development all plant and equipment will be located on areas of hardstanding and within bunds. Operational management systems and procedures will include the use of accidental spill kits. An emergency pollution prevention plan will be prepared which will be adhered to in the event of accidental leaks and spills. Where the handling / storage of hazardous substances is required as part of operations this will be regulated under relevant legislation including COSHH.

12.8 Assessment of Likely Effects

Construction Impacts

Human Health – Construction Workers

12.8.1 The historical development of the Site comprised a military depot in between 1941 –and 1943 including the storage of vehicles and equipment prior to the D Day landings in 1944. Prior to this, the Site comprised agricultural land and woodland. Following the end of the Second World War, the Site was used for the storage of military hardware and the processing of ammunition containers and information indicates that the Site layout has remained unchanged.

12.8.2 The Site is indicated to be underlain by a variable horizon of Made Ground, typically ranging between 0.5 – 1.0 m in thickness, locally up to 1.8 m in thickness.

12.8.3 A number of localised potential contamination sources have been identified at the Site, associated with hydrocarbon storage, railway lines, substations / transformers, vehicle maintenance and washing, asbestos and Made Ground soils.

12.8.4 Contamination by way of localised areas of elevated PAH and asbestos within the shallow soils has been identified along with elevated ground gas concentrations.

12.8.5 During the construction process, activities would involve breaking the ground surface and disturbing soil and shallow perched groundwater (where present). Construction personnel may be at increased risk from contamination. Potential impacts to human health may arise as a result of contact with contaminants via dermal contact, ingestion of soil/soil-derived dusts and inhalation of contaminated dusts / fibres and ground gases.

12.8.6 Construction workers would be required to adopt appropriate levels of hygiene and personal protective equipment (PPE) based on appropriate risk assessments in accordance with the requirements of CDM Regulations 2015. With such measures in place, they are not considered to be at significant risk from potential contaminants of concern.

12.8.7 During the construction phase, there is also the potential for previously unidentified contamination to be encountered as a result of ground disturbance which will be mitigated through the preparation and implementation of the Discovery Strategy in line with the outline CEMP. For further information, refer to the outline CEMP (RPS, 2022) submitted with the planning application.

12.8.8 Given the requirement to undertake specific Health and Safety risk assessments prior to construction works, in accordance with the CDM Regulations 2015, construction workers would be provided with appropriate protective equipment, appropriate welfare facilities and any specific control measures would be implemented. With this mitigation in place, the magnitude of the impact is considered to be negligible.

12.8.9 Construction workers are considered to have a high sensitivity to potential impacts. Taking into account the magnitude of impact with measures in place (negligible), the significance of effect is considered to be **Minor Adverse**.

Human Health – Adjacent Site Users

12.8.10 Adjacent site users are considered very high sensitivity.

12.8.11 The contamination status of the Site is as described above. There is potential for adjacent site users to come into contact with airborne soil derived dusts and fibres. The impact on adjacent site users during construction could have a secondary and potentially adverse effect. With the implementation of the construction mitigation measures described above, in particular dust control measures (see **Chapter 16**), the magnitude of impact would be negligible.

12.8.12 Considering that adjacent site users have a very high sensitivity, the significance of effect is considered to be **Minor Adverse**.

Groundwater

12.8.13 Groundwaters are considered to have a low and medium sensitivity given the aquifer classifications beneath the Site.

12.8.14 Construction activities which involve breaking the ground surface and construction of foundations increase the potential for existing contaminants in the soil and shallow groundwater to be mobilised and migrate through the soil primarily as a result of leaching.

12.8.15 No areas of gross soil contamination have been identified at the Site. Geological information also suggests that low permeability mudstones (Peterborough Member) at least 9.5 m in thickness are present underlying the Site, affording protection to the underlying Kellaway Sands.

12.8.16 Measures to minimise the potential for spillages and leakages of fuels and chemicals would be implemented during the construction phase. These measures would be implemented through the CEMP. Furthermore, the depth of the new foundations are not anticipated to penetrate the full thickness of the Peterborough Member and will thus not act as a potential preferential pathway for the downward migration of any shallow contamination.

12.8.17 With the implementation of appropriate pollution control measures described above, the magnitude of impact would be negligible.

12.8.18 Given that groundwaters are considered to have a low and medium sensitivity, the significance of effect is considered to be **Negligible**.

Surface Watercourses

12.8.19 The surface watercourses within proximity to the Site are considered to be of low sensitivity.

12.8.20 Impacts on surface water quality may arise from surface runoff from construction areas and also as a result of leaching of contaminants in soils or shallow perched groundwater migrating to surface waters which may directly enter into the drains.

12.8.21 Shallow perched groundwater has been identified at the Site, however ground investigation information suggests it may be discontinuous in nature and therefore has limited migration potential to local watercourses.

12.8.22 The magnitude of impact is predicted to be medium. Given that the surface watercourses are considered to be of low sensitivity, the significance of the effect is assessed as **Minor Adverse**.

Soils

12.8.23 The Site is previously developed land formerly in 'hard use' with little potential to return to agriculture. The soils may be considered of negligible sensitivity and though the underlying soils

will be permanently sealed this will remain unchanged. Therefore, the significance of effects would be **No Change.**

Operational Impacts

Human Health – Future Site Users

12.8.24 Potential impacts to human health may arise during operation as a result of contact with existing contaminants via dermal contact, ingestion of soil/soil-derived dusts and inhalation of contaminated dusts / fibres and ground gases. Localised areas of PAH and asbestos contamination have been identified at the Site which exceed screening criteria requiring a basic level of remedial works. Therefore the magnitude of impact is predicted to be medium.

12.8.25 Future Site users are considered to have a medium sensitivity.

12.8.26 During operation, there is the potential for spillages or leakages of oil and fuels from plant and equipment. However, this would likely be of a limited volume, localised and contained within areas of hardstanding and bunds. Any spillages would be easily contained and recovered.

12.8.27 On the basis that future Site users have a medium sensitivity, the significance of effect is considered to be **Moderate Adverse**.

Human Health – Adjacent Site Users

12.8.28 The operation of the Site would not be considered a dusty activity and the development is to comprise predominantly hard cover. The magnitude of impact would therefore be negligible.

12.8.29 On the basis that adjacent site users have a very high sensitivity, the significance of effect is considered to be **Minor Adverse**.

Groundwater

12.8.30 Potential impacts from accidental leaks/spillages plant and equipment may occur whilst the Proposed Development is operational. However, these would be very small, localised and mitigated by surface water drainage mitigation measures (i.e. hydrocarbon interceptors).

12.8.31 The plant/structures and hardstanding would also act to minimise infiltration rates in these areas and would reduce the potential for contaminants in shallow soils leaching into the underlying groundwater. A substantial thickness of low permeability mudstone will likely afford protection to the underlying Kellaway Sands Member. The magnitude of impact would therefore be negligible. Groundwaters are considered to have a medium sensitivity and on this basis, the significance of effect is considered to be **Negligible**.

Surface Watercourses

12.8.32 The sensitivity attributed to the surface waters is low.

12.8.33 During the operation of the Site there are a number of potential pollutants, which may give rise to water quality effects on the surrounding surface watercourses. These include:

- fine particulate materials (e.g. silts and clays); and
- oils and chemicals (from plant machinery and processes).

12.8.34 A new surface water drainage network would be constructed which would incorporate proprietary pollution interceptors (see Figure 7, Appendix A of the SuDS Strategy Report (Alan Baxter, 2022 **Appendix 11.2**)). No process or 'dirty' water would be produced as part of the

Proposed Development. The Proposed Development would incorporate a number of emergency procedures in the operational phase which would be used as a result of accidental spillage.

12.8.35 In summary, pollutants may be present as a result of normal operations, traffic and emergency or accidental spillage.

12.8.36 Pollution arising from accidental spillages on site such as road traffic would be controlled to negligible magnitude of impact given the provision of the above mitigation measures.

12.8.37 As surface waters are considered to have a low sensitivity, the significance of effect is considered to be negligible.

Soils

12.8.38 No additional impacts on soils as a resource are considered during operation. Therefore, the significance of effects would be **No Change.**

12.9 Secondary Mitigation and Enhancement

12.9.1 Whilst ground investigations have been undertaken to characterise the ground conditions at the Site, further ground investigation will be undertaken prior to the construction phase to investigate contamination sources that have not been previously subject to investigation and to verify the risk levels identified within the CSM. The scope of the investigation will be agreed with the EA / CDC prior to its implementation.

12.9.2 The findings of the ground investigations undertaken to date identify the need for a limited scope of site remediation with respect to PAHs and asbestos, which could include source removal or capping and inclusion of basic ground gas protection measures. A Remediation Strategy will be prepared which will comprise the following:

- Options appraisal setting out how the selected remediation option will mitigate the risks from the relevant contaminant linkages identified in the CSM;
- Implementation plan setting out the objectives and requirements of the remediation;
- Validation sampling to confirm that remediation objectives are met; and
- Verification report.

12.9.3 The scope of the Remediation Strategy will include all contamination remediation requirements identified by all phases of ground investigation and will be agreed with the EA / CDC prior to its implementation. The verification report will also be sent to the EA / CDC for approval. Subject to the scope and detail of the Remediation Strategy, the following would be undertaken where appropriate to inform the detailed design of buildings:

- Detailed ground gas risk assessment and gas control measures to be incorporated into building design.

12.9.4 Furthermore, the requirements for buried utility pipes will be assessed in more detail and confirmed with service providers prior to development.

12.9.5 Should any previously unidentified contamination be encountered at the Site during the construction phase, work in the area would cease. A suitability qualified environmental consultant would attend site to advise on an appropriate course of action. Details of the conditions encountered will be reported to the EA / CDC, and a suitable risk assessment and management strategy for dealing with the contamination would be submitted to these authorities for approval.

12.9.6 A CL:AIRE Materials Management Plan (MMP) will be prepared prior to construction to document the management of soils on Site, and include a risk assessment procedure to demonstrate that the soils do not present a risk to human health or the environment. Excavation works will be carried out in such a way to enable effective segregation of suitable materials for reuse on Site wherever practicable.

12.9.7 The construction process includes measures to intercept run-off and ensure that discharges from the Site are controlled in quality, as well as water quality monitoring carried out throughout the construction phase to ensure no discharge of pollutants or increase in suspended sediment occurs. Specific measures to control surface water runoff will be implemented in line with the detailed CEMP.

12.10 Residual Effects

12.10.1 Localised areas of contamination identified at the Site will be mitigated through the preparation and implementation of the Remediation Strategy which is anticipated to be secured via condition. Residual effects associated with remediation of the Site may be considered minor beneficial on soil and/or groundwater beneath the Site as any remediation will improve their contamination status. With this is place residual effects on future site users would be negligible.

12.10.2 Specific control measures and any other mitigation measures considered necessary as per the detailed CEMP will ensure any residual effects on surface waters during construction will be negligible.

12.10.3 Taking into account the mitigation and control measures adopted as part of the Proposed Development for the construction and operational phases, only negligible and minor adverse effects were identified.

12.11 Monitoring

12.11.1 In accordance with the EIA Regulations 2017, as no significant residual effects have been identified, no further monitoring is considered necessary.

Cumulative Effects

12.11.2 Taking into account the mitigation and control measures adopted as part of the Proposed Development for the construction and operational phases, only negligible impacts were identified in relation to hydrogeology, geology and ground conditions.

12.11.3 Three developments are located within the 500 m study area as follows:

- Symmetry Park (19/00388/F)
- Wretchwick Way (16/01268/OUT)
- Graven Hill E & D Sites (11/01494/OUT)

12.11.4 There is potential for cumulative effects to arise from these developments should ground disturbance occur concurrently with the Proposed Development. The primary hazard is considered to be related to any potential contaminated surface water run off entering the network of drains surrounding the Proposed Development site.

12.11.5 Mitigation measures implemented within the CEMP will ensure that the Proposed Development would make no contribution to any cumulative effect. On this basis, it is not considered likely that the Proposed Development will contribute to any significant adverse cumulative effects in relation to ground conditions.

12.12 Comparison to 2014 Planning Permission

12.12.1 No residual significant effects were assessed in relation to the Land Quality and Soils Chapter of the Environmental Statement for the 2014 Planning Permission with only negligible and minor adverse effects assessed in relation to this chapter. Minor adverse effects being assigned on the basis of higher sensitivity receptors only (magnitude of impacts assessed as negligible).

12.13 References

- British Standards (2017) BS10175:2011+A2:2017: Investigation of potentially contaminated sites – Code of Practice.
- British Standards (2019). BS8485:2015+A1:2019: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
- British Standards (2020) British Standard for the Code of practice for ground investigations (BS8485:2015+A1:2020).
- Cherwell District Council, 2015. The Cherwell Local Plan (Part 1 Adopted 20 July 2015 (incorporating Policy Bicester 13 re-adopted on 19 December 2016), July 2015.
- Construction Industry Research and Information Association (CIRIA) (1996) R132: A Guide for Safe Working on Contaminated Sites, December 1996.
- Construction Industry Research and Information Association CIRIA (2001a) C552: Contaminated Land Risk Assessment: A Guide to Good Practice.
- Construction Industry Research and Information Association (CIRIA) (2001b) C532: Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors.
- Construction Industry Research and Information Association (CIRIA) (2007) C665: Assessing Risks Posed by Hazardous Ground Gases to Buildings.
- Construction Industry Research and Information Association (CIRIA) (2014) C733: Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks.
- Defra (2012) Defra Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance.
- Environment Agency (2021) Technical Guidance WM3: Waste Classification – Guidance on the classification and assessment of waste, Version 1.1, January 2021.
- Environment Agency (2020) Land Contamination: Risk Management, April 2021.
- Highways England, Transport Scotland, Welsh Government and the Department for Infrastructure Northern Ireland (2020a) Design Manual for Roads and Bridges: Sustainability and Environmental Appraisal. LA 104: Environmental assessment and monitoring.
- Highways England, Transport Scotland, Welsh Government and the Department for Infrastructure Northern Ireland (2019) Design Manual for Roads and Bridges: Sustainability and Environmental Appraisal. LA 109: Geology and Soils.
- Highways England, Transport Scotland, Welsh Government and the Department for Infrastructure Northern Ireland (2020b) Design Manual for Roads and Bridges: Sustainability and Environmental Appraisal. LA 113: Road Drainage and the Water Environment.

- Oxfordshire County Council, 2017. Oxfordshire Minerals and Waste Local Plan, September 2017.

13 Traffic and Transport

13.1 Introduction

13.1.1 This chapter sets out the assessment methodology for determining the traffic and transport impact from the Proposed Development, the baseline conditions at the Site and surrounding area, the likely significant environmental effects resulting from the Proposed Development, potential mitigation measures, and the likely residual effects after the mitigation measures have been implemented.

13.1.2 This chapter also provides a summary of the Transport Assessment submitted separately as part of the outline planning application. As there is already a 2014 Planning Permission , for an employment usage, much of the analysis is comparative in nature when considering the proposed employment usage. This approach was agreed with Oxfordshire County Council during pre-application discussions.

13.1.3 This chapter has been prepared by Alan Baxter Ltd.

13.2 Policy Context, Legislation, Guidance and Standards

13.2.1 There is a range of national and local policy and guidance documents that outline the planning policy framework for development in Bicester. These are summarised in the Transport Assessment, and have been reviewed in order to inform the proposals.

13.2.2 National planning policies and guidance relevant to the transport aspects of this development are set out in the following documents:

- National Planning Policy Framework (2021)
- Planning Practice Guidance (2016),
- Manual for Streets (Department for Transport (DfT), 2007)
- Manual for Streets 2 (Chartered Institution of Highways and Transportation (CIHT) 2010)
- Local Transport Note 1-20: Cycle Infrastructure Design (DfT, 2020)

13.2.3 Local planning policies and adopted guidance relevant to the transport aspects of this development are set out in the following documents:

- The Cherwell Local Plan 2011-2031 (Adopted 2015)
- Connecting Oxfordshire: Local Transport Plan 2015-2031 (Adopted 2015)
- Oxfordshire Cycling Design Standards (2017)
- Oxfordshire Parking Policy (2014)
- Oxfordshire Electric Vehicle Infrastructure Strategy (2021).

13.3 Consultation

13.3.1 Pre-application advice on transport was provided by Cherwell District Council, as well as Oxfordshire County Council (OCC). A Transport Scoping Note was submitted in March 2022 and reviewed by OCC, and a series of workshops took place during February, March and April of 2022. Through this pre-application process, OCC confirmed on the basis of trip generation

and distribution, the scope of the impact assessment, the standards to be used for parking, and the principle of the new vehicular accesses. Regarding the approach to the EIA, no specific consultation took place, and so the IEMA methodology was followed, and professional judgement was used as the Competent Expert to complete the assessment. The assessment methodology follows the approach agreed with OCC for the TA.

13.4 Scope of Assessment

Not Significant Effects

13.4.1 The scope of the transport assessment is a comparative exercise, of the Proposed Development versus development authorised by the 2014 Planning Permission. This shows that, during the operational stage, there would be a decrease in traffic levels from what is consented (see section 13.8.8). Therefore it is assumed that in a comparative sense the effects would not be significant. Nonetheless, the topics used in this chapter (which followed IEMA Guidelines) were severance, driver delay, pedestrian delay, pedestrian amenity, fear and intimidation, and accidents and safety. These are considered in the following sections of this chapter. There are no significant sources of hazardous loads anticipated, and so this does not need to be considered and is scoped out of the assessment.

13.4.2 During the construction stage, as the Proposed Development is comparable to the consented, it is assumed that in a comparative sense the effects would not be significant. Furthermore, several of the IEMA categories can be scoped out of the assessment. In both the Proposed Development and that granted by the 2014 Planning Permission The site would remain inaccessible to the public, and therefore severance would not need to be considered. Furthermore, pedestrian delay and pedestrian amenity would not need to be considered, given that there would be no pedestrians expected.

Likely Significant Effects

13.4.3 As summarised in 13.4.1, it is assumed that there would not be any significant effects as part of the proposal during the operational stage, when comparing proposed vs consented as agreed with OCC through pre-application consultation on the Transport Assessment. Nonetheless, in order to provide a robust assessment, the following effects (minus those that have been scoped out) are assessed comparatively:

- Severance
- Driver Delay
- Pedestrian Delay
- Pedestrian Amenity
- Fear and Intimidation
- Accidents and Safety

13.4.4 As summarised in 13.4.2, it is assumed that there would not be any significant effects as part of the proposal during the construction stage, when comparing proposed vs consented. Nonetheless, in order to provide a robust assessment, the following effects (minus those that have been scoped out) are assessed comparatively:

- Driver Delay
- Fear and Intimidation
- Accidents and Safety

13.5 Methodology

Study Area

13.5.1 The study area for transport was as agreed with OCC during pre-app discussions, and is the following:

- Walking links within 800m (10min walk) of the Site
- Cycling links within 1,200m (5min cycle) of the Site
- Bus services accessible within 400m (5min walk) of the Site
- Rail services from Bicester stations
- Vehicle accesses from the Site to the public highway network
- Proportional impact assessment for the Pioneer Roundabout, and Rodney House Roundabout

Baseline Data Collection

13.5.2 Given the comparative nature of traffic analysis, the baseline set of data to be collected was the consented vehicular trips on the highway network. Additionally, in order to inform the subsequent analysis, proposed trips vehicular trips on the highway network were collected.

13.5.3 In order to derive the consented trips, documents relating to the 2014 Planning Permission' application were reviewed, including trip generation in the appendices. In order to derive the proposed trips, new trip generation was sourced from the TRICS database for storage and distribution (B8) land usage. Additionally, for bypass flows on the Employment Access Road (EAR), which is the road passing by the northern perimeter of the site, were sourced from OCC. This was SATURN data, and was for a future case where it is extended to the west to become the South East Perimeter Road.

Assessment

13.5.4 The methodology for the assessment of traffic and transport, as summarised in this chapter, and contained in full in the Transport Assessment, was in accordance with standard methodologies from the DfT and OCC.

13.5.5 In the Transport Assessment, baseline transport conditions have been reviewed, and key policy documents have been summarised. An overview of the transport proposals was provided. A trip generation exercise has been presented, with a comparison against consented vehicular trips. Trip distribution has also been reviewed, and a proportional impact assessment undertaken on two local roundabouts. Proposals for new vehicular accesses have been presented and have been modelled.

13.5.6 Given that there is an extant permission for the Site (the 2014 Planning Permission), however, the methodology has been adapted, as agreed with OCC. A comparative exercise has been undertaken, or proposed versus consented, for the year of opening (2024). This is on the basis that the extant permission would have informed the upgrades to local highways, been accounted for by subsequent developments, and incorporated into the Council's area wide SATURN model. The extant permission is therefore considered as a 'committed development' in itself as part of the traffic modelling. The subsequent analysis of local junctions, for example, is therefore a proportional impact assessment, checking the proposed traffic levels versus consented. A specific junction model would not be required, on the basis of the outline consent already having analysed this, and the proposed traffic now being less than what was consented. Junction

models for the various priority junction accesses to the Site, however, have been undertaken. This approach was agreed in pre-app discussions with OCC.

13.5.7 The IEMA Guidelines refers to receptors that could be affected by the proposed development. These were also used in the Environmental Statement for the Outline Application. These are the following:

- Users of the roads that are likely to be affected by changes in traffic movements
- Environmental resources fronting those roads, including the relevant occupiers and uses

13.5.8 The IEMA Guidelines refers to a checklist of environmental topics to be assessed which allows for a comprehensive assessment of the impact resulting from changes to traffic levels and the number of pedestrians associated with the proposed development. A summary of topics assessed, in accordance with the methodology of the 2011 ES and associated application documents, is as follows:

- *Severance:* the perceived division that can occur within a community when it becomes separated by a major traffic artery and is used to describe the factors that separate people from other people and places. For example, severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself. It can also relate to quite minor traffic flows if they impede pedestrian access to essential facilities. The effects of severance can also be applied to motorists, pedestrians, or residents. There are no predictive formulae between traffic factors and levels of severance. The IEMA guidelines state that marginal changes in traffic flow are unlikely to create or remove severance, but that consideration in determining whether severance is likely to be an important issue should be given to factors such as road width, traffic flow and composition, traffic speeds, the availability of crossing facilities and the number of movements that are likely to cross the affected route. Consideration should also be given to different groups such as the elderly and young children.

- *Driver Delay:* delays to non-developmental traffic can occur at several points on the local highway network as a result of the additional traffic that will be generated by a development. The IEMA guidelines state that delays are only likely to be significant when the traffic on the network is already at, or close to, the capacity of the system. The capacity of a road or particular junction can be determined by establishing the ratio of flow to capacity (RFC).

- *Pedestrian Delay:* changes in the volume, composition or speed of traffic may affect the ability of people to cross roads, and therefore, increases in traffic levels are likely to lead to greater increases in delay. Delays will also depend upon the general level of pedestrian activity, visibility and general physical conditions of the crossing location. Given the range of local factors and conditions which can influence pedestrian delay, the IEMA guidelines do not recommend that thresholds be used as a means to establish the significance of pedestrian delay, but recommend that reasoned judgements be made instead.

- *Pedestrian Amenity*: pedestrian amenity is broadly defined as the relative pleasantness of a journey, and is considered to be affected by traffic flow, traffic composition and pavement width/separation from traffic. The IEMA guidelines note that changes in pedestrian amenity may be considered significant where the traffic flow is halved or doubled. With the former leading to a positive effect and the latter a negative effect.

- *Fear and Intimidation:* the scale and fear of intimidation experienced by pedestrians is dependent on the volume of traffic, its HGV composition, its proximity to people or the lack of protection caused by such factors as narrow pavement widths, as well as factors such as the speed and size of vehicles. There are no commonly agreed thresholds by which to determine the significance of the effect. The IEMA guidelines note that special consideration should be given to areas where there are likely to be particular problems, such as high speed sections of road, locations of turning points and accesses.

- *Accidents and Safety:* The IEMA guidelines state that professional judgment will be needed to assess the implications of local circumstances or factors which may elevate or lessen risks of accidents, such as junction conflicts. Due to numerous local causation factors involved in personal injury accidents, the IEMA guidelines do not recommend the use of thresholds to determine significance. Again, professional judgment is required to assess the existing levels of recorded accidents and the possible effects of development generated traffic.

The above are assessed in a comparative nature, of the Proposed Development vs 2014 Planning Permission Consented Development ("Consented Development").

13.5.9 The effects of the Proposed Development are assigned significance in accordance with the generic significance criteria set out in **Table 13-1**. For the purposes of undertaking the assessment in accordance with the EIA Regulations, effects determined to be moderate or greater are considered significant in EIA terms.

Table 13-1 Significance Criteria

Level of Effect	Criteria
Major	These effects are assigned this level of significance as they represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites and features of national or regional importance. A change at a borough scale site or feature may also enter this category.
Moderate	These effects, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.
Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in enhancing the subsequent design of the project and consideration of mitigation or compensation measures.
Negligible or No Effect	Either no effect or effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error. Such effects should not be considered by the decision-maker.

Additionally, in some instances there may be some effects which are beneficial. This would apply given the comparative nature of the development, so would be in instances were the Proposed Development has a lesser impact than the Consented Development in terms of an effect.

13.6 Baseline Conditions

The Site and Surrounding Area

13.6.1 The Graven Hill development area is located approximately 2 km to the south of the centre of Bicester. Falling within secure ex-MOD land, the Site is relatively isolated and therefore local transport provision reflects this. However, there are also a series of transport upgrades planned, as part of the Graven Hill development, and with Bicester's growth in general. The summary of each transport mode is provided in the TA with figures and can also be summarised as described below.

13.6.2 In terms of rail, within Bicester there are two rail stations: Bicester Village and Bicester North. These enable journeys to London (50-60 mins), Birmingham (60-70 mins), and Oxford (20 mins). Bicester Village is located approximately 2km north of the Site, and is approximately a 5-minute drive, or 10-minute cycle. Bicester North is located approximately 3.5km north of the Site, and is approximately a 10-minute drive, or 20-minute cycle.

13.6.3 In terms of bus provision, the closest stop is 800 m to the northeast (or a 10 min walk), on the A41 near Symmetry Park. There are two services, which are the 17 and 18. Further north, buses serve the residential component of the Graven Hill development. There are bus stops in proximity to the Rodney House roundabout, which is 1.3km to the north of the Site (or a 20 min walk). Bus services were introduced relatively recently, in January 2021, being the 29 and H5 services.

13.6.4 In terms of local walking conditions, pedestrian provision to the Site largely consists of footways adjacent to vehicular carriageways along private roads. The wider Graven Hill allocation in the local plan is expected to deliver new public highways and improved pedestrian connectivity across the masterplan area.

13.6.5 In terms of cycling, many amenities will be within a 5-10 minute cycle. These include Bicester Village station, parts of the south of the town centre, and local amenities as part of the Graven Hill development.

13.6.6 The Site is in proximity to key strategic highways, with the A41 in particular running close to the Site. Connections are available to the M40 and the A34, with convenient journeys available to London, Birmingham, and Oxford. In terms of local provision, there are various private roads through the Site, which would have served the various MOD buildings.

Baseline Evolution

13.6.7 As there is an extant planning permission (2014 Planning Permission), the baseline scenario can be considered the current consented proposals, for employment usages on the Site. This contained a mix of employment uses, including B1(a) office, B1(b) R&D, B1(c)/B2 light industry, B8 warehousing.

13.6.8 As part of the wider Graven Hill development, it is anticipated that the EAR, would be delivered along the northern perimeter of the Site, by the time that the proposed development would be delivered. This would connect north to the A41, with a new roundabout (the 'Pioneer Roundabout'). As part of this, two sets of bus stops would be delivered. These would be bus cages in the carriageway, along with shelters and flags. At present, the exact service and frequency at these bus stops is unknown, but it would be expected to build on the existing provision within the vicinity of the Site. A new combined pedestrian route/cycleway would also be included as part of the EAR. Cycle and pedestrian provision would also be included at the Pioneer Roundabout. However, in terms of other onward routes beyond this, the cycle route provision is more limited.

13.6.9 Should the Site not be developed (i.e. despite the 2014 Planning Permission), traffic growth would still be expected to continue, due to other development within Bicester. This is captured in the Council's SATURN model.

13.7 Primary Mitigation

13.7.1 For the traffic and transport assessment, the primary mitigation for the Proposed Development is the EAR, the upgrade to the Pioneer Roundabout, and other upgrades associated with this e.g. bus stops, and a new cycleway on the EAR.

13.7.2 These improvements are designed in and secured as part of the 2014 Planning Permission, and the delivery was secured within the Graven Hill S106 agreement. The design was in accordance with the 2014 Planning Permission, which anticipated an employment usage on the

Site. Hence, the key impacts of the Proposed Development have already been mitigated. In now considering the proposed employment usage, in traffic terms there will be less than what was consented, and therefore less impact on the highway network. This is subsequently expanded on in this chapter.

13.7.3 Furthermore, localised improvements such as the cycle crossings and routings within the Site will be additional mitigation as part of the new proposals.

13.8 Assessment of Likely Effects

Demolition and Construction

13.8.1 The main construction work would be on site works (demolition, earthworks, infrastructure, and construction of the new buildings), and offsite highway works (new vehicular accesses on the completed EAR). Since the application is outline, it is expected that the finalisation of the details of scheme would be during a Reserved Matters Application. At this point, the number of construction vehicles would be analysed when trip generation can be determined.

13.8.2 However, a qualitative assessment has been undertaken using professional judgement and it is expected that the impact of construction vehicles on the highway network can be considered minimal. This is because more generally the new highways in the area have been designed to facilitate a longer term southern relief road, linking the A41 as a bypass at the south of Bicester. The EAR as it passes the Site would eventually form part of this, although in the short term will terminate at the existing roundabout to the west (to enable traffic to turn back). The Pioneer Roundabout will have similarly been designed for more substantial traffic volumes as part of this relief road scheme. Furthermore, traffic volumes in the short to medium term would be minimal, as the EAR only serves the Site, which has not yet been redeveloped. Therefore ample highways capacity will be available on the local highway network for construction vehicles, as it has been designed for much larger volumes in the long term.

13.8.3 The impacts assessed for the demolition and construction stage are those listed in the scope of the assessment in 13.4.4, and are as follows:

13.8.4 *Driver Delay:* During the construction period, the number of construction vehicles for the Proposed Development would be negligible or have no effect compared to the number assumed for the Consented Development. The effect on driver delay, for example at local junctions, would therefore be negligible. The significance of the effect of the proposed development is therefore considered negligible or to have no effect compared to the Consented Development. The receptors (users of the road, and environmental resources fronting the road) would experience a negligible impact.

13.8.5 *Fear and Intimidation:* Although there aren't commonly agreed thresholds on the significance of the effect, scale of fear and intimidation can be affected by the volume of traffic. The number of construction vehicles for the proposed development would be negligible compared to the number assumed for the Consented Development. The significance of the effect of the proposed development is therefore considered negligible or to have no effect compared to the Consented Development. The receptors (users of the road, and environmental resources fronting the road) would experience a negligible impact.

13.8.6 *Accidents and Safety:* The guidelines do not recommend the use of thresholds to determine significance, due to numerous local causation factors involved in personal injury accidents. However, the number of construction vehicles for the proposed development would be neutral compared to that assumed for the Consented Development. The significance of the effect of the Proposed Development is therefore considered negligible or to have no effect when compared to the Consented Development. The receptors (users of the road, and environmental resources fronting the road) would experience a negligible impact.

Operational

13.8.7 The assessment of operational effects identifies the impacts on receptors, namely pedestrians and residents, from the changes to traffic flows. Each impact as defined in the methodology is assessed, and is also assessed comparatively.

13.8.8 When comparing the Consented Development to Proposed Development, there is the following change in vehicular numbers:

Table 13.2 Net Vehicular Trips (Proposed vs Consented Development)

	AM Peak (0800-0900)			Mid Morning Peak (0900-1000)			Midday Peak (1400-1500)			PM Peak (1700-1800)			Daily (0700-1900)		
Mode	Arr	Dep	Tot	Arr	Dep	Tot	Arr	Dep	Tot	Arr	Dep	Tot	Arr	Dep	Tot
Cars & LGVS	-112	-49	-162	-106	-49	-155	-57	-78	-134	-37	-75	-112	-749	-775	-1525
OGV	30	21	50	41	32	72	-7	4	-3	9	11	20	172	192	364
Total Vehicles	-83	-29	-111	-65	-17	-82	-64	-74	-137	-29	-64	-92	-576	-583	-1160

This generally shows a decrease in proposed vehicular traffic compared to what has been consented. For example, in the AM peak there is a decrease of 111 total vehicles. In the PM peak there is a decrease of 92 vehicles. Daily there is an overall decrease of 1160 vehicles. These decreases are largely driven by the removal of office, and other B1 components, from the proposals. The B8 usage that is proposed instead is generally less intensive during the peak periods, and in terms of overall daily volumes.

In terms of the other time periods analysed, during the mid-morning peak (0900-1000) there is a reduction of 82 vehicles; however, there is an increase of 72 OGVs as part of this. This is again due to the supplanting of B1 office with B8 trips. During the mid-day peak (1400-1500), there is a decrease of 137 vehicles.

The trip generation results are provided in full in the Transport Assessment.

13.8.9 The impacts assessed for the operational stage are those listed in the scope of the assessment in 13.4.3, and are as follows:

13.8.10 *Severance:* the proposed development is broadly in keeping with consented, with the same access principles retained. This is the EAR, and the various site accesses. There would be no additional effects in terms of severance anticipated. The significance of the effect of the Proposed Development is therefore considered negligible or to have no effect compared to the Consented Development. The receptors (users of the road, and environmental resources fronting the road) would experience a negligible impact.

13.8.11 *Driver Delay:* the proposed development would have lesser traffic volumes compared to the Consented Development. Therefore driver delay would be expected to reduce, and any RFC values of location junctions would improve. The significance of the effect of the Proposed Development is therefore considered beneficial when compared to the Consented Development. In terms of impact, the receptors (users of the road, and environmental resources fronting the road) would experience a benefit.

13.8.12 *Pedestrian Delay*: this is assumed to reduce when compared to consented, due to reduced volumes of traffic. The ability of people to cross roads would improve. Furthermore, generous pedestrian crossings would be provided as part of the new accesses on the EAR (detailed in

the TA). The significance of the effect of the Proposed Development is therefore considered beneficial when compared to the Consented Development. In terms of impact, the receptors (users of the road, and environmental resources fronting the road) would experience a benefit.

13.8.13 *Pedestrian Amenity:* this is assumed to be similar when comparing proposed and consented. As this can be affected by traffic flow, the Proposed Development would at least have a negligible impact, or have a small benefit to pedestrian amenity, when compared to the Consented Development. The significance of the effect of the Proposed Development is therefore considered negligible or slightly beneficial when compared to the Consented Development. The receptors (users of the road, and environmental resources fronting the road) would experience a negligible impact or small benefit.

13.8.14 *Fear and Intimidation:* Although there aren't commonly agreed thresholds on the significance of the effect, scale of fear and intimidation can be affected by the volume of traffic. The Proposed Development has less traffic compared to consented, although larger HGV numbers. Other parameters such as pavement widths would be neutral in both schemes. The significance of the effect of the Proposed Development is therefore considered negligible or to have no effect compared to the Consented Development. The receptors (users of the road, and environmental resources fronting the road) would experience a negligible impact.

13.8.15 *Accidents and Safety:* The guidelines do not recommend the use of thresholds to determine significance, due to numerous local causation factors involved in personal injury accidents. The Proposed Development has less traffic compared to consented, although larger HGV numbers. The significance of the effect of the Proposed Development is therefore considered negligible or to have no effect compared to the Consented Development. The receptors (users of the road, and environmental resources fronting the road) would experience a negligible impact.

13.9 Secondary Mitigation and Enhancement

Construction

13.9.1 It is expected that the finalisation of the details of scheme would be during a Reserved Matters Application, with a Construction Logistics Plan expected to be conditioned. At this point, the number of construction vehicles would be analysed. Any secondary effects associated with this would be identified. However, in terms of a comparison of the Consented Development to Proposed Development, this is expected to be negligible or to have no effect.

Operational

13.9.2 When comparing the consented to Proposed Developments, in all categories (of severance, driver delay, pedestrian delay, pedestrian amenity, fear and intimidation, or accidents and safety), the proposed would be beneficial, or be negligible when compared to the consented. Therefore it is expected that any secondary effects would similarly be beneficial, or have a negligible impact compared to consented.

13.10 Residual Effects

13.10.1 There are no residual transport effects anticipated in either the construction or operational stage. This would be in terms of severance, driver delay, pedestrian delay, pedestrian amenity, fear and intimidation, or accidents and safety.

13.11 Monitoring

13.11.1 As there are no significant residual effects, monitoring is not expected to be required. However, a Travel Plan (expected to be conditioned) will generally include monitoring of travel patterns as part of this.

13.12 Cumulative Impacts

13.12.1 Other committed developments were identified in Chapter 6 of the ES. In terms of traffic modelling and assessment contained within this chapter, these have been accounted for. As summarised in 13.5.5, the 2014 Planning Permission is considered a 'committed development' itself as part of the traffic modelling, and has been incorporated into the Council's area wide SATURN model.

13.13 Comparison to 2014 Planning Permission

13.13.1 In summary of the above assessment, in terms of traffic and transport considerations, the Proposed Development improves the environmental effects when compared to the 2014 Planning Permission.

13.14 References

- Ministry of Housing, Communities and Local Government (2021), "National Planning Policy Framework"
- Ministry of Housing, Communities and Local Government (2016), "Planning Practice Guidance"
- Department for Transport (2007), "Manual for Streets"
- Chartered Institution of Highways and Transportation (2010), "Manual for Streets 2"
- Department for Transport (2020), "Local Transport Note 1-20: Cycle Infrastructure Design"
- Cherwell District Council (2015) "The Cherwell Local Plan 2011-2031"
- Oxfordshire County Council (2015) "Connecting Oxfordshire: Local Transport Plan 2015-2031"
- Oxfordshire County Council (2017), "Oxfordshire Cycling Design Standards"
- Oxfordshire County Council (2014), "Oxfordshire Parking Policy"
- Oxfordshire County Council (2021) "Oxfordshire Electric Vehicle Infrastructure Strategy"

14 Noise and Vibration

14.1 Introduction

14.1.1 This Chapter, prepared by Waterman IE, presents an assessment of the likely noise and vibration effects of the Proposed Development.

14.1.2 This Chapter is supported by the following appendices, provided in Volume 3 of this ES:

- **Appendix 14.1:** Glossary of Acoustic Terminology
- **Appendix 14.2:** Baseline Conditions
- **Appendix 14.3:** Consultation
- **Appendix 14.4:** Demolition & Construction Assessment Methodology
- **Appendix 14.5:** Road Traffic Noise Assessment

14.2 Policy Context, Legislation, Guidance and Standards

14.2.1 This section presents the key planning policy and guidance documents pertaining to noise within England relevant to the Proposed Development. These documents set out the aims, many of which are comparable, without providing details on specific noise levels, the latter of which are transposed into British Standards or sector specific guidance which are presented within the Assessment section of this chapter.

National Planning Policy Framework (NPPF)

14.2.2 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2021) was revised July 2021. With regard to noise the NPPF promotes 'good design' as part of 'sustainable development' and advocates 'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of …….noise pollution…'

14.2.3 Paragraph 185 of the NPPF states '*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

a. mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b. identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;'

14.2.4 Paragraph 187 of the NPPF introduces the 'Agent of change principle'. This details that 'Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

Noise Policy Statement for England (NPSE)

14.2.5 Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development the Noise Policy Statement for England (NPSE) (Defra, 2010) aims to:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

14.2.6 The NPSE introduces the concept of noise "effect levels" although it does not equate these to a specific level of noise as this is likely to be different for different noise sources, receptors and time of day. The effect levels are as follows:

- NOEL – No Observed Effect Level: Level below which no effect on health and quality of life due to noise can be detected;
- LOAEL – Lowest Observed Adverse Effect Level: Level above which adverse effects on health and quality of life can be detected;
- SOAEL – Significant Observed Adverse Effect Level: Level above which significant adverse effects on health and quality of life occur.

14.2.7 Predominantly, guidance is drawn from the World Health Organisation (WHO) when setting specific noise levels to the above effect levels, which essentially have been transposed into various British Standards, Policy and Guidance.

Local Planning Policy

14.2.8 The Adopted Cherwell Local Plan 2011-2031 (Cherwell District Council, 2015) (Part 1) contains strategic planning policies for development and the use of land. It forms part of the statutory Development Plan for Cherwell to which regard must be given in the determination of planning applications.

14.2.9 The Plan was formally adopted by the Council on 20 July 2015. Policy Bicester 13 was re-adopted on 19 December 2016. Policy ENV1 from the adopted Local Plan 1996 (Cherwell District Council, 1996) has been retained. Policy ENV1 states *"Development which is likely to cause materially detrimental levels of noise, vibration, smell, smoke, fumes or other type of environmental pollution will not normally be permitted."*

14.2.10 Under this policy it states, *"the Council will seek to ensure that the amenities of the environment, and in particular the amenities of residential properties, are not unduly affected by development proposals which may cause environmental pollution, including that caused by traffic generation."*

14.3 Consultation

14.3.1 Environmental Health of CDC were consulted via email 8th March 2022 to agree the baseline approach in light of on-going construction works and to confirm their noise criteria for fixed external plant and building services. A copy of this consultation is provided in **Appendix 14.3.**

14.4 Scope of Assessment

Not Significant Effects

14.4.1 The proposed B8 Use Class does not introduce vibration generating activities or operations. On this basis the assessment of operational vibration is scoped out of the assessment.

Likely Significant Effects

14.4.2 The potential for significant noise and vibration effects are considered to be:

- Noise and vibration from the demolition and construction phase together with change in road traffic noise resultant from construction traffic;
- Noise from fixed plant and building services once completed and operational;
- Break-out noise from the units once completed and operational;
- Operational noise (reverse alarms. Loading/unloading operations); and
- Road traffic noise associated with the Proposed Development on the Employment Access Road (EAR) and the local road network once completed and operational.

14.5 Methodology

Study Area

14.5.1 The study area for demolition, construction, and operational noise, excluding road traffic noise on the local road network, includes the area surrounding the Site extending to the nearest existing residential receptors and proposed residential receptors of the Graven Hill Village Development (the residential element of the 2011 Permission), refer to **Figure 14.1.** With regard to road traffic noise, this includes the area adjacent to the roads that have been assessed, refer to **Appendix 14.5** for relevant road links.

Baseline Data Collection

14.5.2 The baseline conditions at the nearest existing residential receptors to the Site have been established through baseline noise surveys conducted in March 2022. **Figure 14.1** presents the noise monitoring locations. The noise surveys have been undertaken in line with guidance contained in BS 7445:2003(BSI, 2003). Unattended environmental noise logging equipment as set up at key locations to establish prevailing day, evening and night-time noise levels.

14.5.3 Due to on-going construction works in connection with the Graven Hill Village Development and Employment Access Road (EAR), noise from construction works currently contributes to the prevailing noise levels between 07:30-18:30. In light of this, noise measurements taken between this time were not included in subsequent analysis of the data. Full details can be found in **Appendix 14.2**.

Assessment

Predicting Effects

14.5.4 The level of effect has been assessed based on the magnitude of change or absolute level of noise or vibration due to all phases of the Proposed Development and then the sensitivity of the affected receptor.

14.5.5 **Table 14.1** presents the assigned receptor sensitivity:

Table 14-1: Receptor Sensitivity

Receptor Sensitivity	Receptor Type
High	Residential, school, hospital
Medium	Office, commercial
Low	Industrial
Negligible	No receptors within 800m[1]

Note: [1] This has been adopted from BREEAM POL 05 'Reduction of noise pollution' and is considered to be a conservative approach.

14.5.6 The magnitude of the predicted change in or absolute level of noise and vibration arising from the demolition, construction and operational phases of the Proposed Development are classified having regard to NPSE 'Effect Levels' and the noise exposure levels presented within Planning Policy Guidance-Noise[1]. These are presented as **Table 14.2**:

Table 14-2: Magnitude in Predicted Change/Absolute Noise Level

Magnitude	Description
Large	Significant Observed Adverse Effect Level (SOAEL)
Medium	Above LOAEL but below SOAEL
Small	Lowest Observed Adverse Effect Level (LOAEL)
Negligible	No Observed Effect Level (NOEL)

14.5.7 The effect levels are defined as follows:

- NOEL – No Observed Effect Level: Level below which no effect on health and quality of life due to noise can be detected;
- LOAEL – Lowest Observed Adverse Effect Level: Level above which adverse effects on health and quality of life can be detected;
- SOAEL – Significant Observed Adverse Effect Level: Level above which significant adverse effects on health and quality of life occur.

14.5.8 Magnitude of change/absolute level as a result of the Proposed Development is considered within the range of large, medium, small and negligible.

14.5.9 Consideration is given to the scale, duration (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 the extent of the Proposed Development when considering the level of effect.

14.5.10 The matrix outlined in **Table 14.3** coupled with the requirements of NPSE and relevant British Standards, guidance and policy, have been used to determine the level of the effect. The predicted level of effect is based upon the consideration of magnitude of change and sensitivity of the resource/receptor.

[1] https://www.gov.uk/guidance/noise--2

Table 14-3: Level of Effect

Receptor Sensitivity	Magnitude			
	Large (SOAEL or above)	Medium (between LOAEL and SOAEL)	Small (LOAEL)	Negligible (NOEL)
High	Major	Moderate to Major	Minor to Moderate	Negligible
Medium	Moderate to Major	Moderate	Minor	Negligible
Low	Minor to Moderate	Minor	Negligible to Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

14.5.11 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'. A statement is also made as to whether the level of effect is 'Significant' or 'Not Significant', again based on professional judgement.

14.5.12 Further explanation of the significance criteria is presented below:

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

14.5.13 Generally, level of effects that are determined to be Moderate or greater are assessed as significant, but it is ultimately dependent on professional judgement which takes account of site specifics, duration, as well as the magnitude of change and sensitivity of the receptor(s).

Demolition, Construction Noise & Vibration

14.5.14 Demolition and construction noise levels were calculated in accordance with the methodology prescribed within BS 5228-1:2009+A1:2014 (BSI, 2014) for each of the major stages of construction, accounting for the typical type of plant and activities expected within the assumed major stages of work.

14.5.15 The 'ABC Method' provided in BS 5228:2009-1+A1:2014 has been used to determine the category threshold values, which are determined by the time of day and existing prevailing

ambient noise levels. The noise generated by demolition and construction activities is compared with the threshold value and the prevailing noise level to determine the magnitude of the demolition and construction noise. The magnitude is as detailed within DMRB LA 111 (Highways England, 2020), **Table 3.12** 'Construction time period – LOAEL and SOAEL' and **Table 3.16** 'Magnitude of impact and construction noise descriptors' and information provided within Appendix E of BS 5228:2009-1+A1:2014.

14.5.16 There are two aspects of vibration impact which need consideration according to BS5228-2:2009+A1:2014. These are:

- The impacts on people or equipment within buildings; and;
- The impacts on buildings (or other structures) themselves.

14.5.17 There are currently no British Standards that provide a methodology for predicting levels of vibration from demolition and construction activities other than BS 5228-2:2009+A1:2014 , which relates to percussive or vibratory rolling and piling only. People are sensitive to low levels of vibration being just perceptible at 0.3 mm/s Peak Particle Velocity (PPV) in residential environments with potential for complaints at 1.0 mm/s PPV. The magnitude of vibration on people has been derived from Table B1 of BS 5228-2:2009+A1:2014 and as detailed within DMRB LA 111 Table 3.31 'Construction vibration LOAEL and SOAELs for all receptors' and Table 3.3 'Vibration level – magnitude of impact'.

14.5.18 The potential for damage to buildings from vibration occurs at significantly higher levels than human perceptibility, with the probability of damage tending towards zero at ≤ 12.5 mm/s PPV.

14.5.19 The magnitude of noise and vibration impacts arising from the demolition and construction phase are presented in **Table 14.4.**

Table 14-4: Magnitude of Demolition, Construction Noise & Vibration

Magnitude	Demolition & Construction Noise Level dB $L_{Aeq,T}$	Level of Vibration mm/s PPV	Definition
Negligible	≤ Baseline (Prevailing) Noise Level	<0.3	The effect is not of concern
Small Adverse	≤Threshold Noise Level	≥0.3 to <1	The effect is undesirable but of limited concern
Medium Adverse	>Threshold Noise Level to <Threshold +5dB (or ≤75dB $L_{Aeq,T}$, whichever is highest	≥1 to <10	The effect gives rise to some concern but is likely to be tolerable depending on scale and duration
Large Adverse	>Threshold +5dB (or >75dB $L_{Aeq,T}$, whichever is highest	≥10	The effect gives rise to serious concern and it should be considered unacceptable, except for very brief exposure depending on the absolute level

Construction Traffic

14.5.20 Calculation of Road Traffic Noise (DoT, 1988) (CRTN) methodology has been used to determine the potential change in road traffic noise as a result of development construction traffic by determining the percentage change in daily traffic volume and Heavy Goods Vehicles (HGVs). The magnitude of change in noise level is presented in **Table 14.5** and is based on Design Manual for Roads and Bridges (DMRB) criteria (Table 3.17 'Magnitude of impact at receptors').

Table 14-5: Magnitude of Change due to Construction Road Traffic Noise

Magnitude	Change in Road Traffic noise with Construction Traffic (dB)	Definition
Negligible	<1.0	The effect is not of concern
Small	≥1.0 to ≤3.0	The effect is of limited concern
Medium	>3.0 to <5.0	The effect gives rise to some concern depending on absolute levels and duration
Large	≥5.0	The effect gives rise to serious concern and it should be considered unacceptable where it increases the prevailing noise levels by this amount, depending on absolute level and duration. Note: noise from another road link may be the dominant source so the predicted increase may not be realised.

Complete and Operational Development

14.5.21 Assessment of operational noise has been split into four key areas as detailed in the 'Likely Significant Effects' section discussed earlier within this chapter.

Operational Fixed Plant & Building Services

14.5.22 The primary source of guidance in relation to noise which is industrial in nature, such as fixed building services plant, industrial and commercial operations, is provided in BS 4142:2014+A1:2019 (BSI, 2019). BS 4142 states that the potential impact from industrial / commercial sound is based on the level difference between the source, known as the 'specific sound level' ($L_{Aeq,Tr}$), compared with the 'background sound level' ($L_{A90,T}$) that exists in the absence of the source in question. Where the sound contains any acoustic characteristics such as tonality, impulsiveness and intermittency then the specific noise level is adjusted in-line with BS 4142 to determine the 'rating level' ($L_{Ar,Tr}$).

14.5.23 Typically, the greater the difference between the rating level and the background sound level the greater the potential of an adverse impact. BS 4142 states:

14.5.24 "*A difference of +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;*

- *A difference of +5dB or more is likely to be an indication of an adverse impact, depending on the context; and*
- *Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

14.5.25 BS4142 further states; *"Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*

14.5.26 Context is an important consideration of a BS4142 assessment, and the impact may require modification due to context, which may include:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound; and

- Design measures that secure good internal and / or outdoor acoustic conditions, such as: façade insulation treatment; ventilation and / or cooling techniques which reduce the need to have open windows and acoustic screening.

14.5.27 BS 4142 standard is not intended to be applied to the assessment of indoor sound levels.

14.5.28 **Table 14.6** presents the magnitude of noise emissions from fixed external plant and building services. CDC Environmental Health's general recommendation regarding plant noise is that it does not exceed background.

Table 14-6: Magnitude of Noise from Fixed External Plant & Building Services

Magnitude	Rating Level dB $L_{Ar,Tr}$ (without context) Compared to Background Sound Level (L_{A90})	Definition
Negligible	Rating Level ≤ L_{A90}	The effect is not of concern
Small	Rating Level ≤ L_{A90}+5dB	The effect is undesirable but of limited concern
Medium	Rating Level > L_{A90}+5dB	The effect gives rise to some concern but is likely to be tolerable depending on scale, duration and period of operation (day/night)
Large	Rating Level ≥ L_{A90}+10dB	The effect gives rise to serious concern and it should be considered unacceptable

Break-Out Noise from B8 Units

14.5.29 Break-out noise from the B8 Units would be assessed in accordance with BS4142, however at this outline stage where specific detail is not known, a qualitative assessment has been undertaken using professional judgement by a competent expert.

Site Operational Noise (Service Yard)

14.5.30 Due to the nature of Site operational noise, a BS4142 assessment is required. This would assess the potential magnitude of operational noise within the service yard area including loading/unloading operations and general within site vehicle movements. The level of magnitude is as presented in **Table 14.6**, although context will also need to be taken into account when assigning the final magnitude.

Road Traffic Noise

14.5.31 Road traffic noise has been calculated using the calculation methodology of CRTN. This has been used to predict the dB $L_{A10,18\ hour}$ Basic Noise Levels (BNL) for the year of completion, which is anticipated to be 2024, with and without Proposed Development. A comparison has also been undertaken between the Consented Development and the Proposed Development to determine if the Proposed Development results in effects different to the Consented Development.

14.5.32 The calculations use the 18-hour Average Annual Weekday Traffic (AAWT) flow, % HGV composition and average vehicle speed for relevant road links. The magnitude of the change in road traffic noise was evaluated by considering the estimated change in the $L_{A10,18\ hour}$ road traffic noise level on the local highway network as a result of the operation of the completed Proposed Development. The DMRB LA 111 provides magnitude criteria for short-term changes in operational road traffic noise levels which are reproduced in **Table 14.7.**

Table 14-7: Magnitude of Change in Operational Road Traffic Noise

Magnitude	Short-Term Change Road Traffic Noise Level (dB)
Negligible	<1.0
Small	1.0 to 2.9
Medium	3.0 to 4.9
Large	≥5.0

Limitations

Demolition, Construction Noise & Vibration

14.5.33 The BS 5228 calculation methodologies allow accurate noise levels to be determined for various demolition and construction activities. However, at this stage specific detail on the construction plant and machinery to be used (make/model) is not known. A number of assumptions have therefore been made regarding the number and type of plant to be utilised, their location, and detailed operating arrangements. Some of this information will be clarified as the detailed design progresses and later when resources are mobilised and the contractor is appointed, but other information (such as exactly where the plant operates and for how long) would remain uncertain, even after works have commenced.

14.5.34 Construction noise levels have been based on generic plant detail contained within BS5228-1:2009+A1:2014 and information provided by the applicants. The available information is considered sufficient to undertake a noise assessment of the demolition and construction work, focussing on key activities operating at the Site, with the aim of identifying whether a significant, albeit temporary, adverse noise effect is likely to arise at the nearest sensitive receptors. Full details of assumed plant complement and distance to receptors are presented within **Appendix 14.4.** In this respect, a medium to high degree of confidence is assigned to the predicted significance of the potential effects.

Baseline

14.5.35 This assessment is based upon noise monitoring conducted at the nearest sensitive receptors to the Site in March 2022, which are considered to be representative of prevailing conditions and takes account of noise from the surrounding land-uses, such as local road networks namely the A41. There are construction works currently being undertaken in connection with the Graven Hill Village Development and EAR. Noise measured outside of current construction operational hours (07:30-18:00) and therefore not contaminated, have been used as a basis for the assessment. This is considered a robust approach on which to base the assessment of an outline application.

14.5.36 Excluding the on-going construction works, there are no existing sources of vibration proximate to the existing sensitive receptors. On this basis vibration measurements were not conducted as baseline vibration is taken as zero, which is considered to be representative of baseline conditions.

14.6 Fixed Plant & Building Services

14.6.1 On account of the outline nature of the planning application, the specific type, configuration and location of fixed plant are not defined. Consequently, it is not possible to undertake predictions to determine whether appropriate standards would be met, so instead appropriate plant noise emission limits have been set as part of the secondary mitigation. Baseline Conditions

Sensitive Receptors

14.6.2 There are a number of existing residential receptors surrounding the Site, together with MoD land use which is understood to include residential use, that may be adversely impacted by the Proposed Development. **Table 14.8** presents the existing sensitive receptors selected for assessment together with the assigned sensitivity level. Sensitive receptor locations are illustrated on **Figure 14.1.**

14.6.3 In addition to existing sensitive receptors, on review of the Graven Hill Village Masterplan, approximately 70 metres to the northwest of the Site, at some point in the future will be residential buildings. Although houses built within this area will need to take account of road traffic noise from the EAR as well as the Proposed Development as part of the 'agent of change' principle detailed in NPPF paragraph 187, the Proposed Development will also need to have consideration of the future residential receptors, which will be nearer than the existing residential receptors.

Table 14-8: Sensitive Receptors

ID	Description	Use	Sensitivity	Distance From Site Boundary (approx.. m)
SR A	The Hay Barn & Byre	Residential	High	270 (north east)
SR B	The Granary	Residential	High	320 (north east)
SR C	St Davids Baracks	MoD	High	40 (north)
SR D	Graven Hill Village 1A (Hull Lane)	Residential	High	720 (north)
SR E	Graven Hill Village 1B (Graven Hill Road)	Residential	High	720 (north)
SR F	Ambrose Farm House	Residential	High	460 (west)
SF G	Future Graven Hill Village Receptor	Residential	Hight	70 (north west)

Baseline Conditions

14.6.4 A baseline noise survey was undertaken within the vicinity of The Hay Barn & Byre and The Granary on Thursday 10th March to Friday 11th March 2022 and within the vicinity of Phase 1A and Phase 1B of the Graven Hill Village Development (GHVD). As already stated, construction works in connection with the GHVD and EAR are on-going, therefore baseline conditions were established by noise levels measured outside of the construction operational hours (07:30-18:00). Monitoring locations are illustrated in **Figure 14.1** and described in **Table 14.9.** At all locations the microphone was mounted on an integral steel pole approximately 1.5m above ground level.

Table 14-9: Description of Noise Monitoring Locations

ID	Location	Description
LT1	West of The Hay Barn & Byre and The Granary (circa. 85m) set back a comparable distance from the A41 (circa 105m).	Dominant noise outside of construction operational hours is road traffic noise from the A41
LT2	Phase 1A area of Graven Hill Village Development (Hull Lane).	Dominant noise outside of construction operational hours is road traffic noise from the A41
LT3	Phase 1B area of Graven Hill Village Development (Graven Hill Road)	Dominant noise outside of construction operational hours is road traffic noise from the A41

14.6.5 **Table 14.10** presents a summary of the measured noise levels with full details presented in **Appendix 14.2.**

Table 14-10: Summary of Measured Baseline Noise Levels

ID	Location	Period	dB L_{Aeq}[1]	dB L_{Amax}[2]	dB L_{A10}[3]	dB L_{A90}[3] (mode)
LT1	The Hay Barn & Byre, The Granary	Post Construction 18:00-19:00	46	58[4]	No Data	44 ([5])
		Evening (1800-2300)	46	58	No Data	44 (44)
		Night (2300-0700)	44	57	No Data	42 (42)
LT2	Phase 1A GHVD (Hull Lane)	Pre Construction (07:00-07:30)	56	62	57	54 (54)
		Post Construction (18:00-19:00)	65	78	57	49 (40)
		Evening (19:00-23:00)	47	59	48	43 (40)
		Night (23:00-07:00)	49	59	48	41 (39)
LT3	Phase 1B GHVD (Graven Hill Road)	Pre Construction (07:00-07:30)	54	70	53	50 (50)
		Post Construction (18:00-19:00)	52	69	52	41 (39)
		Evening (19:00-23:00)	45	68	45	39 (38)
		Night (23:00-07:00)	46	67	44	40 (37)

Note: [1] Logarithmic average. [2] 90th percentile. [3] Arithmetic average. [4]. L_{AFmax} value measured in the 1-hour measurement period. [5] Only 1 value as hourly measurement therefore not possible to derive modal value.

14.6.6 Outside of construction operational hours, the dominant noise source was noted to be road traffic noise, namely from the A41.

14.6.7 Within the vicinity of The Hay Barn & Byre and The Granary, the measured day and evening ambient noise levels were 46dB $L_{Aeq,T}$ with a background noise level of 44dB L_{A90}. During the night-time period this reduces slightly to 44dB L_{Aeq} and 42dB $L_{A90\ (mode)}$.

14.6.8 Within Phase 1A and 1B of GHVD the daytime ambient noise levels are around mid 50dBs with background noise levels of around 40dB $L_{A90\ (mode)}$ if the morning period (07:00-07:30) is excluded. During the evening period the ambient noise levels are 45-47dB $L_{Aeq,T}$ with background noise levels of 38-40dB $L_{A90\ (mode)}$. During the night-time period the ambient levels are 46-49dB $L_{Aeq,T}$ with background noise level of 37-39dB $L_{A90\ (mode)}$.

14.6.9 It is on these measured noise levels that the assessment of the Proposed Development has been undertaken.

Baseline Evolution

14.6.10 The evolved baseline is a baseline condition at an indeterminate point in the future, for a scenario which assumes all of the Committed Development (see **Appendix 6.1**) are built in the surrounding environment and that the surrounding environment, including the Site has naturally evolved (e.g. natural growth in road vehicles and intensification of existing land-uses), in the absence of the Proposed Development being implemented. This includes the GHVD and EAR which are already permitted.

14.6.11 On review of traffic data supplied by the Transport Engineer's of the Proposed Development (Alan Baxter Ltd), for 2019 and 2024 without the Proposed Development, the majority of road links are predicated to experience no significant change (change in road traffic noise of less than 1dB). For part of the A41 between Oxford Road and A4421 a small decrease in road traffic noise of -1.6dB is predicted due to the decrease in speed from around 78kph to 67kph. Conversely, small increases in road traffic noise of less than +3dB are predicted on the A41, west of the EAR roundabout and on the A4421. Environmental noise level changes of this small magnitude, if gradual, are not expected to be discernible.

14.6.12 It should be noted that at 2024, the EAR is not forecast to have traffic as although this is already permitted in terms of build-out, it is intrinsically linked to the Employment Use areas of the Graven Hill Masterplan.

14.7 Primary Mitigation

Demolition and Construction

14.7.1 The outline Construction Environmental Management Plan (CEMP) which forms part of the application, outlines mitigation measures that may be used to reduce and mitigate construction noise and vibration. As such, although this would ultimately be controlled through planning condition, the assessment is based on the CEMP being inherent to the Proposed Development. Typical mitigation that may be used is presented below:

- Use of hoarding to the required height and density appropriate to the noise sensitivity of the site;
- Use of modern, quiet and well-maintained machinery such as electric powered plant, where possible and hoists should use the Variable Frequency Converter drive system;
- Vehicles and mechanical plant used for the works would be fitted with exhaust silencers, which would be maintained in good and efficient working order and operated in such a manner as to minimise noise emissions in accordance with the relevant EU / UK noise limits applicable to that equipment or no noisier than would be expected based the noise levels quoted in BS 5228. Plant should be properly maintained and operated in accordance with manufacturers' recommendations. Electrically powered plant would be preferred, where practicable, to mechanically powered alternatives;
- Avoidance of unnecessary noise (such as engines idling between operations, excessive revving or engines) by effective site management;

- Demolition works to have consideration to Demolition Code of Practice BS6187 (2011);
- Establish noise and vibration target levels (a Section 61 agreement under the Control of Pollution Act 1974 (COPA)) to reduce noise and vibration to a minimum in accordance with best practicable means, as defined in Section 72 of COPA;
- Using low impact techniques where possible (demolition munchers);
- Off-site prefabrication or preparation of building elements where possible to reduce on-site works;
- Use of acoustic screens or enclosures where possible to reduce localised noise emissions around key plant;
- Use of broad-band audible alarms wherever practicable including reversing alarms and other equipment such as mobile elevated work platforms
- Use of broad-band audible alarms wherever practicable including reversing alarms and other equipment such as mobile elevated work platforms
- Where required, monitoring of noise and vibration levels;
- Changing, where possible, methods and processes to keep noise and vibration levels low as reasonably practicable;
- Positioning and or screening plant as far away from residential property as physically possible;
- Works would be limited to the specified hours to be agreed with Environmental Health of CDC and any works outside of these times will be agreed in advance.

14.7.2 Based on information within BS5228-1:2009+A1:2014, the above mitigation measures should afford 10dB(A) attenuation.

Completed Development

14.7.3 The Proposed Layout Parameter Plan (drawing no. 410-S-51 Rev P2) illustrates the development area, which includes B8 warehouse buildings with a maximum of 20m ridge height, roads, parking and service yards. Specific element details, such as the warehouse building (Units) footprints would be at reserved matters stage.

14.7.4 The Indicative Proposed Plan (drawing no. 410-S-50 Rev P2) illustrates the indicative building (Unit) footprint and location of parking and service yards. This illustrates how the Units themselves could be configured to screen noise from the service yard areas to the receptors. However, because this is illustrative at this outline stage, this cannot be assumed to be inherent to the scheme design and therefore primary mitigation for assessment of the completed development.

14.8 Assessment of Likely Effects

Demolition & Construction Noise

14.8.1 **Table 14.11** presents the predicted noise levels and level of effect with CEMP measures of the 'noisy' operations, namely, demolition, earthworks, concreting and pavement works. All effects are considered to be temporary, direct, short-term and local.

14.8.2 Piling using continuous flight auger (CFA) is presented although it is assumed foundation is most likely to be through concrete spread footings. The construction threshold value (daytime)

at all SR locations is 65dB $L_{Aeq,T}$, where T is the construction operational hours. Full calculation details are presented in **Appendix 14.4.**

Table 14-11: Residual Effect of Demolition & Construction Works Noise With CEMP

Receptor	Demolition	Earthworks	CFA	Concreting	Pavement
A. The Hay Barn & Byre	44 (negligible)	45 (negligible)	46 (negligible)	45 (negligible)	43 (negligible)
B. The Granary	44 (negligible)	44 (negligible)	45 (negligible)	43 (negligible)	41 (negligible)
C. St Davids Barracks	67 (moderate)	62 (minor)	63 (minor)	61 (minor)	59 (minor)
D. Graven Hill 1A	44 (negligible)	37 (negligible)	38 (negligible)	36 (negligible)	34 (negligible)
E. Graven Hill 1B	44 (negligible)	37 (negligible)	38 (negligible)	36 (negligible)	34 (negligible)
F. Ambrosden Farm	44 (negligible)	41 (negligible)	42 (negligible)	40 (negligible)	38 (negligible)

14.8.3 With CEMP measures the predicted level of effect is negligible at all receptors due to the relatively large distance between works and receptors, except SRD St Davids Barracks, which is located within 40m of the Site boundary. At all receptors except St Davids Barracks, the significance of demolition and construction works with CEMP measures is therefore Not Significant.

14.8.4 At St Davids Barracks, when demolition works are being undertaken at the closest distance, the predicted noise level just exceeds the construction threshold value of 65dB $L_{Aeq,T}$, resulting in a short-term, temporary, local moderate adverse level of effect. For all other operations the predicted level of effect is minor adverse.

14.8.5 Given the construction threshold value of 65dB $L_{Aeq,T}$ during demolition works is only just exceeded when works are undertaken at the shortest distance, and that the construction threshold limit of 75dB $L_{Aeq,T}$ is not exceeded, secondary mitigation, such as deconstructive demolition, is not considered necessary. On balance, although an increase in prevailing noise levels are predicted to occur at St Davids Barracks during the demolition and construction phase, these are broadly in-line with BS5228-1 guidelines and therefore considered to be Not Significant.

Demolition & Construction Vibration

14.8.6 **Table 14.12** presents typical distances based on professional judgement for various construction operations which give rise to just perceptible vibration. As noted previously it is considered unlikely that piling would be undertaken, and concrete spread footings (or similar) would be used for foundations. Notwithstanding this, distances at which piling is generally perceptible is presented. Should piling be required the assumption is that CFA would be the method adopted as this gives rise to the lowest noise and vibration levels.

Table 14-12: Distance at which vibration is just perceptible

Construction Activity	Distance from Activity when Vibration may Just be Perceptible (metres)
Heavy vehicles	5 – 10
Excavation	10 – 15
CFA Piling	15 – 20
Rotary Bored Piling	20 – 30
Vibratory Piling	40 – 60

Note: Distances for perceptibility are only indicative and dependent upon a number of factors, such as the radial distance between source and receiver, ground conditions, and underlying geology

14.8.7 Table 14.13 presents typical vibration levels for rotary bored piling, which is taken as being indicative of that arising from CFA piling, extracted from BS5228-2.

Table 14-13: Piling vibration levels with distance (PPV mm/s) BS5228-2

Distance (m)	Rotary Bored Piling PPV mm/s
5	0.22 - 0.54
10	0.30 - 1.10
20	0.05 - 0.55
30	0.03

Note: Dependent on ground conditions and underlying geology

14.8.8 Table 14.14 presents the qualitative residual effects from demolition and construction vibration with CEMP measures. These are based on the separation distance from works to receptors and information presented in Tables 14.4, 14.12 and 14.13.

Table 14-14: Residual Effect of Demolition & Construction Vibration With CEMP

Receptor	Shortest Distance from Site Boundary	Shortest Distance from Demolition Works	Shortest Distance from CFA Piling	Residual Level of Effect	
				Humans	Buildings
A. The Hay Barn & Byre	270	725	270	Negligible	Negligible
B. The Granary	320	785	320		
C. St Davids Barracks	40	55	40		
D. Graven Hill 1A	720	730	720		
E. Graven Hill 1B	720	730	720		

F. Ambrosden Farm	460	740	460		

14.8.9 Due to the distance separation from work to receptors, qualitatively the residual level of effect from demolition and construction vibration with CEMP measures is considered to be Negligible and therefore Not Significant. This is for the effect on both people and buildings.

Demolition & Construction Traffic

14.8.10 Information on peak demolition and construction traffic volumes is not available at this stage to allow a quantitative assessment to be undertaken. Qualitatively however, taking account of baseline traffic flows on the surrounding road network, it is considered that the potential effects would be predominantly Negligible with the potential for some short-term, temporary, local, minor adverse effects and therefore Not Significant.

14.8.11 For example, a 25% increase in traffic volume would be required for a 1dB increase in road traffic noise which is a small increase in terms of magnitude resulting in a minor adverse effect on a receptor with high sensitivity. On the A41, the 2019 baseline traffic data is +20,000 18-hour AAWT with 6-7% HGVs, therefore a 25% increase in traffic volume due to construction traffic is considered to be unlikely. Despite this, secondary mitigation in the form of a Construction Transport Management Plan (CTMP) is recommended to reduce potential adverse effects to as low as reasonably practicable.

Operational Fixed Plant & Building Services

14.8.12 At this outline stage of the Proposed Development, the specific type and configuration of fixed plant and building services are not defined. Consequently, it is not possible to undertake a quantitative assessment to determine whether appropriate standards would be met. On this basis, qualitatively, it is considered there is the potential for localised, permanent moderate to major adverse, and therefore Significant effects at the closest receptors to the Site; namely St David Barracks (SR C) and the future residential receptors of GHVD (SR G). For receptors located at distance (The Hay Barn & Byre, The Granary and Phase 1A and 1B of GHVD), it is considered that the potential for localised, permanent adverse effects would reduce to **minor adverse or negligible** due to distance attenuation and the potential intervening screening due to topography and buildings and are therefore unlikely to be significant.

14.8.13 On this basis it is considered secondary mitigation (Section 14.9) will be required to allow CDC plant noise limits at the nearest residential receptors to be satisfied.

Break-Out Noise from B8 Units

14.8.14 At this stage of the Proposed Development the internal noise levels within the units and sound insulation provided by the envelope of the Units (walls, roof, doors) is unknown. The potential for adverse effects will be a function of internal noise levels within the units together with area of the unit facing the receptor, the separation distance, prevailing noise levels and the time of day.

14.8.15 Assuming noise levels within the warehouse units do not exceed the first action level of the Noise at Work Regulations, which is 80dB(A), and doors to the warehouse units are not left open, then qualitatively it is considered that only the nearest receptors (SR C St David's Barracks and SR G Future GHVD) may be exposed to significant adverse effects. Qualitatively, depending on the internal noise levels within the warehouse units and the sound insulation afforded by the unit envelope, there is the potential for permanent, localised moderate adverse effects.

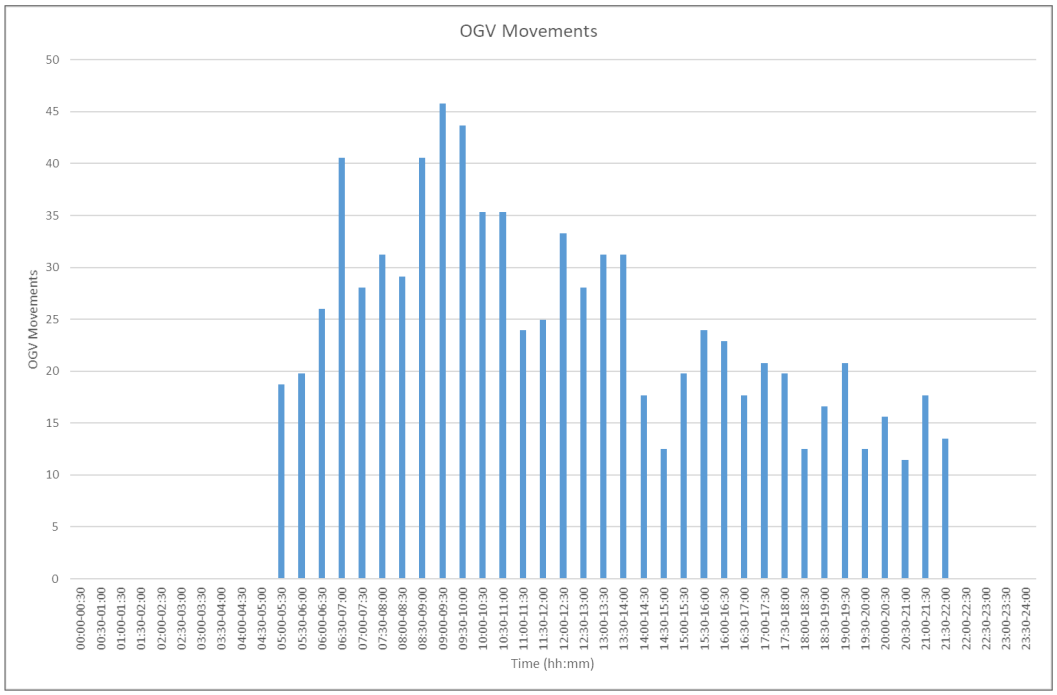
14.8.16 On this basis it is considered that secondary mitigation will be required to reduce break-out noise to acceptable levels resulting in effects which will not be significant at the nearest receptors.

Site Operational Noise (Service Yard)

14.8.17 There are a number of site operations that may generate noise and therefore have the potential to result in significant adverse effects. These include within Site vehicle movements, reverse alarms of HGVs and loading/unloading operations.

14.8.18 Based on the land-use forecast trips provided by Alan Baxter Ltd (Proposed Development transport engineer's) and Gross Internal Areas (GIA) of the Proposed Development provided by Atelier Gooch (Proposed Development architect's), **Graph 14.1** presents the forecast Ordinary Goods Vehicles (OGV) movements. This is illustrative only at this outline stage of the Proposed Development and is therefore subject to change at detailed design stage.

Graph 14-1: Forecast OGV Daily Movements



14.8.19 The potential for significant adverse effects from within Site vehicle movements is dependent on the number of forecast movements, especially from HGVs, type of HGV manoeuvres (turning / reversing), time of day and intervening screening between source and receptor. Based on the forecast OGV daily movements presented in Graph 14.1, qualitatively it is considered there is the potential for significant adverse effects from this source at the nearest receptors extending to those at greater distance without screening.

14.8.20 Further to the above, it is also considered there is the potential for significant adverse effects from reverse alarms, especially if they sound during the night-time period. A Brigade bbs-tek broad band alarm is quoted as having a noise level of 92dB(A) at 1m. Without screening or taking account of on-time and time of day, this has the potential to result in significant adverse effects at all receptors except GHVD Phase 1A and 1B, due to distance attenuation. A tonal reverse alarm would also be more noticeable than a broad band reverse alarm against sounding at the same noise level.

14.8.21 At this stage of the Proposed Development the method for unloading HGVs is not specified. It is anticipated that some units may use Dock Levellers where the HGV reverses into the Dock,

so essentially sealed with no external unloading as goods are loaded/unloaded directly from the HGV into the Unit. At other units the arrangement may be ramp access to the shutters which means it doesn't necessarily need to be rear loading/unloading only. Side loading/unloading externally using a forklift truck (FLT) may therefore be undertaken. There is the potential for permanent, local, moderate to major adverse effects at receptors based on a FLT sound power level of 103dB without screening except GHVD Phase 1A and 1B, due to distance attenuation.

14.8.22 In light of the above, at this outline stage it is considered secondary mitigation (Section 14.9) will be required to reduce the potential effects from Site operational noise.

Road Traffic Noise

14.8.23 **Table 14.13** presents the predicted change in road traffic noise when comparison is made against the No Development scenario for the opening year 2024. This is based on forecast traffic data provided by Alan Baxter Ltd (transport engineer's for the Proposed Development).

Table 14-15: Road Traffic Noise Assessment

ID	Road	No Development 2024 BNL dB $L_{A10,18\text{-hour}}$	With Proposed Development 2024 BNL dB $L_{A10,18\text{-hour}}$	Change	Magnitude
L1	A41 NE of M40 Jnc 9	78.5	78.7	+0.2	Negligible
L2	A41 (Wendlebury Rd-B4030)	77.6	77.8	+0.2	Negligible
L3	A41 (north B4030 roundabout)	74.1	74.3	+0.2	Negligible
L4	A41 (Ocford Rd-A4421)	73.8	74.2	+0.4	Negligible
L5	A41 (east Wretchwick way / w of EAR)	74.5	75.4	+0.9	Negligible
L6	A41 (east of EAR)	76.8	76.9	+0.1	Negligible
L7	Wretchwick Way A4421 (A41 to Peregrine Way)	72.3	72.6	+0.3	Negligible
L8	Wretchwick Way A4421 (Peregrine Way to Gavray Drive)	71.8	72.3	+0.5	Negligible
L9	Charbridge Lane (Gavray Drive - Bicester Rd)	73.3	73.6	+0.3	Negligible
L10	A4421 (west of Charbridge Ln)	72.9	73.2	+0.3	Negligible
L11	A4421 (Launton Rd - Buckingham Rd)	72.9	73.1	+0.2	Negligible

ID	Road	No Development 2024 BNL dB $L_{A10,18\text{-hour}}$	With Proposed Development 2024 BNL dB $L_{A10,18\text{-hour}}$	Change	Magnitude
L12	EAR	Not Operational	64.8	New Source	Subject of a separate assessment

14.8.24 With the exception of the EAR, the predicted change in road traffic noise on the existing road links is Negligible, with all changes being less than 1dB and therefore Not Significant.

14.8.25 The EAR is subject to a separate assessment and application which is permitted but is intrinsically linked to the Proposed Development as it provides access to the Site. This is a new source which forms part of the Graven Hill Masterplan and will be taken account of within the 'agent of change' principle for the GHVD, which is separate to this assessment. When comparison is made against the road traffic noise based on the forecast traffic volume and composition for the Consented Development, EAR road traffic noise is predicted to increase by +1.2dB with the Proposed Development, which is small in magnitude. On this basis the potential impact of EAR road traffic noise is comparable to the development authorised by the 2014 Planning Permission).

14.9 Secondary Mitigation and Enhancement

Demolition & Construction Noise & Vibration

14.9.1 Although the effects from demolition and construction traffic are predicted to be negligible with the potential for some short-term, temporary, local, minor adverse effects and therefore Not Significant, it is still recommended that traffic management is secured by condition and agreed between CDC, contractors and the Applicant. Such measures would be set out within a Construction Traffic Management Plan (CTMP).

14.9.2 Secondary mitigation is not proposed for on-site demolition and construction operations as the assessment with CEMP measures predict negligible up to short-term, temporary, local minor adverse effects, which are considered to be Not Significant.

Completed Development

Fixed External Plant & Buildings Services

14.9.3 **Table 14.16** presents the recommended noise limits concerning fixed external plant and building services, based on prevailing background sound levels. The recommended noise limit is for the rating level not to exceed 5dB below background to prevent creep in background, with a minimum limit of 30dB $L_{Ar,Tr}$. This approach therefore addresses the potential for cumulative effects from all the units. This would be subject to agreement with CDC and likely to be secured by planning conditions.

Table 14-16: Recommended Fixed External Plant & Building Services Noise Limits

Receptor	Day Background Sound Level dB $L_{A90,Tr}$	Day Noise Limit Rating Level dB $L_{Ar,Tr}$	Night Background Sound Level dB $L_{A90, Tr}$	Night Noise Limit Rating Level dB $L_{Ar,Tr}$
The Hay Barn & Byre	44	39	42	37
The Granary	44	39	42	37
St David's Barracks	40	35	39	34
Graven Hill Village 1A	40	35	39	34
Graven Hill Village 1B	39	34	37	32
Ambrosden Farm House	44	39	42	37
Future Residential Receptors NW	39	34	37	32

14.9.4 Secondary mitigation measures to control noise from fixed external plant and building services to the required level as agreed with Environmental Health of CDC may include:

- Procurement of 'quiet' non-tonal plant;
- Locate plant and air vents away from sensitive receptors;
- Acoustic enclosures;
- In-duct attenuators;
- Acoustic louvres; and
- Isolation of plant from building structures.

Break-Out Noise from B8 Units

14.9.5 Break-out noise from the units could be adequately controlled through construction of the facades, roof and doors of the buildings. The required sound insulation to safeguard against adverse impacts will be dependent on the building's internal noise level, wall and roof area facing the receptor, operational hours and distance from the Unit to the receptor. **Table 14.17** provides typical acoustic performance of Kingspan wall and roof panels with no lining and with insulation and lining. The former would be adequate where internal noise levels are not excessively high for the B8 Use Class buildings, ≤65dB(A) whereas the latter should be adequate where internal noise levels do not exceed the first action level of 80dB(A) of the Control of Noise at Work Regulations (BSI, 2005).

Table 14-17: Typical sound insulation performance of Kingspan Architectural Wall Pane (AWP)

Item	Sound insulation dB Rw							Overall dB Rw (Ctr)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
Kingspan AWP/60 + no lining	15	16	19	23	26	22	39	25 (-3)
Kingspan AWP/60 + 15mm plasterboard + 10mm dense particle board	17	24	37	45	52	54	64	47 (-9)
Kingspan AWP/60 + 25mm insulation + 19mm dense wallboard + 12.5mm plasterboard	18	24	37	48	53	55	63	48 (-10)
Kingspan Roof Panel KS1000 RT + no lining	20	19	21	22	22	32	38	25 (-2)
Kingspan Roof Panel (insulated) KS1000 RW/40 + 120mm insulation + 10mm thick dense particle board	17	27	39	44	49	57	-	48 (-)

14.9.6 This could be controlled through planning condition.

Site Operational Noise (Service Yard)

14.9.7 Secondary mitigation to reduce and mitigate site operational noise may include the following measures:

- Strategic layout of units and service yard areas to maximise screening between source and receptors;
- Use of broad-band reverse alarms rather than tonal, with use of banks person (no reverse alarms) during the night-time (2300-0700) period;
- Provision of acoustic grade fence around the service yard areas where screening is not provided by the Unit itself; and
- Use of electric plant where loading/unloading operations are external (FLT or telehandler).

14.9.8 This could be controlled through planning condition.

Road Traffic Noise

14.9.9 Given the potential effects from road traffic noise as a result of the Proposed Development, excluding the EAR, are predicted to be Negligible and therefore Not Significant, secondary

mitigation is not proposed. With regard to the EAR, although a small increase is predicted when compared to the 2014 Planning Permission this is considered to be insignificant and therefore secondary mitigation is not proposed.

14.10 Residual Effects

Demolition & Construction Noise & Vibration

14.10.1 Secondary mitigation is not proposed for on-site demolition and construction works. Residual noise and vibration effects are the same as predicted based on primary mitigation only, as outlined below.

14.10.2 Residual demolition and construction noise effects are Negligible for all receptors except at St Davids Barracks, which is the nearest to the Site. At St Davids Barracks short-term, temporary, local minor to moderate adverse effects are predicted. Taking account of the absolute predicted noise levels and guidance within BS5228-1, residual noise effects are considered to be Not Significant.

14.10.3 Residual demolition and construction vibration effects are Negligible at all receptors due to distance separation from works, which is Not Significant.

14.10.4 Qualitatively, taking account of 2019 baseline flows and secondary mitigation in the form of a CTMP, residual demolition and construction road traffic noise effects are anticipated to be negligible but with the potential for short-term, temporary, local, minor adverse effects, which is considered to be Not Significant.

Completed Development

Fixed External Plant & Building Services

14.10.5 With the implementation of secondary mitigation to achieve the recommended plant noise limits outlined within **Table 14.16**, residual effects would be Negligible and therefore Not Significant. This could be controlled through planning condition.

Break-Out Noise from B8 Units

14.10.6 Provided the buildings envelope of the units afford sufficient sound insulation to break-out noise then the likely adverse impacts will be rendered Negligible and therefore Not Significant. This could be controlled through planning condition.

Site Operational Noise (Service Yard)

14.10.7 Through provision of secondary mitigation, primarily through screening, it should be possible to reduce site operational noise to acceptable levels, when assessed in accordance with BS4142, having regard to context. Preliminary high-level calculations indicate residual effects would potentially range from permanent, local Minor adverse effects, to Negligible, which are considered acceptable and therefore Not Significant. This could be controlled through planning condition.

Road Traffic Noise

14.10.8 Mitigation measures (primary or secondary) are not proposed for changes in road traffic noise as a result of the Proposed Development. The residual effects on all links, except the EAR are Negligible and therefore Not Significant. On the EAR, which is a new road and subject of a separation permitted application, the change in road traffic noise when compared to the 2014 Planning Permission is +1.2dB higher which is of small magnitude. The level of effect is permanent, local and Minor adverse, which is considered to be Not Significant.

14.11 Monitoring

14.11.1 Monitoring during the demolition and construction works is not proposed as with the implementation of primary mitigation measures, the predicted levels are considered to be acceptable in the context of BS5228 guidance.

14.12 Cumulative Assessment

Demolition & Construction

14.12.1 Potential cumulative noise and vibration effects may be expected where works are within 200m of each other and noisy or vibration-inducing operations occur concurrently. It is clear that each of the cumulative schemes are located at a distance greater than 200m with the exception of parts of the Graven Hill Village Development 11/01494/OUT (the 2011 Permission). In the event that the demolition and construction works overlap with those of the Proposed Development, and accounting for the assumed CEMPs that would be implemented at each site, the likely residual Type 2 cumulative effects in relation to demolition and construction noise and vibration are expected to be no different from those reported within ES Chapter 14: Noise and Vibration, namely insignificant.

14.12.2 For all other cumulative schemes, they are considered to be of sufficient distance from the Application Site so that Type 2 cumulative residual effects would not occur.

14.12.3 Cumulative effects resultant from construction traffic would have the potential to cause Type 2 cumulative residual effects, should the construction phases of each development overlap. However, provided each cumulative scheme implements its own CTMP Logistics Plan, which would include consideration of concurrent construction schemes to minimise the combined effects of construction traffic, Type 2 cumulative residual effects from road traffic noise are likely to be insignificant to temporary, local, adverse and of minor significance at worst.

Completed Development

14.12.4 It is considered that all of the cumulative schemes, with the exception of parts of GHVD (11/01494/OUT), are too distant from Sensitive Receptors to cause significant Type 2 cumulative residual effects in terms of noise for the completed Development.

14.12.5 Both the GHVD and Proposed Development will be subject to the same controls regarding noise, for example noise from fixed plant would be subject to a standard planning condition based upon the guidance provided in BS 4142: 2014+A1:2019 and the requirement of. As such, noise from fixed plant from all committed and pending developments and the Proposed Development would be insignificant.

14.12.6 Noise from all other non-residential operations are not anticipated to give rise to Type 2 cumulative effects as all would be subject to the same planning conditions which if adhered to should give rise to insignificant effects.

14.13 Comparison to 2014 Planning Permission

14.13.1 A road traffic noise assessment has been undertaken between the 2014 Planning Permission and the Proposed Development for the year of anticipated completion, 2024. **Table 14.18** presents a summary of the results.

Table 14-18: Road Traffic Noise Assessment 2014 Planning Permission v Proposed Development 2024

ID	Road	2014 Planning Permission 2024 BNL dB $L_{A10,18\text{-}hour}$	With Proposed Development 2024 BNL dB $L_{A10,18\text{-}hour}$	Change	Magnitude
L1	A41 NE of M40 Jnc 9	78.7	78.7	0.0	Negligible
L2	A41 (Wendlebury Rd-B4030)	77.7	77.8	+0.1	Negligible
L3	A41 (north B4030 roundabout)	74.2	74.3	+0.1	Negligible
L4	A41 (Ocford Rd-A4421)	74.1	74.2	+0.1	Negligible
L5	A41 (east Wretchwick way / w of EAR)	75.2	75.4	+0.2	Negligible
L6	A41 (east of EAR)	76.9	76.9	+0.3	Negligible
L7	Wretchwick Way A4421 (A41 to Peregrine Way)	72.5	72.6	+0.1	Negligible
L8	Wretchwick Way A4421 (Peregrine Way to Gavray Drive)	72.2	72.3	+0.1	Negligible
L9	Charbridge Lane (Gavray Drive - Bicester Rd)	73.5	73.6	+0.1	Negligible
L10	A4421 (west of Charbridge Ln)	73.1	73.2	+0.1	Negligible
L11	A4421 (Launton Rd - Buckingham Rd)	73.0	73.1	+0.1	Negligible
L12	EAR	63.7	64.8	+1.2	Small

14.13.2 With the exception of the EAR, the predicted change in road traffic noise on the existing road links is Negligible, with all changes being less than 1dB and therefore Not Significant.

14.13.3 With regard to the EAR, the predicted increase with the Proposed Development is a function of the increase in %HGV (from 12% to 46%) which offsets the reduction in the forecast 18-hour AAWT from 3170 to 1912. A small increase in road traffic noise of +1.2dB when compared to

the 2014 Planning Permission is only just above negligible in terms of magnitude and therefore regarded as Not Significant.

14.13.4 With regard to on-site operations, the Proposed Development is predicted to give rise to a greater number of OGV movements and is anticipated to result in a greater number of loading/unloading operations. Strategic layout and screening for the Proposed Development could be used so that it is comparable in terms of impact to the 2014 Planning Permission.

14.14 References

- Ministry of housing, Communities and Local Government, July 2021, “National Planning Policy Framework”: HMSO.
- Defra, 2010, “Noise Policy Statement For England”: Defra.
- Cherwell District Council, July 2015, “The Cherwell Local Plan 2011-2031 Part 1” Adopted 20 July 2015: Cherwell District Council.
- Cherwell District Council, November 1996, “Adopted Local Plan 1996”: Cherwell District Council.
- BSI, 2003, “BS7445-1:2003 Description and measurement of environmental noise. Guide to quantities and procedures”: BSI.
- British Standards Institution, 2014, “BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites- Part 1: Noise”: BSI.
- Highways England, 2020, “Design Manual for Roads and Bridges, LA 111 Sustainability and Environmental Appraisal. Noise and Vibration, Rev 2”: Crown Copyright.
- British Standards Institution, 2014, “BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites- Part 2: Vibration”: BSI.
- Department of Transport Welsh Office, 1988, “Calculation of Road Traffic Noise”: HMSO.
- British Standard Institute, 2019, “BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound”: BSI.
- BSI, 2005, The Control of Noise at Work Regulations: BSI.

15 Climate Change

15.1 Introduction

15.1.1 This chapter assesses the effects of the Proposed Development in relation to climate change. It considers impacts that may arise because of the Proposed Development on receptors sensitive to climate change.

15.1.2 The chapter describes the methods used to assess the impacts, the baseline conditions currently existing at the Site and surroundings, the potential direct and indirect impacts of the development arising in relation to climate change, in particular, the impact of the project on climate change (i.e. the nature and magnitude of greenhouse gas emissions), as well as the vulnerability of the project itself to climate change. It also details the mitigation measures required to prevent, reduce, or offset the impacts and describes the residual impacts.

15.1.3 When discussing 'carbon' in relation to climate change, this is a term used to cover all greenhouse gas emissions and is measured in terms of CO_2 equivalent (CO_{2eq}).

15.1.4 This chapter has been prepared by Ridge and Partners LLP.

15.2 Policy Context, Legislation, Guidance and Standards

15.2.1 Details of planning policy relevant to the Proposed Development are contained in **Chapter 7**. A summary of legislation particularly relating to Climate Change is provided in the following paragraphs.

15.3 Legislative Background

UK Net Zero Emissions by 2050

15.3.1 The Climate Change Act 2008 committed the UK to an 80% reduction in carbon emissions relative to the levels in 1990, to be achieved by 2050. In June 2019, secondary legislation was passed that extended that target to require that the UK reduce all greenhouse gas emissions to net zero by 2050 relative to 1990 levels. In April 2021, the Government confirmed its intention to ratify 'The Sixth Carbon Budget' which effectively requires a 78% reduction in UK territorial emissions between 1990 and 2035.

15.4 Planning Policy Context

National Planning Policy Framework

15.4.1 Section 14 of the National Planning Policy Framework (NPPF) specifically addresses the challenge of climate change. It states that:

'…New development should be planned for in ways that:

(a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and

(b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the government's policy for national technical standard Local Plan and supplementary guidance...'

The Cherwell Local Plan 2011-2031

15.4.2 With respect to sustainability and energy considerations, the following policies are relevant to Climate Change and the district's development.

15.4.3 Cherwell District Council's strategic objective for ensuring sustainable development is: (Objective SO II) 'To incorporate the principles of sustainable development in mitigating and adapting to climate change impacts including increasing local resource efficiency, minimising carbon emissions, promoting decentralised and renewable or low carbon energy and ensuring that the risk of flooding is not increased'.

15.4.4 'Policy PSD I: Presumption in favour of sustainable development - we will take a proactive approach to reflect the presumption in favour of sustainable development contained in the National Planning Policy Framework when considering development proposals'.

15.4.5 'Policy BSC 2: The Effective and Efficient Use of Land - Brownfield Land and Housing Density – Housing development will be expected to make effective and efficient use of land. We will encourage the re-use of previously developed land in sustainable locations- new housing should be provided on net developable areas at a density of at least 30 dwellings per hectare'.

15.4.6 'Policy ESD 1: Mitigating and Adapting to Climate Change – Measures will be taken to mitigate the impact of development within the District on Climate Change. At a strategic level this will include:

- Distributing growth to the most sustainable locations.
- Deliver development that seeks to reduce the need to travel and which encourages sustainable travel options including walking, cycling and public transport.
- Designing development to reduce carbon emissions and use resources more efficiently, including water.
- Promoting the use of decentralised and renewable or low carbon energy.

15.4.7 Suitable adaptation measures in new developments to ensure that development is more resilient to climate change impacts will include consideration of the following:

- Taking into account known physical and environmental constraints when identifying locations for development.
- Demonstration of design approaches that are resilient to climate change impacts including the use of passive solar design for heating and cooling.
- Minimising the risk of flooding and making use of sustainable drainage methods.
- Reducing the effects of development on the microclimate through the provision of green infrastructure such as including open space and water, plants and green roofs'.

15.4.8 'Policy ESD 2: Energy Hierarchy and Allowable Solutions – To achieve reductions in carbon emissions we will promote an 'energy hierarchy' as follows:

- Sustainable design and construction measures to reduce energy use.
- Supplying energy efficiently and giving priority to decentralised energy supply.
- Making use of renewable energy.
- Making use of allowable solutions'.

15.4.9 'Policy ESD 3: Sustainable Construction – All new Non-residential development will be expected to meet at least BREEAM 'Very Good' with immediate effect and demonstrate the achievement of this target within the Energy Statement'.

15.4.10 'Policy ESD 4: Decentralised Energy Systems - The use of decentralised energy systems, providing either heating (District Heating) or heating and power (Combined Heat and Power) will be encouraged in all new developments. A feasibility assessment for DH/CHP will be required for:

- All applications for non-domestic developments above 1,000m^2 floorspace'.

15.4.11 'Policy ESD 5: Renewable Energy - The potential local environmental, economic and community benefits of renewable energy schemes will be a material consideration in determining planning applications. Planning applications involving renewable energy development will be encouraged. Feasibility assessment of the potential for significant on-site renewable energy provision will be required for:

- All applications for non-domestic developments above 1,000m^2 floorspace'

15.4.12 'Policy ESD 6: Sustainable Flood Risk Management - We will manage and reduce flood risk using a sequential approach to development; locating vulnerable developments in areas at lower risk of flooding. Opportunities will be sought to restore natural river flows and floodplains and existing flood defences will be protected from damaging development'.

15.4.13 'Policy ESD 7: Sustainable Drainage Systems (SuDS) - All development will be required to use sustainable drainage systems for the management of surface water runoff. In considering SuDS solutions, the need to protect ground water quality must be taken into account. SuDS should seek to reduce flood risk, reduce pollution and provide landscape and wildlife benefits'.

15.4.14 'Policy ESD 17: Green Infrastructure - The District's green infrastructure network will be maintained and enhanced through the following measures:

- Pursuing opportunities to maintain and improve the green infrastructure network, whilst protecting sites of importance.
- Protecting and enhancing existing sites and features and improving connectivity between sites.
- Ensuring that green infrastructure network considerations are integral to the planning of new developments.
- All strategic development sites to incorporate green infrastructure provision and proposals should include details for future management and maintenance'

Other Relevant Policy, Standards and Guidance

Oxfordshire Energy Strategy

15.4.15 The Oxfordshire Energy Strategy sets out an ambitious framework to enable the county to be at the forefront of energy innovation to foster clean growth, which Cherwell District Council is a signatory. 'It is underpinned by three guiding principles:

- *To secure a smart, modern, clean energy infrastructure.*
- *To reduce countywide emissions by 50% by 2030 (compared with 2008 levels) and set a pathway to achieve zero carbon growth by 2050.*
- *To enhance energy networking and partnership working.'*

Cherwell District Council, Climate Action Framework

15.4.16 CDC declared a Climate Emergency in July 2019, committing it to ensuring its own operations and activities are zero carbon by 2030. This declaration has also provided the goal of achieving net zero for the wider district by 2030 with the support of residents, businesses and other organisations. CDC's Climate Action Declaration set out a number of commitments covering its two connected roles:

- *'Ensure our own operations and activities are net zero by 2030.*
- *Do our part to achieve a net zero carbon district by 2030 and lead through example.'*

15.4.17 The document sets out CDC's approach to tackling to the Climate Emergency in its priority areas for action: *'our own estate, working with suppliers, ensuring our policies enable other to make low-carbon choices and working with partners and businesses'*.

Low Carbon Environmental Strategy

15.4.18 This is a strategy of the Cherwell Local Strategic Partnership; its aim is for Cherwell to make the transition to a low carbon economy and is part of an overarching objective of the Council's economic development strategy. The Key Actions are as follows:

- *'We will work with local partners to raise awareness and encourage take up of low carbon and renewable energy technologies and CO2 saving actions by residents.*
- *We will actively encourage uptake of home energy efficiency measures and seek to provide additional support to those most in need.*
- *We will work with industry to embrace the opportunities of a low carbon economy by developing green knowledge and skills and supporting innovation in green technologies.*
- *We will encourage the take up of Green Travel Plans with businesses and organisations.*
- *We will work with the community in conjunction with the Oxfordshire Waste Partnership to further increase recycling and promote and facilitate waste minimisation and reuse.*
- *We will work with local partners to gain better understanding of what a changing climate means for the Cherwell community.'*

15.5 Consultation

15.5.1 The applicant informally agreed the scope of the EIA with Cherwell District Council (CDC) in March 2022 and this included the preparation of an ES chapter on Climate Change.

15.5.2 No specific technical consultations have been undertaken by Ridge and Partners LLP with CDC to inform this chapter which is based on professional judgement by RPS as the competent expert.

15.6 Scope of Assessment

15.6.1 In accordance with the EIA regulations (2017), this chapter will address:

- The impact of the Proposed Development on climate change.
- The vulnerability of the Proposed Development to climate change (climate change resilience).

15.6.2 Within the context of global climate change, it is possible that there could be some significant effects, therefore these two elements above are being scoped into the assessment to determine any significant effects.

15.7 Methodology

Study Area

15.7.1 The study area for the assessment of the impact on climate change is the boundary of the Proposed Development but also encompasses emissions arising outside of this boundary, including the embodied emissions associated with construction materials, and the emissions associated with the transportation of materials and workers to site and removal of waste from the site.

15.7.2 The study area for the climate change resilience assessment is the Proposed Development itself.

Baseline Data Collection

15.7.3 Historic climate data has been obtained from the Met Office website (accessed May 2022) recorded by the closest meteorological station to the Proposed Development (High Wycombe Station) for the 30-year climate period of 1981-2010. This data was used for the baseline assessment for the impact of the project on climate change.

15.7.4 UK Climate Projections published in 2018 (UKCP18) have been developed by the UK Climate Impacts Programme (UKCIP) to provide projections for future climate scenarios and trends. This was used for the baseline analysis on climate change resilience.

Assessment

Impact of the Proposed Development on Climate Change

Construction and Demolition Impacts

15.7.5 Given that the Proposed Development is at an early stage of design there is insufficient detail to undertake a full Life Cycle Assessment to determine the construction-related CO_{2eq} emissions. However, this can be estimated using a typical benchmark. To give an idea of the scale of construction-related emissions, the assessment uses the commercial benchmark identified in the RIBA Sustainable Outcomes Guide (2019), which is taken from the M4i KPI Benchmarks (cradle to grave) from early 2000's.

Operational Impacts

15.7.6 Data from the Transport Assessment has been used to determine operational transport related CO_{2eq} emissions. An assessment has been undertaken by Alan Baxter Ltd to identify the CO_{2eq} emissions associated with the energy use of the development once operational. This assessment is based on the estimated figures using typical loading profiles, normal working practices and impact of external climate conditions.

Assessing Significance

15.7.7 According to the IEMA guidance (IEMA, 2022), the application of the standard EIA significance criteria is not considered to be appropriate for climate change assessments. To assess the

significance of both construction and operational impacts, the following approach will therefore be taken:

- **Receptors:** The receptor for assessment of the impact of the project on climate change is the global climate. For the purposes of this assessment, the UK carbon budget will be used as a proxy for the global climate. The receptor is considered to be of high sensitivity.

- **Magnitude:** The magnitude of the impact will be based on the UK carbon budget, see **Table 15.1**. It is assumed that demolition will start in Oct 2022, with construction commencing in Q1 2023, and will become operational in 2024. The relevant UK carbon budgets are as follows (House of Commons Library, 2021):

    - Budget 4 (2023-2027): 1,950MtCO_{2eq}
    - Budget 5 (2028-2032): 1,765MtCO_{2eq}
    - Budget 6 (2033-2037): 965 MtCO_{2eq}

Table 15.1 Magnitude

	Description
Low magnitude	Emissions represent <0.001% of total emissions from the relevant 5 year UK carbon budget in which they arise
Medium magnitude	Emissions represent between 0.001% and 1% of total emissions from the relevant 5 year UK carbon budget in which they arise
High magnitude	Emissions represent >1% of total emissions from the relevant 5 year UK carbon budget in which they arise

15.7.8 Significance will be determined as per **Table 15.2.**

Table 15.2 Significance

Low magnitude	Minor significance
Medium magnitude	Moderate significance
High magnitude	Major significance

15.7.9 Mitigation measures which are already being incorporated within the development ('primary mitigation') will be taken into account when determining the significance.

Climate Change Resilience Assessment

15.7.10 To assess the vulnerability of the Proposed Development to climate change, a climate change resilience assessment in line with the Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation (IEMA, 2020) will be undertaken using the following approach:

15.7.11 **Receptors:** Receptor groups will be identified and their sensitivity will be determined based on the susceptibility of the receptor (e.g. ability to be affected by a change – low, medium or high) and the vulnerability of the receptor (i.e. potential exposure to a change – low, medium or high).

- Low susceptibility: receptor has the ability to withstand/not be altered much by the projected changes to the existing/prevailing climatic factors (e.g. retain much of its original function and form).

- Medium susceptibility: receptor has some limited ability to withstand/not be altered by the projected changes to the existing/prevailing climatic conditions.

- High susceptibility: receptor has no ability to withstand/not be substantially altered by the projected changes to the existing/prevailing climatic factors.
- Low vulnerability: Climatic factors have little influence on the receptors.
- Medium vulnerability: receptor is dependent on some climatic factors but able to tolerate a range of conditions.
- High vulnerability: receptor is directly dependent on existing/prevailing climatic factors and reliant on these specific existing climate conditions continuing in future or only able to tolerate a very limited variation in climate conditions.

Table 15.3 Receptor sensitivity

	1 (Low vulnerability)	**2 (Medium vulnerability)**	**3 (High vulnerability)**
1 (Low susceptibility)	1 (Low sensitivity)	2 (Low sensitivity)	3 (Medium sensitivity)
2 (Medium susceptibility)	2 (Low sensitivity)	4 (Medium sensitivity)	6 (High sensitivity)
3 (High susceptibility)	3 (Medium sensitivity)	6 (High sensitivity)	9 (High sensitivity)

15.7.12 **Magnitude:** Magnitude will be based on a combination of likelihood (the chance of the effect occurring over the lifespan of the project if the risk is not mitigated) and consequence (which will reflect the geographical extent of the effect or the number of receptors affected, the complexity of the effect, degree of harm to those affected and the duration, frequency and reversibility of effect).

- Low likelihood: The event may occur once or on limited occasions during the lifetime of the development.
- Medium likelihood: The event may occur several times during the lifetime of the development.
- High likelihood: The event will occur on multiple occasions during the lifetime of the development.
- Low consequence: Minor disruption to business operations / no risk to building occupants / no damage to buildings / infrastructure.
- Medium consequence: Some disruption to building operations / slight risk to building occupants / slight damage to buildings / infrastructure.
- High consequence: Major disruption to business operations / risk to building occupants / significant damage to buildings / infrastructure.

Table 15.4 Magnitude

	1 (Low consequence)	**2 (Medium consequence)**	**3 (High consequence)**
1 (Low likelihood)	1 (Low magnitude)	2 (Low magnitude)	3 (Medium magnitude)
2 (Medium likelihood)	2 (Low magnitude)	4 (Medium magnitude)	6 (High magnitude)
3 (High likelihood)	3 (Medium magnitude)	6 (High magnitude)	9 (High magnitude)

15.7.13 **Significance:** The potential significance of each impact will be based on the magnitude of the impact and the sensitivity of the receptor.

Table 15.5 Significance

	1 (Low magnitude)	2 (Medium magnitude)	3 (High magnitude)
1 (Low sensitivity)	1 (Minor significance)	2 (Minor significance)	3 (Minor significance)
2 (Medium sensitivity)	2 (Minor significance)	4 (Minor significance)	6 (Major significance)
3 (High sensitivity)	3 (Minor significance)	6 (Major significance)	9 (Major significance)

15.7.14 Mitigation measures which are already being incorporated within the development ('primary mitigation' will be considered when determining significance.

Limitations

15.7.15 The assessment of construction stage carbon emissions is based on a typical benchmark. The actual quantity of carbon emissions is likely to be different to this as will vary depending on the construction materials and construction methods employed.

15.7.16 The assessment considers the operational carbon emissions up to 2037 only as the UK Carbon Budget has not been set beyond this. It is considered likely that the National Grid will be significantly decarbonised by this point, however the extent to which this is the case is unknown. Operational regulated carbon emissions have been calculated using an assessment based on the estimated demand figures provided by the fit-out team with an analysis of typical loading profiles, normal working practices and impact of external climate conditions.

15.7.17 The energy related CO_{2eq} figures are a worst-case assumption. They assume that all electricity will come from the National Grid and do not take into account any on-site renewables. They also assume the carbon intensity of the UK National Grid will not change, whereas there is a strong likelihood that with the push to renewables and Net Zero Carbon by 2050, the CO_{2eq} emissions associated with National Grid electricity production will decrease.

15.7.18 In addition, the current assessment does not take into account any potential reductions which may occur as a result of future changes to the Building Regulations. The UK Government is currently consulting on changes to Part L of the Building Regulations, which may require further improvements to energy efficiency and carbon emissions.

15.7.19 The estimation of additional road trips does not include transport of staff using methods other than the private car, as this information was not readily available at the time of writing. However, it is confirmed in the interim Travel Plan (Alan Baxter Ltd, 2022) that a Care Sharing Scheme and Car Club is recommended to encourage the reduction of single-occupancy vehicle trips,

15.8 Baseline Conditions

Impact of the Proposed Development on Climate Change

15.8.1 In relation to the impact of the Proposed Development on climate change, i.e. carbon emissions, the baseline is a scenario whereby the Proposed Development does not proceed.

Climate change resilience

Current climate

15.8.2 The existing baseline for the climate change resilience assessment is the current climate in the location of the Proposed Development. Historic climate data obtained from the Met Office website (accessed May 2022) recorded by the closest meteorological station to the Proposed Development (High Wycombe Station) for the 30-year climate period of 1981-2010 is summarised in **Table 15.6.**

Table 15.6 Historic climate data recorded by the closest meteorological station

Climatic factor	Month	Figure
Average annual maximum daily temperature (°C)	-	13.2°C
Warmest month on average (°C)	July	21.2°C
Coldest month on average (°C)	January	6.2°C
Mean annual rainfall levels (mm)	-	814.7mm
Wettest month on average (mm)	November	88.6mm
Driest month on average (mm)	July	52.2mm

15.8.3 The Met Office baseline climate averages for the South of England region (Met Office website, accessed May 2022) identify gradual warming between 1961 and 2010, as well as increased rainfall. Information on mean maximum annual temperatures (°C) and mean annual rainfall (mm) is summarised in **Table 15.7.**

Table 15.7 Historic climate data for the South of England

Climate period	Mean maximum annual temperatures (°C)	Mean annual rainfall (mm)
1961-1990	13.3°C	767.7mm
1971-2000	13.6°C	781.7mm
1981-2010	14°C	793.9mm

15.8.4 The Met Office website (accessed May 2022) confirms that past severe weather events in the last 5 years have included severe flooding, severe winter weather with significant snowfalls, record breaking heatwaves and storm and high wind events.

Baseline Evolution

Future climate

15.8.5 The baseline evolution scenario for the climate change resilience assessment is the future climate projections in the location of the Proposed Development. UK Climate Projections published in 2018 (UKCP18) have been developed by the UK Climate Impacts Programme (UKCIP) to provide projections for future climate scenarios and trends. **Table 15.8** provides a summary of predications for summer and winter changes by the 2070s (Met Office, 2018).

Table 15.8 Future climate estimates under a high emissions scenario (England)

Summer rainfall change	Winter precipitation change	Summer temperature change	Winter temperature change
57% drier to 3% wetter	2% drier to 33% wetter	1.1 °C warmer to 5.8 °C warmer	0.7 °C warmer to 4.2 °C warmer

15.9 Primary Mitigation

15.9.1 Management of construction effects which are embedded into the design of the Proposed Development are provided in an Outline Construction Environmental Management Plan (CEMP) by RPS Group (2022). As part of the Outline CEMP the following will be implemented:

- The Contractor will be required to monitor material and waste transport to and from the site and record the total carbon emissions associated with this to help identify where savings can be made.
- The use of diesel and petrol powered generators will also be avoided with mains electricity or battery powered equipment used where practicable.
- Vehicle engines and plant will be switched off when not in use to reduce emissions associated with idling.

15.10 Assessment of Likely Effects

Impact of the Proposed Development on Climate Change

Construction

15.10.1 Construction of the Proposed Development will result in CO_{2eq} emissions associated with construction transport (i.e. HGV movements and the transportation of the workforce) and emissions associated with the use of energy on site for construction activities.

15.10.2 Construction works will also result in carbon emissions associated with the embodied carbon within construction materials. Embodied carbon is the total greenhouse gas emissions generated to produce a built asset. This includes emissions caused by extraction, manufacture/processing, transportation and assembly of every product and element in an asset. It may also include the maintenance, replacement, deconstruction, disposal and end-of-life aspects of the materials and systems that make up the asset (UK Green Building Council, 2017).

15.10.3 Given the early stage of the proposals, the construction-related carbon emissions have been estimated using a typical benchmark, identified in the RIBA Sustainable Outcomes Guide, which is taken from the M4i KPI Benchmarks (cradle to grave) from early 2000's. Based on the office benchmark of 1100kgCO_2/m^2, the Proposed Development (104,008m^2) can be estimated to result in carbon emissions of 114,408,800 kgCO_2. The office benchmark has been used as the most relevant in lieu of a specific industrial or warehouse benchmark being available.

15.10.4 A Life Cycle Assessment will be undertaken during the detailed design of the scheme to inform material selection to reduce the carbon footprint as far as possible. A Whole Life Carbon Assessment will then be undertaken of the final design to calculate the final carbon footprint (kgCO_{2eq}) of the construction of the development.

Summary of construction impacts

15.10.5 It is estimated that the construction of the Proposed Development may result in 114,408,800 kgCO_2. Based on the UK Carbon Budget period 4 (2023-2027), this equates to 0.000058% of the overall UK Carbon Budget. Based on these figures, the construction stage may result in an adverse impact of low magnitude. Significance is therefore considered to be **Minor.**

Operation

Operational transport

15.10.6 The operation of the Proposed Development will result in carbon emissions associated with operational transport (i.e. the transportation of workers to and from the Site and deliveries). The Transport Assessment includes an estimation of the additional road trips generated by the development. Information has been provided from Alan Baxter Ltd on the average trip distance based on ONS 2011 census data and Eurostat (2020) data to determine average travel distances. This has been used, together with the UK Government Greenhouse Gas Conversion Factors (2021) to estimate the potential CO_{2eq} emissions associated with transport to and from the Site.

Table 15.9 Estimation of additional road trips

Type	Daily (Weekday) Trips	Average trip distance (km)	Average km per year	Carbon Factor	Total Yearly Average kg CO_{2eq}
Cars and LGVs	818	16.7	3,551,756	0.17431	619,107
OGVs	646	139	23,346,440	0.86407	20,172,958
Total	**1,464**	**-**	**-**	**-**	**20,792,065**

15.10.7 Please note this figure does not include transport of staff using methods other than the private car, as this information was not readily available at the time of writing.

Operational Energy

15.10.8 The operation of the Proposed Development will result in carbon emissions associated with energy usage for heating, cooling, ventilation, lighting and electrical equipment, which will therefore result in an increase in emissions compared to the baseline scenario. There will also be carbon emissions associated with any equipment the occupier may use. The estimation of energy use in occupation for the Proposed Development is difficult due to its speculative nature. At present the full details of the plant and equipment to be installed are not known.

15.10.9 An Energy and Sustainability Statement has been prepared by BWB (2022) which considers the proposed energy strategy for the Proposed Development.

15.10.10 The total building energy intensity for a typical B8 unit has been taken from CIBSE Guide F (2012). This is 167kWhr/m^2 per annum, and this figure can be utilised across the Site. Therefore, based on a total floor area of 104,008m^2, the total building energy use across the site is estimated as 17,369,336kWhr per annum. It is proposed that all energy demand will be met by electricity, therefore the UK Government Greenhouse Gas Conversion Factors (2021) can be used to convert this into an estimated CO_{2eq} figure using a carbon factor of 0.21233. This indicates a figure of 3,688,031kg CO_{2eq}/annum.

Summary of operational impacts

15.10.11 In terms of transport related emissions, it is estimated that the Proposed Development could result in 20,792,065kg CO_{2eq}/annum.

15.10.12 In terms of emissions from building operations, it is estimated that the Proposed Development could result in 3,688,031kg CO_{2eq}/annum.

15.10.13 Therefore, the total emissions during the operation of the development are 24,480,096kg CO_{2eq}/annum or 24,480 tonnes.

15.10.14 Based on the UK Carbon Budget periods, and assuming that the development is operational by 2024, this equates to:

- Budget 4 (2023-2027): 97,920 tonnes CO_2 out of 1,950MtCO_2 (0.00005%)
- Budget 5 (2028-2032): 122,400 tonnes CO_2 out of 1,765MtCO_2 (0.00007%)
- Budget 6 (2033-2037): 122,400 tonnes CO_2 out of 965MtCO_2 (0.00013%)

15.10.15 The above assessment does not consider emissions beyond 2037.

15.10.16 These figures are a worst-case assumption without mitigation. They assume that the CO_2 emissions associated with transportation will remain constant, which is unlikely given the push for electric vehicles. The figures also assume that all electricity used on site will come from the National Grid and do not take into account any on-site renewables. In addition, they assume that the carbon intensity of the UK National Grid will not change, whereas there is a strong likelihood that with the push to renewables and Net Zero Carbon by 2050, the CO_{2eq} emissions associated with National Grid electricity production will decrease.

15.10.17 Based on these figures, the magnitude of the operational impact is considered to be low. Significance is therefore considered to be **Minor.**

Climate Change Resilience Assessment

15.10.18 Given the relatively short timescale for the construction phase (2022-2024) and its temporary nature, it is not considered that there will be any significant effects associated with the construction phase in relation to the climate change resilience assessment. This assessment considers the operation of the completed development only.

15.10.19 **Table 15.10** identifies the potential impacts associated with climate change, the receptors affected (and the sensitivity of those receptors), the magnitude of the impact (likelihood x consequence of impact) and the overall significance (based on mitigation already incorporated).

Table 15.10 Climate Change Resilience Assessment

Hazard associated with Climate Change	Impact	Receptor	Magnitude			Significance
			Likelihood	Consequence	Summary of Magnitude	
Increased flooding	Rising Flood levels can cause inundation of basements and ground floor accommodation. The Site is located in Flood Zone 1 which has a 'low' probability of fluvial flooding. During a 1 in 100 year rainfall event, the majority of the site would be unaffected by surface water flooding and the linear areas across the site which are at risk of flooding will be flooded with depth of approximately 300mm. However, the area in the south east of the site will be flooded with depth of between 300mm and 900mm and at places exceeding 900mm. During a 1 in 1000 year event (which can be considered as a proxy for the 1 in 100 year plus climate change event) the flood outline is slightly wider, but the flood depths remain in the same magnitude for the respective areas. See Chapter 11 and the Flood Risk Assessment.	Buildings and infrastructure (Medium sensitivity)	1	3	Medium	Moderate

Hazard associated with Climate Change	Impact	Receptor	Magnitude			Significance
			Likelihood	Consequence	Summary of Magnitude	
Increased likelihood of storms (including high winds)	High winds can result in a risk of structural damage to buildings and reduction of mechanical ventilation capacity.	Buildings and infrastructure (Medium sensitivity)	3	2	High	Major
	Risk to the safety of building occupants from doors slamming.	Building occupants (Medium sensitivity)	3	3	High	Major
More extreme heat and cold events & greater temperature variation	Extremes of temperature may result in building services being unable to maintain thermal comfort levels.	Building occupants (Medium sensitivity)	3	2	High	Major
	Extreme cold events may lead to plant failure due to freezing or defrost cycles	Buildings and infrastructure (Medium sensitivity)	3	2	High	Major
	Landscape planting may be affected.	Planting (Medium sensitivity)	2	2	Medium	Moderate

Hazard associated with Climate Change	Impact	Receptor	Magnitude			Significance
			Likelihood	Consequence	Summary of Magnitude	
Wetter winters (including increased moisture and driving rain)	Increased moisture and rain may cause damage to building fabric and services.	Buildings and infrastructure (Medium sensitivity)	3	2	High	Major
	Increased rate of run off risks of system inundation leading to localised flooding. The Site is located in Flood Zone 1 which has a 'low' probability of fluvial flooding. During a 1 in 100 year rainfall event, the majority of the site would be unaffected by surface water flooding and the linear areas across the site which are at risk of flooding will be flooded with depth of approximately 300mm. However, the area in the south east of the site will be flooded with depth of between 300mm and 900mm and at places exceeding 900mm. During a 1 in 1000 year event (which can be considered as a proxy for the 1 in 100 year plus climate change event) the flood outline is slightly wider, but the flood depths remain in the same magnitude for the respective areas. See Chapter 11 and the FRA.	Buildings and infrastructure (Medium sensitivity	1	3	Medium	Moderate

Hazard associated with Climate Change	Impact	Receptor	Magnitude			Significance
			Likelihood	Consequence	Summary of Magnitude	
More drought events (including reduced summer rainfall)	Reduced rainfall may decrease the amount of water available for the development.	Building occupants (Medium sensitivity)	3	2	High	Major
	Drying soils could result in structural damage to buildings.	Buildings and infrastructure (Medium sensitivity)	2	3	High	Major
	Landscape planting may be affected.	Planting (Medium sensitivity)	2	2	Medium	Moderate

Hazard associated with Climate Change	Impact	Receptor	Magnitude			Significance
			Likelihood	Consequence	Summary of Magnitude	
Warmer summers and increased solar radiation	Increased temperatures may result in building services being unable to maintain thermal comfort. levels.	Building occupants (Medium sensitivity)	3	2	High	Major
	Solar radiation may reduce the durability of roof and external wall materials.	Buildings and infrastructure (Medium sensitivity)	3	2	High	Major
	Reduced rainfall may decrease the amount of water available for the development.	Building occupants (Medium sensitivity)	3	2	High	Major
	Drying soils could result in structural damage to buildings.	Buildings and infrastructure (Medium sensitivity)	2	3	High	Major
	Landscape planting may be affected.	Planting (Medium sensitivity)	2	2	Medium	Moderate

Hazard associated with Climate Change	Impact	Receptor	Magnitude			Significance
			Likelihood	Consequence	Summary of Magnitude	
More precipitation e.g. rain and snow	Increased rate of run off risks of system inundation leading to localised flooding. The site is located in Flood Zone 1 which has a 'low' probability of fluvial flooding. During a 1 in 100 year rainfall event, the majority of the site would be unaffected by surface water flooding and the linear areas across the site which are at risk of flooding will be flooded with depth of approximately 300mm. However, the area in the south east of the site will be flooded with depth of between 300mm and 900mm and at places exceeding 900mm. During a 1 in 1000 year event (which can be considered as a proxy for the 1 in 100 year plus climate change event) the flood outline is slightly wider, but the flood depths remain in the same magnitude for the respective areas. See Chapter 11 and the FRA.	Buildings and infrastructure (Medium sensitivity	1	3	Medium	Moderate
	Damage to building fabric and services.	Buildings and infrastructure (Medium sensitivity)	2	3	High	Major
Milder winters	This may reduce winter heating requirements.	N/A	N/A	N/A	N/A	N/A

Hazard associated with Climate Change	Impact	Receptor	Magnitude			Significance
			Likelihood	Consequence	Summary of Magnitude	
Subsidence or ground movement	Drying soils could result in subsidence / ground movement and resulting structural damage to buildings.	Buildings and infrastructure (Medium sensitivity)	2	3	High	Major

15.10.20 The Climate Change Resilience Assessment identifies that climate change is likely to result in a number of hazards that may impact upon the development.

15.11 Secondary Mitigation and Enhancement

Impact of the project on climate change

Construction

15.11.1 The Applicant has made a commitment that the Proposed Development will be 'Net Zero Carbon in Construction'.

15.11.2 A Life Cycle Assessment will be undertaken to inform material selection to reduce the carbon footprint as far as possible at the detailed design stage. A Whole Life Carbon Assessment will then be undertaken of the final design to calculate the embodied carbon footprint ($kgCO_{2eq}$) of the development. Any residual embodied carbon emissions will then be offset through the funding of verified and accredited offset schemes, in line with principals set out in UKGBC's net zero framework (UKGBC, 2019).

15.11.3 Management of construction effects will form part of a comprehensive and auditable Detailed Construction Environmental Management Plan (CEMP). The building will also be assessed under BREEAM and a minimum 'Excellent' rating targeted.

Operation

Transport Related Carbon

15.11.4 The Interim Travel Plan (Alan Baxter Ltd, 2022) contains details of the measures incorporated to reduce the impact of transport associated with the development. This will assist in reducing carbon emissions associated with operational transport.

15.11.5 These measures include:

- 345 on-site cycle parking spaces.
- Pedestrian and cycle routes and new cycle crossings.
- 25% of spaces to be electric vehicle recharging facilities.

Energy Related Carbon

15.11.6 To mitigate for the anticipated operational energy related emissions, the Proposed Development will use the 'energy hierarchy' to reduce carbon emissions, as detailed in the Energy and Sustainability Statement (BWB, 2022) submitted with the planning application.

Figure 15.1 The Energy Hierarchy (source: BWB, 2022)

Reduce demand (passive measures)

15.11.7 Based upon the energy hierarchy, the Proposed Development proposals will aim to reduce energy/CO_2 demand through a 'fabric first' approach. As the development progresses into detailed design planning stage, energy modelling will be undertaken to demonstrate compliance with Part L2 Building Regulations demonstrating an improved performance where technically and commercially feasible.

15.11.8 The fabric first stage of the energy hierarchy will seek to minimise demand for heat and power from the outset through the optimisation of the building envelope. This includes ensuring suitable levels of fabric insulation (u-values), air tightness and thermal bridging, and the provision of energy efficiency measures.

15.11.9 The development will target building element u-values and air tightness in accordance with Part L2 of the Building Regulations standards, including high performance glazing with appropriate window u-values and g-values to reduce heat loss and optimise positive solar gain while reducing the potential for overheating.

15.11.10 Light and Solar Transmittance are factors that measure the amount of light and solar energy that pass through glazed openings. They are important as they affect the control of solar gains and availability of natural light into the building. Consequently, the development will target light and solar transmittance values in accordance with Part L2 of the Building Regulations standards.

15.11.11 In addition to the Proposed Development improved envelope u-values, a key area of construction which could result in a significant reduction in heating demand are junction details where two elements of the development envelope meet (thermal bridging). Consequently, the Proposed Development will be designed to make use of best practice design to minimise thermal bridging, energy losses, and reducing CO_2 emissions.

15.11.12 In addition to an improved fabric specification, energy efficiency and sustainability will be maximised on the Proposed Development Site at all stages, and this will include the following measures, wherever feasible:

- Maximise thermal mass (where feasible) allowing the proposed development to store and release heat gains from the sun and internal appliances;
- Promotion of passive solar gains, maximising natural daylight, sunlight and ventilation whilst minimising the risk of summer overheating;
- Proportion and distribution of glazing to ensure good levels of daylight, helping to reduce electricity consumption through artificial lighting.
- Through these passive design measures the Proposed Development will deliver energy & carbon savings beyond the requirements of Part L2 of the Building Regulations.

Energy Efficiency

15.11.13 The next stage in the energy hierarchy is exploiting local energy resources (such as secondary heat) and supplying energy efficiently and cleanly to reduce CO_2 emissions.

15.11.14 The growth of decentralised energy generation is a core component of decarbonising the energy supply. District heat networks are an important part of a sustainable and flexible energy system of which each building is a part, and which enables a more circular approach to energy use by storing, using, and reusing energy sources. This supports a more effective and efficient use of energy by reducing primary energy demand and minimising the amount of energy that is ultimately wasted within the system.

15.11.15 A desktop study was undertaken (Alan Baxter Ltd 2022) to investigate whether an existing distribution network was in place close to the site. However, there are no existing district heating networks within 500m of the Site, therefore, connection to an existing network is not feasible.

15.11.16 As such, whilst the Proposed Development will not rely on third parties to meet their heat or power requirement, some flexibility may be included to allow third party energy connection in the future. The Proposed Development could be left with spare valve connections, capable for connection into the future heat network, should the applicant wish.

15.11.17 New network could be considered for the Proposed Development Site and should incorporate good practice design and specification standards. Poorly designed heat network infrastructure within a building can contribute towards internal overheating problems, especially in communal areas, and high service charges.

15.11.18 Thus, if deemed feasible at the detailed design planning stage, to avoid this, the Applicant will work with their chosen heat network operator from pre-design and commit to designing and delivering communal heating systems in compliance with the relevant CIBSE/ADE Heat Networks Code of Practice for the UK and in partnership with energy services companies that are or are working towards being registered participants of the Heat Trust scheme. This will support the development of good quality networks whilst helping network operators prepare for regulation and ensuring that customers are offered a reliable and cost-competitive service.

15.11.19 High efficiency systems, plant, controls and equipment will also be incorporated into the development as follows (Alan Baxter Ltd, 2022):

- Incorporate 100% high efficiency LED light fittings to reduce energy consumption; and
- Use of high efficiency heating and/or cooling systems and controls.

Renewable / Low Carbon Technology

15.11.20 The final level in the energy hierarchy is to incorporate renewables / low carbon technology. It is anticipated that the following will be explored further as part of the detailed design stage:

- Photovoltaics (PVs) and/or Solar Thermal - this technology is becoming more cost effective and is considered suitable for the Proposed Development Site and thus can be considered and explored further as part of the detailed design planning stage of the proposal.
- Air source heat pumps - this technology is considered suitable for the Proposed Development Site and thus can be considered and explored further as part of the detailed design planning stage of the proposal.
- For further information refer to the energy and sustainability statement (Alan Baxter, 2022).

Climate Change Resilience Assessment

15.11.21 The following measures should be incorporated into the design of the development to ensure it is climate change resilient:

- Installation of a surface water drainage scheme and raising the floors by 150mm above ground to mitigate against surface water flooding, as stated in the Flood Risk Assessment (RPS, 2022).
- Design of building and roof mitigated against the risk of high winds and all doors to be on restrictive stays to prevent them slamming shut unintentionally from wind.
- Cooling plant selection to be based on projected future temperatures. Facility for cooling capacity increase to be included in infrastructure.
- Heating plant selection to be based on projected temperatures. Adequate preheating to limit thermal lag on occupation
- Include use of waste heat on air-based equipment to raise operating temperatures.
- The whole external fabric to be designed as a weathertight structure. Roof and external wall materials to be guaranteed to perform for a minimum of 25 years.
- Low flush volume WCs and low flow rate taps to be specified to minimise water demand.
- A major leak detection system to be installed to identify leaks.
- Shut off valves to be installed on the water supply to WC areas which will stop the water supply to these areas when they are not in use, thereby minimising the impact of any minor water leaks in these areas.
- Pulsed output water meters to be installed on the water supply to each building so that occupants can monitor their water usage.
- The roofs will be designed to resist snow loads.
- A site investigation has been undertaken by Alan Baxter Ltd (2022) to understand the ground conditions and the structure and ground slabs will be designed to accommodate the findings.

15.12 Residual Effects

Impact of the Project on Climate Change

Construction

15.12.1 The Proposed Development will result in carbon emissions during construction. However, with the additional mitigation, the development will be 'Net Zero Carbon in Construction' using the methodology outlined in the UKGBC's net zero framework. Carbon emissions will be reduced as much as feasibly possible. Following this, if there are any construction related residual carbon emissions, these will be offset through the funding of verified and accredited offset schemes, in line with principals set out in UKGBC's net zero framework. Therefore, the residual construction impact is considered to be **Negligible (Not Significant).**

Operation

15.12.2 The Proposed Development will result in carbon emissions during operation through both operational energy use and operational transport. While the additional mitigation may result in the development reducing the carbon emissions below those estimated, the extent to which this

will be achieved is unclear. Therefore, the residual operational impact is considered to remain as a **Minor Adverse** significance only **(Not Significant).**

Climate Change Resilience Assessment

15.12.3 The Climate Change Resilience Assessment has been repeated, this time incorporating the additional mitigation, see **Table 15.11** below.

Table 15.11 Climate Change Resilience Assessment with Additional Mitigation

Hazard associated with climate change	Impact	Mitigation	Receptor	Magnitude			Significance
				Likelihood	Consequence	Summary of magnitude	
Increased flooding	Rising Flood levels can cause inundation of basements and ground floor accommodation. See Chapter 11 and the FRA for more information.	Installation of a surface water drainage scheme and raising the floors by 150mm above ground to mitigate against surface water flooding.	Buildings and infrastructure (Medium sensitivity	1	2	Medium	Moderate

Hazard associated with climate change	Impact	Mitigation	Receptor	Magnitude			Significance
				Likelihood	Consequence	Summary of magnitude	
Increased likelihood of storms (including high winds)	High winds can result in a risk of structural damage to buildings and reduction of mechanical ventilation capacity.	Structural engineers will ensure design of building and roof is mitigated against the risk of high winds. Intake and exhaust positions protected from direct wind impact.	Buildings and infrastructure (Medium sensitivity)	1	2	Medium	Moderate
More extreme heat and cold events & greater temperature variation	Extremes of temperature may result in building services being unable to maintain thermal comfort levels.	Cooling plant selection to be based on projected future temperatures. Facility for cooling capacity increase to be included in infrastructure. Heating plant selection to be based on projected temperatures. Adequate preheating to limit thermal lag on occupation	Building occupants (Medium sensitivity)	2	2	Medium	Moderate
	Extreme cold events may lead to plant failure due to freezing or defrost cycles	Plant selection to be based in projected temperatures. Include use of waste heat on air based equipment to raise operating temperatures.	Buildings and infrastructure (Medium sensitivity)	1	2	Medium	Moderate
	Landscape planting may be affected.	To be determined during detailed planning stages	Planting (Medium sensitivity)	2	2	Medium	Moderate

Hazard associated with climate change	Impact	Mitigation	Receptor	Magnitude			Significance
				Likelihood	Consequence	Summary of magnitude	
Wetter winters (including increased moisture and driving rain)	Increased moisture and rain may cause damage to building fabric and services.	The whole external fabric will be designed as a weathertight structure. Roof and external wall materials will be guaranteed to perform for a minimum of 25 years and in reality will do so for much longer. Intake and exhaust positions will be protected from water ingress.	Buildings and infrastructure (Medium sensitivity)	2	2	Medium	Moderate
	Increased rate of run off risks of system inundation leading to localised flooding. See Chapter 11 and the FRA.	Installation of a surface water drainage scheme and raising the floors by 150mm above ground to mitigate against surface water flooding.	Buildings and infrastructure (Medium sensitivity	1	2	Medium	Moderate
More drought events (including reduced summer rainfall)	Reduced rainfall may decrease the amount of water available for the development.	Water supplies and storage to include allowance for more potable water consumption. Low water use sanitary fittings will be specified where appropriate to minimise water demand. Pulsed output water meters will be installed on the water supply so that occupants can monitor their water usage.	Building occupants (Medium sensitivity)	1	2	Low	Minor
	Drying soils could result in structural damage to buildings.	Structural engineers will ensure design of foundations is mitigated against the risk ground shrinkage.	Buildings and infrastructure (Medium sensitivity)	1	3	Medium	Moderate

Hazard associated with climate change	Impact	Mitigation	Receptor	Magnitude			Significance
				Likelihood	Consequence	Summary of magnitude	
	Landscape planting may be affected.	Planting designed to thrive across extremes of temperature and, precipitation events.	Planting (Medium sensitivity)	1	2	Medium	Moderate
Warmer summers and increased solar radiation	Increased temperatures may result in building services being unable to maintain thermal comfort levels.	Cooling plant selection to be based on projected future temperatures. Facility for cooling capacity increase to be included in infrastructure.	Building occupants (Medium sensitivity)	2	2	Medium	Moderate
	Solar radiation may reduce the durability of roof and external wall materials.	Roof and external wall materials will be guaranteed to perform for a minimum of 25 years and in reality will do so for much longer.	Buildings and infrastructure (Medium sensitivity)	2	2	Medium	Moderate
	Reduced rainfall may decrease the amount of water available for the development.	Water supplies and storage to include allowance for more potable water consumption. Low water use sanitary fittings will be specified where appropriate to minimise water demand. Pulsed output water meters will be installed on the water supply to each building so that occupants can monitor their water usage.	Building occupants (Medium sensitivity)	2	2	Medium	Moderate
	Drying soils could result in structural damage to buildings.	Structural engineers will ensure design of foundations is mitigated against the risk ground shrinkage	Buildings and infrastructure (Medium sensitivity)	1	3	Medium	Moderate

Hazard associated with climate change	Impact	Mitigation	Receptor	Magnitude			Significance
				Likelihood	Consequence	Summary of magnitude	
	Landscape planting may be affected.	To be determined during detailed planning stages	Planting (Medium sensitivity)	2	2	Medium	Moderate
More precipitation e.g. rain and snow	Increased rate of run off risks of system inundation leading to localised flooding. See Chapter 11 and the FRA.	Installation of a surface water drainage scheme and raising the floors by 150mm above ground to mitigate against surface water flooding.	Buildings and infrastructure (Medium sensitivity	1	2	Medium	Moderate
	Damage to building fabric and services	The roofs will be fully designed for snow loads and to avoid ponding. Intake and exhaust positions will be protected from water ingress.	Buildings and infrastructure (Medium sensitivity)	1	3	Medium	Moderate
Milder winters	This may reduce winter heating requirements.	N/A	N/A	N/A	N/A	N/A	N/A
Subsidence or ground movement	Drying soils could result in subsidence / ground movement and resulting structural damage to buildings	Structural engineers will ensure design of foundations is mitigated against the risk ground movement	Buildings and infrastructure (Medium sensitivity)	1	3	Medium	Moderate

15.12.4 This assessment identifies that, while climate change is likely to result in increased hazards that may impact upon the development, the additional mitigation measures will result in impacts of **Minor Adverse** significance only (**Not Significant**).

15.13 Monitoring

15.13.1 Management of construction effects will form part of a comprehensive and auditable Detailed Construction Environmental Management Plan (CEMP). An outline CEMP has been provided by RPS Group (2022). The building will also be assessed under BREEAM and a minimum 'Excellent' rating targeted. As part of the Outline CEMP and BREEAM assessment, the Contractor will be required to monitor material and waste transport to and from the site and record the total carbon emissions associated with this to help identify where savings can be made. The Contractor will also be required to monitor the site energy usage by all construction plant, equipment (mobile and fixed) and site accommodation to help identify where savings can be made.

15.14 Cumulative Assessment

15.14.1 No inter-project cumulative effects are anticipated on the basis that climate change adaptation effects and impacts are specific to the development and will not result in impacts to any other committed developments, as identified in **Appendix 6.1.**

15.15 Comparison to 2014 Planning Permission

15.15.1 A Climate Change Chapter was not included in the Environmental Statement for the 2014 Planning Permission, and therefore it is not possible to provide a comparison in terms of level of effect.

15.16 References

- Department for Environment, Food and Rural Affairs (DEFRA) (2018) The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting.
- BWB (2022). Energy and Sustainability Statement.
- House of Commons Library (2021). UK Carbon Budgets.
- IEMA (2022). Institute of Environmental Management & Assessment (IEMA) Guide: Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition.
- IEMA (2020). EIA Guide to: Climate Change Resilience & Adaptation.
- Royal Institute of British Architects (RIBA) (2019). Sustainable Outcomes Guide
- Royal Institution of Chartered Surveyors (RICS) (2017) Whole life carbon assessment for the built environment.
- RPS (2022). Flood Risk Assessment Report.
- RPS (2022). Outline Construction Environmental Management Plan.
- The Met Office (2019). UK Climate Projections: Headline Findings.
- The Met Office website (accessed May 2022). UK Climate Averages. https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/

- The Met Office website (accessed May 2022). Past Weather Events. https://www.metoffice.gov.uk/weather/learn-about/past-uk-weather-events
- UK Green Building Council (2017). Embodied Carbon: Developing a Client Brief.
- UK Green Building Council (2019). Net Zero Carbon Buildings.
- Alan Baxter Ltd (ABA) (2022) Transport Assessment.

16 Air Quality

16.1 Introduction

16.1.1 This Chapter, prepared by Waterman IE, presents an assessment of the likely air quality effects of the Proposed Development.

16.1.2 This chapter provides an overview of relevant policy and guidance related to the air quality in the area, followed by a description of the methods used in the assessment. This is followed by a description of the relevant baseline conditions of the Site and surrounding area, together with an assessment of the likely potential effects of the Proposed Development during the Site preparation and construction works and once the Proposed Development is completed and operational. Mitigation measures are identified where appropriate to avoid, reduce or offset any adverse effects identifies and / or enhance likely residual effects are described.

16.1.3 This chapter is supported by the following technical appendices:

- **Appendix 16.1:** Figures
- **Appendix 16.2:** Air Quality Modelling study

16.2 Policy Context, Legislation, Guidance and Standards

Legislation

EU Framework Directive 2008/50/EC, 2008

16.2.1 Air pollutants at high concentrations can have adverse effects on the health of humans and ecosystems. European Union (EU) legislation on air quality forms the basis for UK legislation and policy on air quality (European Parliament, 2008).

16.2.2 The EU Framework Directive 2008/50/EC on ambient air quality assessment and management came into force in May 2008 and was implemented by Member States, including the UK, by June 2010. The Directive aims to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

Air Quality Standards Regulations, 2010

16.2.3 The Air Quality Standards Regulations implement Limit Values prescribed by the EU Framework Directive 2008/50/EC (Defra, 2010). The Limit Values are legally binding and the Secretary of State, on behalf of the UK Government, is responsible for their implementation.

The UK Air Quality Strategy, 2007

16.2.4 The current UK Air Quality Strategy (UK AQS) was published in July 2007 sets out the objectives for Local Planning Authorities (LPA) in undertaking their Local Air Quality Management (LAQM) duties (Defra, 2007). The 2007 UK AQS introduced a national level policy framework for exposure reduction for fine particulate matter. Objectives in the UK AQS are in some cases more onerous than the Limit Values set out within the relevant EU Directives and the Air Quality Standards Regulations 2010. In addition, objectives have been established for a wider range of pollutants.

16.2.5 The UK AQS objectives for air pollutants relevant to this assessment are summarised in **Table 16.1.**

Table 16.12: Summary of Relevant UK AQS Objectives

Pollutant	Objective		Date by which Objective to be Met
	Concentration	Measured as	
Nitrogen Dioxide (NO_2)	200µg/m^3	1 hour mean not to be exceeded more than 18 times per year	31/12/2005
	40µg/m^3	Annual Mean	31/12/2005
Particulate Matter (PM_{10}) (a)	50µg/m^3	24 hour mean not to be exceeded more than 35 times per year	31/12/2004
	40µg/m^3	Annual Mean	31/12/2004
Particulate Matter ($PM_{2.5}$) (b)	Target of 15% reduction in concentrations at urban background locations	Annual Mean	Between 2010 and 2020
	25µg/m^3	Annual Mean	01/01/2020

Note: (a) Particulate matter with a mean aerodynamic diameter less than 10 microns (or micrometres – µm) (b) Particulate matter with a mean aerodynamic diameter less than 2.5 microns

The Environment Act, 1995

16.2.6 In a parallel process, the Environment Act 1995 required the preparation of a national air quality strategy setting health-based air quality objectives for specified pollutants and outlining measures to be taken by a Local Planning Authority (LPA) in relation to meeting these objectives (the LAQM system) (ODPM, 1995).

16.2.7 Part IV of the Environment Act 1995 provides a system of LAQM under which LPAs are required to review and assess the future quality of the air in their area by way of a staged process. Should this process suggest that any of the AQS objectives will not be met by the target dates, the LPA must consider the declaration of an Air Quality Management Area (AQMA) and the subsequent preparation of an Air Quality Action Plan (AQAP) to improve the air quality in that area in pursuit of the AQS objectives.

Planning Policy

National Planning Policy Framework, 2021

16.2.8 The National Planning Policy Framework (NPPF), published in July 2021 sets out the Government's planning policies for England and how these should be applied (DCLG,2021).

16.2.9 Paragraph 105 states *"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."*

16.2.10 Paragraph 174 states *"Planning policies and decisions should contribute to and enhance the natural and local environment by: … preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans"*

16.2.11 Paragraph 185 states *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.".*

16.2.12 Paragraph 186 states *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.".*

The Cherwell Local Plan 2011-2031

16.2.13 The Adopted Cherwell Local Plan 2011-2031 (CDC, 2015) sets out our priorities and policies for Cherwell, Bicester, Banbury, Kidlington, and for rural areas.

16.2.14 Policy ESD 10: Protection and Enhancement of Biodiversity and the Natural Environment states: *"Air quality assessments will also be required for development proposals that would be likely to have a significantly adverse impact on biodiversity by generating an increase in air pollution"*

Guidance

Department for Environment, Food and Rural Affairs, Clean Air Strategy, 2019

16.2.15 Published in January 2019, the Clean Air Strategy sets out a coherent framework and national action to improve air quality throughout the UK (Defra, 2019).

16.2.16 The Strategy is underpinned by new national powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to act in areas with an air pollution problem. The Strategy also supports the creation of Clean Air Zones to lower emissions from all sources of air pollution, backed up with clear enforcement mechanisms.

Improving Air Quality in the UK: Tackling Nitrogen Dioxide in our Towns and Cities. UK Air Quality Plan for Tackling Nitrogen Dioxide, 2017

16.2.17 The UK Government was required by the High Court to release an Air Quality Plan to meet the NO_2 Limit Value in the shortest timescale as possible (Defra, 2017). This document was adopted on 26th July 2017.

16.2.18 The plan focuses on reducing concentrations of NO_x and NO_2 around road vehicle emissions within the shortest possible time. With the principal aims to:

a. reduce emissions of NOx from the current road vehicle fleet in problem locations now; and

b. accelerate road vehicle fleet turnover to cleaner vehicles to ensure that the problem remains addressed and does not move to other locations.

16.2.19 The other aims include reducing background concentrations of NOx from:

- Other forms of transport such as rail, aviation and shipping;
- Industry and non-road mobile machinery; and
- Buildings, both commercial and domestic, and other stationary sources.

16.2.20 The Plan provides measures to reduce NO_x and NO_2 concentrations in the UK, such measures include:

- Mandate local authorities to implement Clean Air Zones within the shortest possible time;
- Consultation on proposal for a Clean Air Zone Framework for Wales;
- Consultation on a draft National Low Emission Framework for Scotland;
- Commitment to establishing a Low Emission Zone for Scotland by 2018;
- Tackling air pollution on the English Road network;
- New real driving emissions requirement to address real world NOx emissions;
- Additional funding to accelerate uptake of hydrogen vehicles and infrastructure;
- Additional funding to accelerate the uptake of electric taxis;
- Further investment in retrofitting alongside additional support of low emission buses and taxis;
- Regulatory changes to support the take up of alternatively fuelled light commercial vehicles;
- Exploring the appropriate tax treatment for diesel vehicles;
- Call for evidence on updating the existing HGV Road User Levy;
- Call for evidence on use of red diesel;
- Ensure wider environmental performance is apparent to consumers when purchasing cars;
- Updating Government procurement policy;
- New emissions standards for non-road mobile machinery;
- New measures to tackle NOx emissions from Medium Combustion Plants; and
- New measures to tackle NOx emissions from generators.

16.2.21 The above measures do not provide any actions which are relevant to the operation or design of the Proposed Development.

16.2.22 A High Court ruling (High Court of Justice, 2018) on 21st February 2018, stated the UK Governments air quality improvement plan adopted on 31st July 2017 was unlawful as *'it does not contain measures sufficient to ensure substantive compliance with the 2008 Directive and the English Regulations'. The UK Government 'must ensure steps are taken to achieve compliance as soon as possible, by the quickest route possible and by a means that makes that outcome likely'.*

16.2.23 The judgement stated that the UK Government must produce a supplementary plan, setting out requirements for feasibility studies to be undertaken in the 33 Local Authority Areas. CDC is not considered within this judgement.

16.2.24 In May 2018, it was announced the European Union (EU) was going to take the UK to the European Commission over failure to meet the Limit Values for NO_2.

Environmental Protection UK & Institute of Air Quality Management Guidance; Land-Use Planning & Development Control: Planning for Air Quality, 2017

16.2.25 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) provide guidance for air quality considerations within the local development control processes, promoting a consistent approach to the treatment of air quality issues (EPUK and IAQM, 2017).

16.2.26 The EPUK and IAQM guidance explains how development proposals can adopt good design principles to reduce emissions and contribute to better air quality. The guidance also provides a method for screening the need for an air quality assessment and a consistent approach for describing the impacts at individual receptors. The EPUK and IAQM Guidance, advises that:

16.2.27 *"In arriving at a decision about a specific proposed development the local planning authority is required to achieve a balance between economic, social and environmental considerations. For this reason, appropriate consideration of issues such as air quality, noise and visual amenity is necessary. In terms of air quality, particular attention should be paid to:*

- *Compliance with national air quality objectives and of EU Limit Values;*
- *Whether the development will materially affect any air quality action plan or strategy;*
- *The overall degradation (or improvement) in local air quality; or*
- *Whether the development will introduce new public exposure into an area of existing poor air quality".*

Planning Practice Guidance

16.2.28 The Government's online Planning Practice Guidance (PPG) states that air quality concerns are more likely to arise where development is proposed within an area of existing poor air quality, or where it would adversely impact upon the implementation of air quality strategies and / or action plans (DCLG, 2014). The PPG notes that when deciding whether air quality is relevant to a planning application, considerations would include whether the development would lead to:

- Significant effects on traffic, such as volume, congestion, vehicle speed, or composition;
- The introduction of new point sources of air pollution, such as furnaces, centralised boilers and Combined Heat and Power (CHP) plant; and
- Exposing occupants of any new developments to existing sources of air pollutants and areas with poor air quality.

Local Air Quality Management Policy Guidance, 2016

16.2.29 The Local Air Quality Management Policy Guidance LAQM.PG (16) provides additional guidance on the links between transport and air quality (Defra, 2016). LAQM.PG (16) describes how road transport contributes to local air pollution and how transport measures may bring improvements in air quality. Key transport-related Government initiatives are set out, including

regulatory measures and standards to reduce vehicle emissions and improve fuels, tax-based measures and the development of an integrated transport strategy.

16.2.30 LAQM.PG (16) also provides guidance on the links between air quality and the land use planning system. The guidance advises that air quality considerations should be integrated within the planning process at the earliest stage and is intended to aid local authorities in developing action plans to deal with specific air quality issues and create strategies to improve air quality. LAQM.PG (16) summarises the means in which the land use planning system can help deliver compliance with the air quality objectives.

Institute of Air Quality Management: Guidance on the Assessment of Dust from Demolition and Construction, 2014

16.2.31 The IAQM Construction Dust Guidance provides guidance to consultants and Environmental Health Officers (EHOs) on how to assess air quality impacts from construction related activities (IAQM, 2014). The guidance provides a risk-based approach based on the potential dust emission magnitude of the site (small, medium or large) and the sensitivity of the area to dust impacts. The importance of professional judgement is noted throughout the guidance. The guidance recommends that once the risk class of the site has been identified, the appropriate level of mitigation measures are implemented to ensure that the construction activities have no significant impacts.

Cherwell District Council Air Quality Action Plan, 2017

16.2.32 CDC's Air Quality Action Plan (CDC, 2017) set out actions to improve air quality within Cherwell between 2017 and 2020.

16.2.33 Actions were considered under five broad topics:

- *"Policy guidance and development control;*
- *Promoting low emission transport;*
- *Promoting travel alternatives to private vehicle use;*
- *Transport planning and infrastructure; and*
- *Public information."*

16.2.34 Priorities include:

- *"Priority 1 – Strengthening local policy to improve air quality and its role in protecting health;*
- *Priority 2 – Reducing NOx emissions from cars in all AQMAs;*
- *Priority 3 – Ensuring new developments encourage and facilitate low emission and alternative transport;*
- *Priority 4 – Ensuring transport infrastructure delivery takes account of air quality improvement potential within AQMAs;*
- *Priority 5 – Raising awareness of poor air quality and encouraging improvement actions by vehicle users and fleet managers."*

16.3 Consultation

16.3.1 The Applicant has informally agreed the structure of the ES with CDC through pre-application dialogue in March 2022. In the Absence of formal consultation with CDC, the assessment has been undertaken in accordance with relevant guidance and professional judgement of the competent expert.

16.4 Scope of Assessment

Not Significant Effects

Construction Plant Emissions

16.4.1 The construction plant would adhere to relevant emissions standards for NO_2 and PM_{10} set out for Non-Road Mobile Machinery. As such, in line with the IAQM guidance on assessing construction effects, it is considered than a construction plant emissions assessment is not required and has not been considered further.

Dust Emissions - Sensitivities of Receptors to Ecological Effects

16.4.2 There are no statutory designated sites for nature conservation within 350m of the Site. Dust effects on ecology have therefore not been considered further.

Likely Significant Effects

Demolition and Construction

- Temporary generation of dust arising from the construction works leading to potential dust nuisance to surrounding sensitive receptors;
- Temporary changes in traffic-related emissions during the construction works as a result of changes in traffic generated by such works / activities and emissions from construction plant.

Complete and Operational Development

- The effect upon existing receptors from NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) transport emissions from the operation of the Proposed Development.
- The effect upon future users of the Graven Hill Village Masterplan to exposure to pollutant concentrations in excess of the relevant air quality objectives.

16.5 Methodology

Study Area

16.5.1 The study area assessed for the construction phase covers an area within 350m of the Site boundary, and within 50m of construction routes up to 500m from the Site entrance. The study area for the operational phase covers receptors along roads surrounding the Proposed Development or along roads with an increase in annual average daily traffic of over 100 light duty vehicles (LDV) or a change in 25 heavy duty vehicles (HDV) within an AQMA, or 500 LDV and 100 HDV outside an AQMA in accordance with the Institute of Air Quality (IAQM) guidance.

Baseline Data Collection

16.5.2 To establish baseline conditions at and around the Site, information has been taken from a review of Cherwell District Council's (CDC) 2020 Air Quality Annual Status Report (CDC, 2020) published as part of the Local Air Quality Management (LAQM) regime. This includes a review of CDC's monitoring data.

Assessment

16.5.3 Identification and assessment of likely significant air quality effects of the Proposed Development used the following well established models and standard procedures, alongside professional judgement:

- A qualitative assessment of the likely effects of the proposed activities during the construction phase;
- Review of the local area to identify potentially sensitive receptor locations that could be affected by changes in air quality due to the Proposed Development;
- Review and use of relevant traffic flow data from the Applicant's transport consultant Alan Baxter;
- Dispersion modelling of pollutant emissions using the ADMS-Roads model (Cambridge Environmental research Consultants, 2020) to predict the likely pollutant concentrations at the Site and surrounding area from road traffic emissions, and the likely effect of the complete and operational Proposed Development on local air quality from additional traffic emissions. Version 8.1 of the NO_x to NO_2 Calculator, available from the LAQM Support website (AEA, 2020), has been applied to derive the road-related NO_2 concentrations from the modelled NO_X concentrations;
- Comparison of the predicted air pollutant concentrations with a CDC diffusion tubes Aylesbury Road and Howes Lane;
- Determination of the effects of the completed and operational Development on air quality, based on the application of the Environmental Protection UK and Institute of Air Quality Management (EPUK and IAQM, 2017) significance criteria to modelled results; and
- Identification of mitigation measures, where appropriate.

16.5.4 The UK AQS (Defra, 2007) identifies the pollutants associated with road traffic emissions and local air quality as:

- Nitrogen oxides (NO_x);
- Particulate matter (as PM_{10} (particles with a diameter up to 10µm) and $PM_{2.5}$ (particles with a diameter up to 2.5µm));
- Carbon monoxide (CO);
- 1, 3-butadiene (C_4H_6); and
- Benzene (C_6H_6).

16.5.5 Emissions of total NO_x from motor vehicle exhausts comprise nitric oxide (NO) and nitrogen dioxide (NO_2). NO oxidises in the atmosphere to form NO_2. The most significant pollutants associated with road traffic emissions, in relation to human health, are NO_2 and particulate matter (PM_{10} and $PM_{2.5}$). This assessment therefore focuses on NO_2 and particulate matter (PM_{10} and $PM_{2.5}$).

Demolition and Construction

Dust Emissions

16.5.6 The assessment of the effects from demolition and construction activities (the Works) in relation to dust has been based on the IAQM's Guidance on the Assessment of Dust from Demolition and Construction, 2014 (IAQM, 2014) and the following:

- Consideration of the Works and their phasing; and
- A review of the sensitive uses in the area immediately surrounding the Site.

16.5.7 The IAQM guidance indicated that receptors within 350m of the boundary of a site, and within 50m of construction routes within 500m of the Site entrance, would be sensitive to emissions and nuisance dust from construction activities. For clarification, **Figure 16.1**: Construction Phase Assessment Bands, shows the area surrounding the Site, where sensitive receptors could be affected during the Works, considering the IAQM guidance.

16.5.8 Following the IAQM guidance, construction activities can be divided into the following four distinct activities:

- Demolition – any activity involved in the removal of an existing building;
- Earthworks – the excavation, haulage, tipping and stockpiling of material, but may also involve levelling the site and landscaping;
- Construction – any activity involved with the provision of a new structure; and
- Trackout – the movement of vehicles from unpaved ground on a site, where they can accumulate mud and dirt, onto the public road network where dust might be deposited.

16.5.9 The IAQM guidance considers three separate dust effects, with the proximity of sensitive receptors being taken into consideration for:

- Annoyance due to dust soiling;
- Potential effects on human health due to significant increase in exposure to PM10; and
- Harm to ecological receptors (any sensitive habitat affected by dust soiling).

16.5.10 A summary of the four-step process undertaken for the demolition and construction dust assessment, as set out in the IAQM guidance, is presented in **Table 16.2.**

Table 16.13: Summary of the IAQM Guidance for Undertaking a Construction Dust Assessment

Step		Description
1	Screen the Need for a Detailed Assessment	Simple distance-based criteria are used to determine the requirement for a detailed dust assessment. An assessment would normally be required where there are 'human receptors' within 350m of the boundary of the site and/or within 50m of the route(s) used by construction vehicles on public highway, up to 500m from the site entrance or 'ecological receptors' within 50m of the boundary of the site and/or within 50m of the route(s) used by construction vehicles on public highway, up to 500m from the site entrance.

2	Assess the Risk of Dust Effects	The risk of dust arising in sufficient quantities to cause annoyance and/or health or ecological effects should be determined using three risk categories: low, medium and high based on the following factors: • The scale and nature of the works, which determines the risk of dust arising (i.e., the magnitude of potential dust emissions) classed as small, medium or large; and • The sensitivity of the area to dust effects, considered separately for ecological and human receptors (i.e., the potential for effects) defined as low, medium or high.
3	Site Specific Mitigation	Determine the site-specific measures to be adopted at the site based on the risk categories determined in Step 2 for the aforementioned four activities. For the cases where the risk is 'negligible' no mitigation measures beyond those required by legislation are required. Where a local authority has issued guidance on measures to be adopted these should be taken into account.
4	Determine Significant Effects	Following Steps 2 and 3, the significance of the potential dust effects should be determined, using professional judgement, taking into account the factors that define the sensitivity of the surrounding area and the overall pattern of potential risks.

Construction Vehicle Exhaust Emissions

16.5.11 The IAQM guidance on assessing construction effects states:

> *"Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant effect on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur. For site traffic on the public highway, if it cannot be scoped out, then if should be assessed using the same methodology and significance criteria as operational traffic impacts."*

16.5.12 In accordance with the IAQM guidance, it is considered that a quantitative assessment of the exhaust emissions from construction traffic is not required, and a qualitative assessment is appropriate.

Complete and Operational Development

ADMS Model

16.5.13 The likely effect on local air quality from the traffic from the completed and operational Proposed Development has been assessed using the atmospheric dispersion model ADMS-Roads.

16.5.14 Traffic data has been provided by the Applicant's Transport team, Alan Baxter. The year 2019 has been used to assess the baseline, as this is the latest full year of representative data due to the COVID-19 pandemic.

16.5.15 The year 2024 was used for the 'without Development' and 'with Development' scenarios – the anticipated year the entire Proposed Development would be completed and operational.

16.5.16 The ADMS-Roads dispersion model predicts how emissions from roads combine with local background pollution levels, taking account of meteorological conditions, to affect local air quality. The model has been run for the completion year, using background data and vehicle emission rates for 2024 as inputs. For the verification assessment (referred to later in this Chapter), background data and vehicle emission rates for 2019 have been used. Pollutant concentrations have been modelled at locations representative of nearby sensitive receptors.

16.5.17 Full details of the dispersion modelling study, including the road traffic data used in the assessment, are presented in **Appendix 16.2.**

Model Uncertainty

16.5.18 Analyses of historical monitoring data by Defra (Defra, 2011) identified a disparity between actual measured NO_X and NO_2 concentrations and the expected decline associated with emission forecasts, which form the basis of air quality modelling as described above. In February 2020, Air Quality Consultants published a report on Performance of Defra's Emission Factor Toolkit 2013-2019 (Air Quality Consultants, 2020). The report concluded that recent analysis of recent NO_X measurements provides evidence that vehicle controls are working, and as a result, the Emission Factor Toolkit (EFT) is now reflecting the rate of observed reductions. This air quality assessment has been undertaken using the latest emission factors published by Defra in the EFT version 11, which accounts for the uptake of low carbon passenger cars and light good vehicles with electric and hybrid electric propulsion systems.

Background Pollutant Concentrations

16.5.19 To estimate the total concentrations due to the contribution of any other nearby sources of pollution, background pollutant concentrations need to be added to the modelled concentrations. Full details of the background pollution data used within the air quality assessment are included in **Appendix 16.2.**

Model Verification

16.5.20 Model Verification is the process of comparing monitored and modelled pollutant concentrations and, if necessary, adjusting the modelled results to reflect actual measured concentrations, to improve the accuracy of the modelling results. The model has been verified by comparing the predicted annual mean NO_2 concentrations for the baseline year of 2019, with the 2019 results from two CDC diffusion tubes, Aylesbury Road and Howes Lane. Modelled concentrations have then been adjusted accordingly. The verification and adjustment process is described in detail in **Appendix 16.2.**

UK Air Quality Strategy Objectives

16.5.21 The Government has established a set of air quality standards and objectives to protect human health. The current AQS was published in July 2007 (Defra, 2007) and sets out the objectives for Local Planning Authorities (LPA) in undertaking their LAQM duties. The AQS objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Box 1.1 of Defra's Local Air Quality Management Technical Guidance (LAQM.TG16) (LAQM, 2018) explains the locations where these objectives apply.

16.5.22 The European Union (EU) also sets Limit Values (European Parliament, 2008) for NO_2, PM_{10} and $PM_{2.5}$, which have been adopted by the UK (Defra, 2010). The Limit Value concentrations for NO_2, PM_{10} and $PM_{2.}$are the same numerical levels as the AQS Objectives but the target dates differ. Achievement of the Limit Values is a national obligation rather than a local obligation. In the UK, only monitoring and modelling carried out by Defra and Central Government meets the specification required to assess compliance with the Limit Values. Further, Defra and Central Government does not recognise local authority monitoring or local

modelling studies when determining the likelihood of the Limit Values being exceeded. As such the Limit Values have not been considered further in this Chapter.

16.5.23 The UK AQS objectives in relation to air pollutants relevant to this assessment are summarised in **Table 16.3.**

Table 16.14: National Air Quality Strategy Objectives

Pollutant	Objective		Date by Which Objective is to be Met
	Concentration	Measured As	
Nitrogen Dioxide (NO_2)	200µg/m^3		1 hour mean not to be exceeded more than 18 times per year
	40µg/m^3		Annual Mean
Particulate Matter (PM_{10}) (a)	50µg/m^3		24 hour mean not to be exceeded more than 35 times per year
	40µg/m^3		Annual Mean
Particulate Matter ($PM_{2.5}$) (b)	Target of 15% reduction in concentrations at urban background locations		Annual Mean
	25µg/m^3		Annual Mean

Notes: (a) Particulate matter with a mean aerodynamic diameter less than 10 microns (or micrometres – µm) (b) Particulate matter with a mean aerodynamic diameter less than 2.5 microns

Significance Criteria

Demolition and Construction

Dust emissions

16.5.24 The potential demolition and construction effects on local air quality were based on professional judgment and with reference to the criteria ser out in IAQM's construction dust guidance. Appropriate mitigation that would be implemented to minimise any adverse effects on air quality were also considered. Details of the assessor's experience and competence to undertake the dust assessment is provided in **Appendix 16.2.**

16.5.25 The assessment of risk of dust effects arising from the likely construction activities, as identified by the IAQM's construction dust guidance, is based on the magnitude of potential dust emissions and the sensitivity of the area. The risk category matrix for construction activity types, taken from the IAQM guidance, are presented in **Table 16.4** to **Table 16.7.**

Table 16.15: Risk Category form Demolition Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 16.16: Risk Category form Earthworks Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 16.17: Risk Category form Construction Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 16.18: Risk Category form Trackout Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

16.5.26 The risk category determined for each of the construction activity types is used to define the risk impact and identify appropriate Site-specific mitigation measures that should be applied. The IAQM guidance recommends that significance is only assigned to the effect after considering mitigation because it assumes that all actions to avoid or reduce the environmental effects are an inherent part of the Proposed Development, and that, in the case of demolition/construction, mitigation measures (secured through planning conditions, legal requirements or required by regulations) would ensure that likely significant adverse residual effects would not occur.

16.5.27 **Figure 16.1**: Construction Phase Assessment Bands shows the area surrounding the Site, where sensitive receptors could be affected during the construction phase.

Construction Vehicle Exhaust Emissions

16.5.28 The significance of the effects of construction vehicle exhaust emissions on air quality references peak construction traffic movements and is based on professional judgment.

Complete and Operational Development

16.5.29 The EPUK/IAQM guidance provides an approach to assigning the magnitude of changes because of a development as a proportion of a relevant assessment level, followed by an

examination of this change in the context of the new total concentration and its relationship with the assessment criterion to provide a description of the impact at selected receptor locations.

16.5.30 **Table 16.8** presents the IAQM framework for describing the impacts (the change in concentration of an air pollutant) at individual receptors. The term Air Quality Assessment Level (AQAL) is used to include air quality objectives or limit values, where these exist.

Table 16.19: Impact Descriptors for Individual Receptors for Annual Mean Objective

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Minor	Moderate
76-94% of AQAL	Negligible	Minor	Moderate	Moderate
95-102% of AQAL	Minor	Moderate	Moderate	Major
103-109% of AQAL	Moderate	Moderate	Major	Major
110% or more of AQAL	Moderate	Major	Major	Major

Note: AQAL may be an air quality objective, EU limit value, or an Environment Agency 'Environmental Assessment Level (EAL)'
The table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers. Changes of 0% (i.e. less than 0.5%) are described as negligible.
The table is only to be used with annual mean concentrations

16.5.31 The approach set out in the EPUK / IAQM guidance provides a method for describing the impact magnitude at individual receptors only. The guidance outlines that this change may have an effect on the receptor depending on the severity of the impact and other factors that may need to be considered. The assessment framework for describing impacts can be used as a starting point to make a judgement on significance of effect. However, whilst there may be 'slight', 'moderate' or 'major' impacts described at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances.

16.5.32 Following the approach to assessing significance outlined in the EPUK/IAQM guidance, the significance of likely residual effects of the completed Proposed Development on air quality has been established through professional judgement and the consideration of the following factors:

- The geographical extent (local, district or regional) of effects;
- Their duration (temporary or long term);
- Their reversibility (reversible or permanent);
- The magnitude of changes in pollution concentrations;
- The exceedance of standards (e.g., AQS objectives); and
- Changes in pollutant exposure.

Limitations

16.5.33 For the purposes of the dust emissions assessment, it has been assumed that construction works would be carried out at the boundary of the Site throughout the construction phase. This approach would provide a worst-case assessment.

16.5.34 Currently there is no methodology to assess and determine the impact of a development against the EU limit Values. In addition, compliance with the EU Limit Values is the UK Government's responsibility given that national measures (such as vehicle scrappage schemes and increased diesel fuel prices) would be required to meet compliance. As such the effect of the Proposed Development has been assessed against the UK AQS objectives rather than the EU Limit Values. To demonstrate that the Proposed Development would have a positive influence on air quality, a summary of measures which are likely to lead to a benefit to air quality have been outlined.

16.5.35 There is no standard or recognised methodology to predict the reduction in pollutant concentrations from all air quality mitigation measures or measures likely to have a positive impact on local air quality (such as cycle spaces, electric charging points, sustainable transport options, green infrastructure etc) as these measures are either based on holistic behavioural changes and/or there is a lack of real-world quantifiable data (in $\mu g/m^3$).

16.5.36 The Energy and Sustainability Statement states combustion processes could have negative impacts on the health of residents and occupiers of the Proposed Development, and these factors would be considered in determining the site-wide heat network strategy for the Proposed Development. If proposed at the detailed design stage, the combustion plant would be designed to meet relevant guidance. Additionally, any emissions would be released from a vent or stack in a location and at a height that provides adequate dispersion and ensure there would not be any risk of impact at relevant receptors. A planning condition attached to the granting of any planning permission would ensure that any emissions generated by combustion plant, if proposed, would not result in an impact to local air quality. Combustion plant has therefore not been considered further in this report.

16.6 Baseline Conditions

The Surrounding Area

Cherwell District Council Review and Assessment of Air Quality

16.6.1 In 2011 CDC declared No.1 AQMA AQMA) No.1 for exceedances of the annual mean and 1-hour NO_2 AQS objectives. In 2014 CDC declared two more AQMA's (AQMA No.2 and AQMA No.3) for exceedances of the annual mean NO_2 AQS objective. In 2015, a further AQMA was declared (AQMA No.4) for exceedances of the annual mean NO_2 objective.

16.6.2 The coverage and locations of the CDC AQMA's in relation to the Site are:

- AQMA No.4, incorporating sections of Kings End, Queens Avenue, Field Street, St Johns Street, Bicester, located approximately 3.1km north-west of the Site;
- AQMA No.3, incorporating an area of Bicester Road, Kidlington to the north of its junction with Water Eaton Lane, located approximately 10km south-west of the Site;
- AQMA No.2, incorporating sections of Oxford Road, Bloxham Road, South Bar, High Street, Horsefair, North Bar, Warwick Road and Southam Road, Banbury, located approximately 24km north-west of the Site; and
- AQMA No.1, incorporating Hennef Way Between the junctions with Ermont Way and Concord Avenue, located approximately 25km north-west of the Site.

16.6.3 The Site is therefore not located within an AQMA.

Cherwell District Council Local Monitoring

16.6.4 2020 and 2021 monitoring data was not considered representative of normal baseline conditions due to the COVID-19 pandemic and has therefore not been considered further. 2019 data is considered a conservative estimate of current baseline air quality conditions.

16.6.5 In 2019, CDC did not currently undertake monitoring at any automatic monitors. In 2019, CDC undertook NO_2 monitoring at 42 diffusion tubes. The results for the diffusion tubes located within approximately 3km of the Site are presented in **Table 16.9.**

Table 16.20: Measured Concentrations at the CDC's Diffusion Tubes within 3km from the Site

Site	Classification	Distance to centre of Site (km)	Annual mean NO_2 Concentration (µg/m^3)			
			2016	2017	2018	2019
Aylesbury Rd 2014	Roadside	1.4	30.0	28.8	29.5	26.7
London Road 2016	Roadside	2.3	29.1	26.3	25.7	23.6
A41, Oxford Road (Premier Inn)	Kerbside	2.6	-	-	-	25.5
Market Square 2014	Roadside	2.6	25.4	24.7	23.1	22.2
Kings End South	Roadside	2.8	**46.0**	**41.7**	**41.9**	**41.5**
Queens Avenue (x3)	Kerbside	2.9	40.5	39.5	35.0	35.6
St Johns 2014	Kerbside	3.0	36.2	37.8	38.6	31.7

Notes: Data from Cherwell District Council 2020 Air Quality Status Report, June 2020.
Exceedances of the AQS Objectives shown in **bold** text.

16.6.6 The monitoring results in **Table 16.9** indicate the annual mean NO_2 AQS objective were met at all monitoring locations in 2019 with the exception of the Kings End South. **Table 16.9** illustrates annual mean NO_2 concentrations have reduced from 2016 to 2019 at all seven diffusion tubes closest to the Site.

Baseline Evolution

16.6.7 Notwithstanding the implementation, or otherwise, of the Proposed Development, future air quality baseline conditions are expected to improve as there will likely be a reduction in vehicle emission rates and background concentrations following the uptake of less polluting vehicles.

16.6.8 The future baseline year of 2024 would have residential receptors in vicinity of the Site, which will form part of the larger Graven Hill Village Masterplan (2011 Permission).

16.6.9 The completed Employment Access Road (EAR) is included in the baseline evolution scenario.

Sensitive Receptors

16.6.10 A number of sensitive receptors have been identified, following the baseline review, as set out in **Table 16.10.**

Table 16.21: Sensitive Receptors

ID	Receptor	Description	Grid Reference		Height Above Ground (m)
1	15 Blackburn Walk	Residential	459384	224033	0
2	Wretchwick End Cottages	Residential	459830	220648	0
3	Kestrel Way	Residential	459159	221277	0
4	24 Ravencroft	Residential	459435	221356	0
5	Whitelands Academy	School	457324	221429	0
6	Bicester Park Homes	Residential	457062	220874	0
7	32 Church Lane	Residential	455872	219729	0
8	**Masterplan (2011 Permission):** Residential South-east	Residential	459521	220271	0
9	**Masterplan (2011 Permission):** Residential North-east	Residential	459607	220646	0

16.6.11 The location of the selected receptors assessed are presented in Figure 16.2.

16.7 Primary Mitigation

16.7.1 The Proposed Development includes embedded mitigation and design features that would mitigate impacts of the Proposed Development.

16.7.2 During construction, the outline Construction Environmental Management Plan (CEMP) forms part of the planning application outlining mitigation measures to prevent the release of dust to the atmosphere and/or being deposited on nearby receptors. Such measures would be likely to include:

- Implementing measures to reduce dust emissions during transport (for example, sheeting the sides of vehicles carrying fine material);
- All mobile plant shall be maintained to prevent or minimise the release of dark smoke from vehicles exhaust;
- Using dust screens and covers and the appropriate location of dusty materials storage;
- Fires to be prohibited on the Site;
- Restricting drop heights onto lorries;
- Assessing the risk of dust annoyance from the operations throughout the working day, taking account of wind speed, direction, and surface moisture levels. The Contractor should ensure that the level of dust suppression implemented on site is adequate for the prevailing conditions. The assessment should be recorded as part of documented site management procedures;
- Spraying of internal un-surfaced temporary roadways with water at regular intervals as conditions require. The frequency of road spraying will be recorded as part of documented site management procedures;

- Keeping surfaced roads and the public road during all ground works clean and swept at regular intervals using a road sweeper as conditions require. The frequency of road sweeping shall be recorded as part of documented site management procedures;
- Adherence to the speed limits. All vehicles operating within the Site on un-surfaced roads shall not exceed 15mph to minimise the re-suspension of dust;
- Where dust from the operations are likely to cause significant adverse impacts at sensitive receptors, then the operation(s) should be suspended until the dust emissions have been abated. The time and duration of suspension of working and the reason shall be recorded.
- Review of the dust management plan on a monthly basis during the construction project and the outcome of the review to be recorded as part of the documented site management procedures.
- No bonfires shall be permitted on the Site.

16.8 Assessment of Likely Effects

Demolition and Construction

16.8.1 The nearest high sensitivity human receptors during demolition and construction would be residential properties, within the Graven Hill Village Masterplan (2011 Permission).

16.8.2 As there will be existing receptors within 350m of the boundary of the Site and within 50m of the routes that would be used by construction vehicles on the public highway within 500m of the Site entrance, it is considered a detailed assessment is required to determine the likely dust effects, as recommended by the IAQM guidance on construction dust. Results of this assessment are provided for each main activity (demolition, earthworks, construction and trackout) below.

Dust Emissions

Demolition

16.8.3 The total volume of buildings to be demolished is estimated to exceed 50,000m^3. Based on the volume of demolition and considering the other criteria in Step 2 of the IAQM guidance, the potential dust emissions during demolition activities would be of large magnitude.

Earthworks

16.8.4 The area of the Site is 305,330m^2. Based on the size and considering the other criteria in Step 2 of the IAQM guidance, the potential dust emissions during earthworks activities would be of large magnitude.

Construction

16.8.5 It is estimated that the total volume of buildings to be constructed would exceed 100,000m^3. Based on the size and considering the other criteria in Step 2 of the IAQM guidance, the potential dust emissions during construction activities would be of large magnitude.

Trackout

16.8.6 It is estimated that there would be between 10-50 HDV outward movements in any one day. Therefore, considering the criteria in Step 2 of the IAQM guidance, the potential for dust emissions due to trackout activities would be of medium magnitude.

Sensitivity of the Area

16.8.7 The sensitivity of the area to each main activity set out above has been assessed based on the number and distance of the nearest sensitive receptors to the activity, and the sensitivity of these receptors to dust soiling and human health.

Sensitivities of People to Dust Soiling Effects

16.8.8 There are estimated to be between 10 and 100 high sensitive receptors within 20 m of the Site with the Graven Hill Village Masterplan (2011 Permission) in place. On this basis (as set out in Table 2 of the IAQM guidance) the sensitivity of the area to dust soiling is considered to be high.

Sensitivities of People to Health Effects of PM_{10}

16.8.9 The 2019 PM_{10} concentration from the Defra background maps was 14.8µg/m^3. On this basis (as set out in Table 3 of the IAQM guidance) the sensitivity of the area to human health is considered to be low.

Dust Risk Summary

16.8.10 The dust risk categories, based on the potential magnitude of dust emissions and the sensitivity of the area to dust, are presented in **Table 16.11.**

Table 16.22: Summary of Risk

Potential Effect	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High Risk	High Risk	High Risk	Medium Risk
Human Health	Medium Risk	Low Risk	Low Risk	Low Risk

16.8.11 The Site is considered high risk due to dust soiling impacts. With the implementation of primary mitigation however, the effect of dust nuisance on existing sensitive receptors would be **Negligible (Not Significant)**

Construction Vehicle Emissions

16.8.12 Vehicles entering and egressing the Site from / to the local road network during the construction phase would have the potential to increase local air pollutant concentrations, particularly in respect of NO_2 and particulate matter (both PM_{10} and $PM_{2.5}$).

16.8.13 Based on the size of the Site, the Proposed Development and using professional judgement, it is estimated that the number of Heavy Duty Vehicles (HDV) could range between 10 and 50 HDV trips in any one day. Following review of the surrounding area, emissions from construction traffic would be relatively small compared to existing road traffic emissions on the A41 (Link 5 had 18,735 daily vehicles including 7.6% HDVs in 2019, see **Appendix 16.2** for detail).

16.8.14 Considering the current traffic movements and the background pollutant concentrations around the Site, the likely effect of construction vehicles entering and egressing the Site to air quality would be **Negligible (Not Significant)** during the construction period.

Complete and Operational Development

16.8.15 Emissions on local air quality associated with the completed and operational Proposed Development would likely result from changes to the associated traffic flows. **Table 16.12** and **Table 16.13** present the predicted concentrations at relevant existing and proposed Graven Hill Village Masterplan (2011 Permission) receptors nearest to road traffic.

Nitrogen Dioxide (NO_2)

Table 16.23: NO_2 Results of the ADMS Modelling at Sensitive Receptors

ID	Receptor	NO_2 Annual Mean (µg/m^3)			
		2019 Baseline	2024 Without Development	2024 With Development	2024 Change
1	15 Blackburn Walk	19.4	15.5	15.6	0.1
2	Wretchwick End Cottages	23.5	18.0	18.1	0.1
3	Kestrel Way	23.0	17.4	17.7	0.3
4	24 Ravencroft	21.9	16.7	16.9	0.2
5	Whitelands Academy	18.5	14.3	14.4	0.1
6	Bicester Park Homes	20.5	15.8	15.9	0.1
7	32 Church Lane	20.1	14.5	14.5	0.0
8	**Masterplan (2011 Permission):** Residential South-east	-	-	14.2	-
9	**Masterplan (2011 Permission):** Residential North-east	-	-	14.4	-

16.8.16 The results in **Table 16.12** indicate the 2019 annual mean NO_2 concentrations are predicted to meet the annual mean NO_2 objective at all existing sensitive receptors modelled. The highest concentration of 23.5µg/m^3 is predicted at Receptor 2 (Wretchwick End Cottages).

16.8.17 As discussed in **Appendix 16.2**, the 1-hour mean NO_2 AQS objective is unlikely to be exceeded at a roadside location where the annual mean NO_2 concentration is less than 60µg/m^3. As shown in **Table 16.12**, the predicted NO_2 annual mean concentrations in 2019 were below 60µg/m^3 at all the existing locations and as such it is likely the 1-hour mean objective is met at these locations.

16.8.18 **Table 16.12** shows that both 'without' and 'with' the Proposed Development, all existing receptors are also predicted to be below the NO_2 annual mean objective in 2024. Therefore, the 1-hour mean objective is also predicted to be met at all existing receptor locations.

16.8.19 Using the impact descriptors outlined in **Table 16.8**, the Proposed Development is predicted to result in a 'negligible' impact on annual mean NO_2 concentrations at all existing receptors. The effect of the Proposed Development on NO_2 concentrations would be **Negligible (Not Significant).**

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

Table 16.24: PM_{10} and $PM_{2.5}$ Results of the ADMS Modelling at Sensitive Receptors

ID	PM_{10} Annual Mean (µg/m³)				PM_{10} - Number of Days >50µg/m³				$PM_{2.5}$ Annual Mean (µg/m³)			
	2019 Baseline	2024 Without Development	2024 With Development	2024 Change	2019 Baseline	2024 Without Development	2024 With Development	2024 Change	2019 Baseline	2024 Without Development	2024 With Development	2024 Change
1	14.6	13.7	13.7	0.0	0	0	0	0	9.8	9.1	9.1	0.0
2	16.2	15.3	15.4	0.1	0	0	0	0	10.1	9.4	9.4	0.0
3	15.8	14.8	14.9	0.1	0	0	0	0	10.4	9.6	9.7	0.1
4	15.7	14.7	14.8	0.1	0	0	0	0	10.4	9.6	9.6	0.0
5	16.9	16.0	16.0	0.0	0	0	0	0	10.4	9.6	9.6	0.0
6	16.3	15.4	15.4	0.0	0	0	0	0	9.8	9.1	9.1	0.0
7	17.8	16.9	16.9	0.0	1	0	0	0	11.0	10.2	10.2	0.0
8	-	-	14.0	-	-	-	0	-	-	-	8.7	-
9	-	-	14.1	-	-	-	0	-	-	-	8.7	-

16.8.20 As shown in **Table 16.13,** the annual mean concentrations of PM_{10} are predicted to be below the objective of 40µg/m³ in 2019 and in 2024 both 'without' and 'with' the Development at all receptor locations considered. The maximum predicted concentration in all scenarios assessed is 17.8µg/m³ at Receptor 7 (32 Church Lane) in 2019.

16.8.21 Using the impact descriptors outlined in **Table 16.8,** the Proposed Development is predicted to result in a 'negligible' impact on annual mean PM_{10} concentrations at all sensitive receptors.

16.8.22 The results in **Table 16.13** indicate that in 2019 and in 2024 both 'without' and 'with' the Proposed Development, all receptor locations are predicted to be below the 24-hour mean PM_{10} objective value of no more than 35 days exceeding 50µg/m³.

16.8.23 The results in **Table 16.13** indicate that in 2019 and in 2024 both 'without' and 'with' the Proposed Development, all receptor locations are predicted to be below the annual mean $PM_{2.5}$ objective value of 25µg/m³.

16.8.24 Using the impact descriptors outlined in **Table 16.8,** the Proposed Development is predicted to result in a 'negligible' impact on annual mean $PM_{2.5}$ concentrations at all existing receptors.

16.8.25 Using professional judgement, based on the severity of the impact and the concentrations predicted at the sensitive receptors, it is considered the effect of the Proposed Development on PM_{10} and $PM_{2.5}$ concentrations would be **Negligible (Not Significant)**.

16.9 Secondary Mitigation and Enhancement

Demolition and Construction

Dust Emissions

16.9.1 With the implementation of primary mitigation, the effect of nuisance dust on existing sensitive receptors would be **Negligible (Not Significant)**. Accordingly, secondary mitigation is not required.

Construction Vehicle Emissions

16.9.2 The effect of construction vehicle emissions on existing receptors would be **Negligible (Not Significant).** Accordingly, secondary mitigation is not required.

Complete and Operational Development

16.9.3 It has been demonstrated the likely effect of the completed and operational Proposed Development on local air quality at all existing receptors would be **Negligible (Not Significant).** Accordingly, secondary mitigation would not be required.

16.10 Residual Effects

Demolition and Construction

Dust Emissions

16.10.1 The mitigation measures detailed above are routinely and successfully applied to construction projects throughout the UK and are proven to reduce significantly the potential for adverse nuisance dust effects associated with the various stages of the construction work. Therefore, it is considered that residual effect of fugitive emissions would be **Negligible (Not Significant).**

Construction Vehicle Exhaust Emissions

16.10.2 The likely residual effect of construction vehicles entering and egressing the Site to air quality would be **Negligible (Not Significant).**

Operational Phase

16.10.3 As detailed above in 'Assessment of Likely Effects' there would be no predicted exceedences of the relevant AQS objectives for the Complete and Operational Development. Mitigation is therefore not required and the likely residual effects on local air quality at existing receptors would remain **Negligible (Not Significant).**

16.11 Monitoring

16.11.1 The residual effects of dust emissions residual effects would be **Negligible (Not Significant).** However, a range of measures to minimise or prevent dust and reduce exhaust emissions generated from construction activities, inclusive of monitoring, would be set out in the CEMP and implemented throughout the demolition and construction phase.

16.11.2 CDC would continue to monitor local air quality using diffusion tubes across their administrative boundary.

16.12 Comparison to 2014 Planning Permission

Demolition and Construction

16.12.1 The conclusions of the demolition and construction assessment would be the same for the Proposed Development and the 2014 Planning Permission.

Operational Phase

16.12.2 Emissions on local air quality associated with the completed and operational Proposed Development would likely result from changes to the associated traffic flows assessed for the 2014 Planning Permission). **Table 16.14** and **Table 16.15** present the predicted change in concentrations at relevant existing receptors nearest to road traffic from the 2014 Planning Permission to the Proposed Development.

Nitrogen Dioxide (NO_2)

Table 16.25: Comparison of NO_2 Results for Extant Permission (2014 Planning Permission) and Proposed Development

ID	Receptor	NO_2 Annual Mean (µg/m^3)		
		2024 Extant Permission	2024 With Development	2024 Change
1	15 Blackburn Walk	15.6	15.6	0.0
2	Wretchwick End Cottages	18.1	18.1	0.0
3	Kestrel Way	17.7	17.7	0.0
4	24 Ravencroft	16.9	16.9	0.0
5	Whitelands Academy	14.4	14.4	0.0
6	Bicester Park Homes	15.9	15.9	0.0
7	32 Church Lane	14.5	14.5	0.0
8	**Masterplan (2011 Permission):** Residential South-east	14.2	14.2	0.0
9	**Masterplan (2011 Permission):** Residential North-east	14.4	14.4	0.0

16.12.3 The results in **Table 16.14** indicate the Proposed Development would not result in any increases in annual mean NO_2 concentrations when compared to the 2014 Planning Permission.

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

Table 16.26: Comparison of PM_{10} and $PM_{2.5}$ Results for Extant Permission (2014 Planning Permission) and Proposed Development

ID	PM_{10} Annual Mean (µg/m³)			PM_{10} - Number of Days >50µg/m³			$PM_{2.5}$ Annual Mean (µg/m³)		
	2024 Extant Permission	2024 With Development	2024 Change	2024 Extant Permission	2024 With Development	2024 Change	2024 Extant Permission	2024 With Development	2024 Change
1	13.7	13.7	0.0	0	0	0	9.1	9.1	0.0
2	15.4	15.4	0.0	0	0	0	9.4	9.4	0.0
3	14.9	14.9	0.0	0	0	0	9.7	9.7	0.0
4	14.8	14.8	0.0	0	0	0	9.6	9.6	0.0
5	16.0	16.0	0.0	0	0	0	9.6	9.6	0.0
6	15.4	15.4	0.0	0	0	0	9.1	9.1	0.0
7	16.9	16.9	0.0	0	0	0	10.2	10.2	0.0
8	14.0	14.0	0.0	0	0	0	8.7	8.7	0.0
9	14.1	14.1	0.0	0	0	0	8.7	8.7	0.0

16.12.4 The results in **Table 16.15** indicate the Proposed Development would not result in any increases in PM_{10} concentrations or annual mean $PM_{2.5}$ concentrations when compared to the Extant Permission.

16.13 Cumulative Effects Assessment

Demolition and Construction

Dust Emissions

16.13.1 The main effects on air quality during the demolition and construction phases of developments are relation to dust. Owing to the typical dispersal and deposition rates of dust with distance with their source, without mitigation. Cumulative dust effects could be an issue for cumulative schemes within 700m of the Site, and only if they were to be constructed at the same time.

16.13.2 All four cumulative schemes identified are within 700m. These are:

- Graven Hill Site C, D and E including subsequent reserved matters applications and amendments, excluding the employment element which forms the basis of the Site;
- New Dedicated Employment Access Road (EAR) adjacent to the northern boundary of the Site;
- Wretchwick Way, Bicester; and

- Symmetry Park, Morrell Way, Bicester, Unit C

16.13.3 The Proposed Development and all cumulative schemes would implement their own CEMP (or equivalent) to mitigate potential dust nuisance to an appropriate and acceptable level to CDC. Accordingly, it is unlikely that there would be any cumulative dust effects and it is therefore considered the potential cumulative effects from dust emissions would be **Negligible (Not significant)**.

Construction Vehicle Exhaust Emissions

16.13.4 Exhaust emissions from the combined construction traffic of the Proposed Development and the cumulative schemes could also give rise to cumulative residual effects on local air quality. However, this would depend upon the extent to which the implementation of the Proposed Development and the cumulative schemes overlap. Even in the worst-case scenario, whereby the demolition and construction phases of the cumulative schemes overlap with the demolition and construction of the Proposed Development and use the same haulage routes, the proportion of additional construction traffic on the local road network would still be small compared to existing traffic. As with the Proposed Development it is assumed that appropriate traffic management measures would be implemented to reduce traffic disruption as much as is practically possible. The likely residual effect is therefore considered to be **Negligible (Not Significant)**.

Complete and Operational Development

16.13.5 The effect of the complete and operational Proposed Development on air quality is mainly linked to associated changes in traffic flows. The traffic data supplied by the Applicant's transport consultant and considered in the assessment already accounts for the cumulative schemes. Therefore, it is considered that the likely cumulative residual effects of traffic emissions upon local air quality from the Proposed Development and cumulative schemes would be equivalent to those presented earlier in the report, which are **Negligible (Not Significant)**.

16.14 References

- AEA, 2020. "NOx to NO2 Calculator, Version 8.1".
- Air Quality Consultants, 2020. "Performance of Defra's Emission Factor Toolkit 2013 – 2019".
- Cambridge Environmental Research Consultants, 2020. "ADMS-Roads, Version 5.0.1.3".
- Cherwell District Council, 2015. "The Cherwell Local Plan 2011-2031".
- Cherwell District Council, 2017. "Cherwell District Council, Air Quality Action Plan 2017-2020".
- Cherwell District Council, 2020. "2020 Air Quality Annual Status Report (ASR)".
- DCLG, 2014. "Planning Practice Guidance: Air Quality (ID 32)".
- Defra, 2007. "The Air Quality Strategy for England, Scotland, Wales and Northern Ireland".
- Defra, 2010. "The Air Quality Standards (England) Regulations".
- Defra, 2011. "Trends on NOx and NO2 Emissions and Ambient Measurements in the UK (Defra, 2010)".
- Defra, 2016. "London Local Air Quality Management (LLAQM) Policy guidance 2016 (LLAQM.PG (16))".

- Defra, 2017. “Improving Air Quality in the UK: Tackling nitrogen dioxide in our towns and cities. Draft UK Air Quality Plan for Tackling Nitrogen Dioxide (Consultation Document)”.
- Defra, 2019. “Clean Air Strategy”.
- Department for Communities and Local Government (DCLG), 2021. “National Planning Policy Framework”.
- Environmental Protection UK & Institute of Air Quality Management (EPUK and IAQM), 2017. “Land-Use Planning & Development Control: Planning for Air Quality”.
- European Parliament, Council of the European Union, 2008. “Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe”.
- Institute of Air Quality Management (IAQM), 2014. “Guidance on the Assessment of dust from demolition and construction”.
- Local Air Quality Management, 2018. “Technical Guidance (TG16)”.
- Office of the Deputy Prime Minister (ODPM), 1995. “The Environment Act”.
- The High Court of Justice, 2018. “The Queen on the application of ClientEarth -v- Secretary of State for the Environment, Food and Rural Affairs”.

17 Socio-Economics

17.1 Introduction

17.1.1 This chapter of the ES has been prepared by Quod and assesses the likely significant effects of the Proposed Development with respect to socio-economics. Mitigation measures are identified, where appropriate, to avoid, reduce or offset any significant adverse effects identified and/or enhance likely beneficial effects. The nature and significance of the likely residual effects are reported.

17.2 Policy Context, Legislation, Guidance and Standards

National

17.2.1 The National Planning Policy Framework (NPPF) (MHCLG, 2021) is the key national planning policy relevant to the Proposed Development. The policy framework set out within Chapter 6 'Building a strong, competitive economy' is of most relevance to this assessment.

Regional

17.2.2 The Oxfordshire Plan 2050 is an emerging policy document at the regional level. The Regulation 19 plan is in preparation. Draft Policy Option 22 encourages the creation of jobs and draft Policy Option 23 supports appropriate growth of economic assets.

Local

17.2.3 The Cherwell Local Plan (Cherwell District Council, 2015) is the local planning policy of relevance to the Proposed Development, specifically Policy SLE 1: Employment Development, which supports new employment development subject to meeting criteria set out within the policy.

17.2.4 Cherwell District Council's (CDC) Developer Contributions SPD (CDC, 2018) is also of relevance to the Proposed Development, as it seeks to secure an Employment, Skills and Training Plan (ESTP) as part of S106 agreements, to cover both construction and end-use phases.

17.3 Consultation

17.3.1 The applicant has held pre-application discussions with the local planning authority (CDC) in March 2022 and informally agreed that socio-economics should form part of the environmental impact assessment. There has been no specific pre-application consultation held with the planning officer on the topic of socio-economics.

17.4 Scope of Assessment

Not Significant Effects

17.4.1 The assessment will not consider the loss of employment on Site. There are a number of B8 use buildings on the Site, but they are vacant, and there is no employment or business activity currently on Site.

17.4.2 The application of additionality is unnecessary for a scheme of this scale and nature. The additionality guide provides details on how to assess the impact of intervention on economic or housing growth. The guide is more appropriately applied to measure the impact where public

money is being spent e.g. green book appraisal style, and is not very meaningful when applied at the project level of developments such as this.

17.4.3 The guide sets out that the additional impact due to an intervention should be proportionate to the nature and scale of the project. It is often not feasible to undertake detailed assessment of additionality for smaller projects / interventions. Therefore, it is not appropriate to assess additionality as part of this ES. The emphasis of the assessment should be on the direct employment effects through accommodating new roles on-site.

17.4.4 The assessment will consider the direct employment effects. These are most relevant to the environmental impacts associated with delivering the Proposed Development in this location.

Likely Significant Effects

17.4.5 The scope of this chapter is limited to an assessment of the aspects where there is considered to be a potential for likely significant effects. Given the scale and nature of the Proposed Development, the assessment has considered direct employment effects during the construction and operations phase.

17.4.6 The Proposed Development would also generate economic benefits for the local economy through indirect spending by employees. Shops and services within the surrounding area may capture some of this spending, including in the nearby settlement of Bicester and the Graven Hill development.

17.5 Methodology

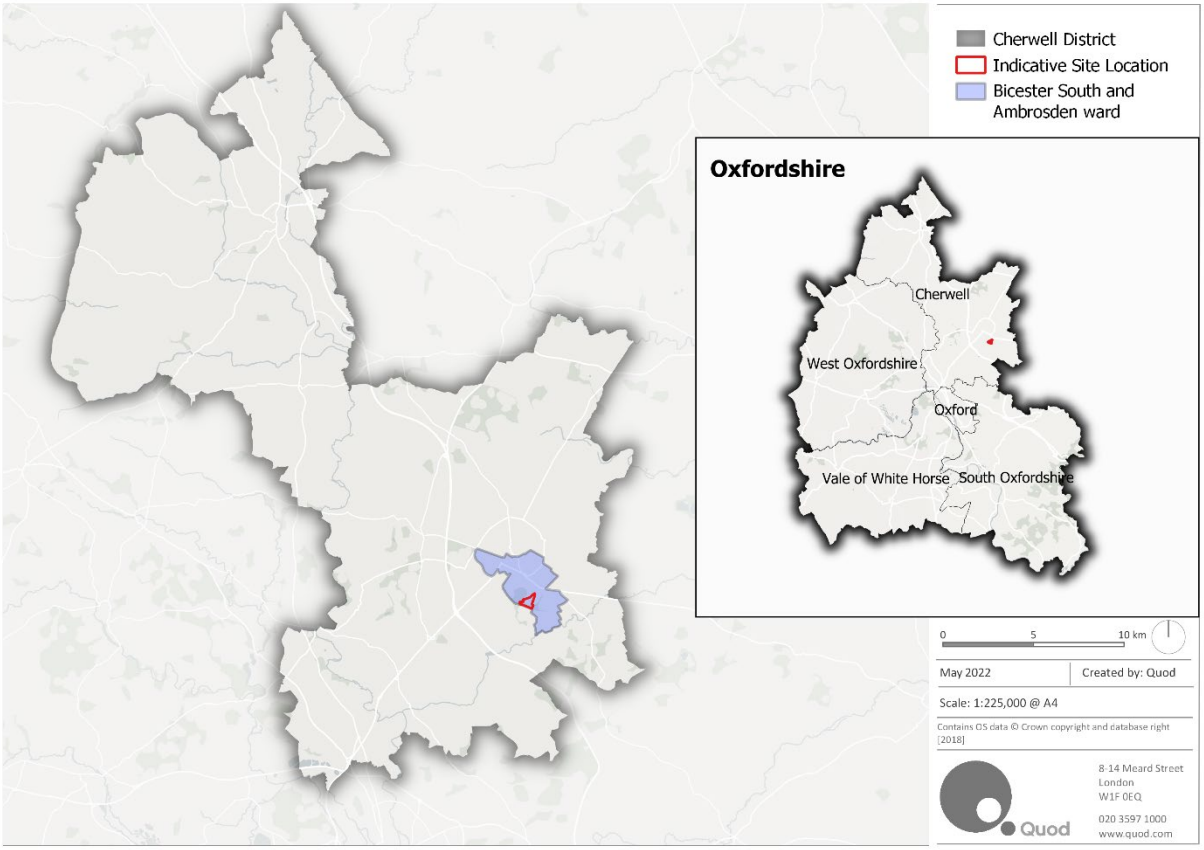
Study Area

17.5.1 The baseline assessment considered the current socio-economic conditions at different spatial levels (i.e. study area) as defined below:

- Site level – the Site as defined by the red line boundary;
- Local Area – Bicester South and Ambrosden ward (where data is available at this spatial level);
- District – Cherwell;
- County – Oxfordshire; and
- Region – South East of England.

17.5.2 A map showing the spatial areas is provided at **Figure 17.1**

Figure 17.1 Context Plan



Baseline Data Collection

17.5.3 Baseline socio-economic conditions were established through analysis of nationally recognised research and survey information and datasets including:

- Census data (ONS, 2011);
- ONS Mid-Year Population Estimates (ONS, 2021);
- Business Register and Employment Survey (BRES) data (ONS, 2021);
- Indices of Multiple Deprivation (IMD) (MHCLG, 2019); and
- Claimant Count Data (ONS, 2022).

17.5.4 Ward boundaries in Cherwell were revised in 2016, therefore Census 2011 data presented for the Local Area is based on a best-fit of 2011 Census output areas to the new ward area[2].

Assessment

Construction

Construction Employment

17.5.5 Construction-related employment expected to be generated by the Proposed Development was assessed using the Construction Industry Training Board (CITB) Labour Forecasting Tool

[2] Output areas: E01028425, E01028463, E01028464, E01028465, E01028468, E01028424.

(CITB, 2022). This tool computes an estimated average construction roles over the duration of the construction phase based on the total construction cost, duration / start-finish dates, location and type of construction.

Completed Development

Employment Creation

17.5.6 The Proposed Development will provide logistics and warehousing floorspace under Use Class B8.

17.5.7 Employment was calculated by applying the standard job density ratios from the Homes and Communities Agency (HCA) Employment Density Guide (HCA, 2015) ('HCA Guidance'). For the Use Class B8 floorspace, the HCA Guidance prescribes a density of one employee per every 69-95 sqm GEA of floorspace. Quod's research and experience demonstrates that more recent examples of B8 Use buildings have a job density of one employee per every 45 sqm GEA of floorspace. Therefore, the job density of one employee per every 45-95 sqm GEA was applied.

Employee Spending

17.5.8 The level of spending likely to take place once the Proposed Development was completed is assessed. The assessment is of local expenditure made by employees working at the completed development. The level of expenditure is estimated based on survey information carried out by research agency Loudhouse for Visa Europe, identifying an average spend per day of £13.10 per employee (Visa Europe, 2014).

Cumulative Effects

17.5.9 The assessment of cumulative effects considered the two cumulative schemes identified in Chapter 6: Assessment Method by reviewing available planning application documents. Where detailed information was unavailable, professional judgement has been applied on approach to consideration of schemes.

Determining Effect Significance

17.5.10 There is no published or formalised technical guidance or criteria available relating to the assessment of socio-economic effects. Professional judgement and experience were therefore drawn upon to assess the significant of the Proposed Development's socio-economic effects. The approach to assessing significance is detailed in paragraph 17.5.14.

Sensitivity of Receptor

17.5.11 Receptor sensitivity is largely driven by the baseline conditions and the extent to which socio-economic issues are present in the area. Receptor sensitivity was based on the scale set out in **Table 17.1.**

Table 17.1 Receptor Sensitivity Descriptors

Value (Sensitivity)	Descriptor
High	Above average levels of socio-economic deprivation, unemployment or low access to employment
Medium	Average levels of socio-economic deprivation, unemployment or access to employment

Low	Below average levels of socio-economic deprivation, unemployment or high access to employment

Magnitude of Impact

17.5.12 The assessment of the magnitude of the socio-economic impact is quantified where possible and an objective qualitative assessment is made in the cases where quantification is not possible. The magnitude of impact was based on the scale set out in **Table 17.2.**

Table 17.2 Magnitude of Impact Descriptors

Impact Magnitude	Descriptor
High	Substantial change to one or more of the socio-economic receptors
Medium	Noticeable change to one or more of the socio-economic receptors
Low	Hardly perceptible change to one or more of the socio-economic receptors
Negligible	No perceptible change to one or more of the socio-economic receptors

Defining the Effect

17.5.13 The nature of an effect has been determined by reference to the following criteria:

- Adverse – a negative effect to a socio-economic resource or receptor; and
- Beneficial – an advantageous effect to a socio-economic resource or receptor.

Effect Scale

17.5.14 The scale of the effect has been determined by reference to the following criteria:

- Negligible – effects generally beneath levels of perception;
- Minor – slight or highly localised effects;
- Moderate – limited effects; and
- Major – considerable effect.

Assessing Significance

17.5.15 The significance of effects has been determined by reference to the criteria set out in **Table 17.3**. Determining the scale of socio-economic effects requires professional judgement therefore the determination includes a degree of flexibility when considering the magnitude of an impact in the context of the sensitivity of the receptor. Effects classified as moderate or major in scale are considered 'significant'. Effects classified as minor or negligible are considered 'not significant'.

Table 17.3: Matrix to Determine Significance of Effect

Receptor Sensitivity	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Major	Major or Moderate	Moderate or Minor	Negligible
Medium	Major or Moderate	Moderate	Minor or Negligible	Negligible
Low	Moderate or Minor	Minor or Negligible	Negligible	Negligible

Geographic Extent of Effect

17.5.16 The geographic extent of the effect is identified i.e. site, Local, District, County or Regional level.

Effect Duration

17.5.17 Effects generated as a result of the construction works (i.e those that last for a set period of time) are classed as 'temporary'. Effects that result from the completed and operational Proposed Development are classed as 'permanent' effects.

Direct and Indirect Effects

17.5.18 The assessment also identifies whether the effect is 'direct' (i.e. resulting without any intervening factors) or 'indirect' or 'secondary' (i.e. not directly caused or resulting from something else).

Limitations

17.5.19 As with any dataset, baseline data will change over time. The most recent published data sources were used in this assessment; but in some instances, this data may not be up-to-date. For example, the latest Census data available is from 2011. This is an inevitable limitation that is not considered to adversely impact the validity of the assessment undertaken to identify the likely significant socio-economic effects.

17.5.20 As set out in Chapter 4: Construction and Site Management, there is a degree of uncertainty as to the length of the construction phase as contractors have not yet been appointed. To assess a worst-case scenario, an estimate of 22 months was assumed for the duration. This assumption takes the longest duration for the demolition and construction period which is estimated to take between 19 to 22 months.

17.5.21 The assessment has not considered the potential effects of the Covid-19 pandemic on the baseline and changes to working practices in the construction industry. It is not known at this time what the long-term effects on construction practices, the labour market, or the economy may be. The latest available baseline data predates the Covid-19 pandemic in some cases, and in other cases have been collected during the pandemic. In each case, a consistent time period is used when comparing across spatial scales, in order to show relative effects. This is considered robust since it is not skewed by recent (and potentially temporary) health and economic anomalies.

17.5.22 Similarly, construction employment was estimated based on the CITB labour forecasting tool which uses historical data to make forward projections. The total construction employment generated through the construction of the Proposed Development is likely to remain unchanged, but the number of construction workers allowed on-Site at any given time may be affected by

restrictions intended to control the spread of Covid-19. This could affect the profile of construction employment but is unlikely to affect the average reported in this assessment.

17.5.23 The application is made for 104,008 sqm (GIA) of Use Class B8 floorspace. The application is made in outline, and the exact quantum of development will be determined through reserved matter applications. For the purposes of this socio-economic assessment, Completed Development employment creation has been assessed based on the maximum floor area with further illustration provided by the indicative masterplan.

17.6 Baseline Conditions

The Site

17.6.1 The Site is adjacent to the A41, which connects to Junction 9 of the M40 motorway. It is in Bicester South and Ambrosden ward. The existing site accommodates vacant warehousing units and brownfield land.

17.6.2 The Site is within the Graven Hill masterplan area and to the north-west of the Site is the area of ongoing development of the residential portion of the masterplan. This is an infill extension to Bicester, the settlement to the north-west of the Site. To the south and east of the Site is predominantly agricultural land. The settlement of Ambrosden is approximately 1 km to the east of the Site.

The Surrounding Area

Demographic Baseline

17.6.3 At the time of the 2011 Census, the total resident population of the Local Area was 11,108, which is 8% of the total number of Cherwell residents as a whole, at 141,868 residents.

17.6.4 Mid-year ONS population estimates indicate that the population of the Local Area in 2020 had increased by 39% since the 2011 Census. This is a faster growth rate than that at other spatial scales: the population has grown 7% in Cherwell, Oxfordshire and the South-East over the same period. -

17.6.5 In the Local Area, 23% of the population was 15 years old or younger at the time of the 2011 Census, which was slightly higher than across the Cherwell, Oxfordshire and the South-East. Only 10% of the population was aged 65 and over, which is much lower than the rate in the South-East (17%), Oxfordshire (16%) and Cherwell (15%).

17.6.6 A summary of the demographic baseline is presented at **Table 17.4.**

Table 17.4 Demographic Baseline Summary

Measure	Local Area	Cherwell	Oxfordshire	South East
Total Population				
2011 Census	11,108	141,868	653,798	8,634,750
2020 Mid-year Population Estimates	15,444	151,846	696,880	9,217,265

2011 to 2020 Population Growth	39%	7%	7%	7%
Age Profile: 2011 Census				
0-15	23%	20%	19%	19%
16-64	67%	65%	65%	64%
65+	10%	15%	16%	17%

Source: 2011 Census, ONS Mid -year Population Estimates, 2020. Note: figures may not sum due to rounding

Economic and Employment Baseline

17.6.7 At the time of the 2011 Census, there were 7,942 working age residents living in the Local Area. Levels of economic activity in the Local Area were higher than at other spatial scales, with 83% of economically active residents in employment, compared to 76% in Cherwell and 72-73% in Oxfordshire and the South-East.

17.6.8 The unemployment rate in the Local Area was comparatively low, at 2.7% at the time of the 2011 Census, which was almost half the rate of unemployment in the South-East, and lower than the rate in Cherwell and Oxfordshire at 3.7-3.8%.

17.6.9 The claimant count provides more recent data on the proportion of working age residents claiming unemployment-related benefits in an area. It is calculated for residents aged 16-64 years. This is currently considered an experimental data set. Claimant count does not capture all unemployment in an area such as those unwilling or unable to claim Universal Credit or Job Seekers Allowance.

17.6.10 The most recent claimant count data available is for February 2022, which indicates a claimant count rate of 2.4% in Cherwell, which is in line with the average across Oxfordshire, and slightly lower than the average across the South-East at 3.3%. Data from before the start of the widespread impacts of Covid-19 in the UK, from January 2020, shows that the claimant count rate was lower at 1.5% in Cherwell and Oxfordshire, and 2% in the South-East.

Qualifications of Residents

17.6.11 At the time of the 2011 Census the Local Area had a comparatively low rate of residents with no qualifications, at 13%, compared to the average across Cherwell at 20%. While 33% of Local Area residents had Level 4 qualifications or above, this is lower than the rate across Oxfordshire, at 36%.

17.6.12 The proportion of residents in professional, managerial or technical jobs at the time of the 2011 Census was 52%, in line with the Oxfordshire average of 48%. However, the rate in Cherwell was lower, at only 41%.

Business Structure

17.6.13 According to BRES data, there are 10,720 jobs in the Local Area, which is 13% of jobs in Cherwell. The largest sector is retail, accounting for 38% of jobs. This is notably higher than the average proportion of employment in retail at other spatial scales, representing 9-12%.

17.6.14 The second largest sector in the Local Area is health, accounting for 16% of jobs. This is a slightly higher rate of employment in health compared to other spatial levels. Accommodation

and food services, the third largest employment sector in the Local Area, provides 10% of jobs, which is slightly higher than the average of 6-7% at other spatial scales.

17.6.15 Construction jobs comprise 2% of Local Area employment, which is lower than the rate in Cherwell (5%) and Oxfordshire and the South-East (both 6%).

17.6.16 A summary of the economic and employment baseline is presented in **Table 17.5.**

Table 17.5 Economic and Employment Baseline

Measure	Local Area	Cherwell	Oxfordshire	South East
Working Age Residents				
Total number of working age residents	7,942	103,269	482,238	6,274,341
Economy Activity (residents)				
Economically active	83%	76%	73%	72%
Unemployed	2.7%	3.8%	3.7%	4.8%
Claimant Count (residents)				
Claimants January 2020	110	1,355 (1.5%)	6,415 (1.5%)	115,330 (2.0%)
Claimants February 2022	165	2,335 (2.4%)	10,765 (2.4%)	193,095 (3.3%)
Highest Level of Qualification (residents)				
No formal qualifications	13%	20%	17%	19%
GCSE and A Level equivalent	48%	47%	42%	46%
Further and higher education	33%	28%	36%	30%
Other qualifications	6%	5%	5%	5%
Occupation (residents)				
Management / professional / technical	52%	41%	48%	45%
Admin / skilled trades / services	27%	31%	29%	32%

Measure	Local Area	Cherwell	Oxfordshire	South East
Sales / process / elementary	20%	27%	22%	23%
Key Employment Sectors (jobs)				
Total Jobs	10,720	85,650	384,500	4,232,000
Retail	38%	12%	9%	9%
Health	16%	10%	12%	13%
Accommodation & Food Services	10%	6%	7%	7%
Business Administration & Support Services	8%	13%	8%	8%

Source: 2011 Census, and Employment Survey, 2020. Note: figures may not sum due to rounding ONS Claimant Count, January 2020 & May 2021; Business Register

Indices of Multiple Deprivation

17.6.17 The Government's Indices of Multiple Deprivation measures deprivation by combining several indicators, including social, economic and housing factors, to give a single deprivation score for each small area (Lower-layer Super Output Area (LSOA)) across England. These factors are divided into seven domains as listed below:

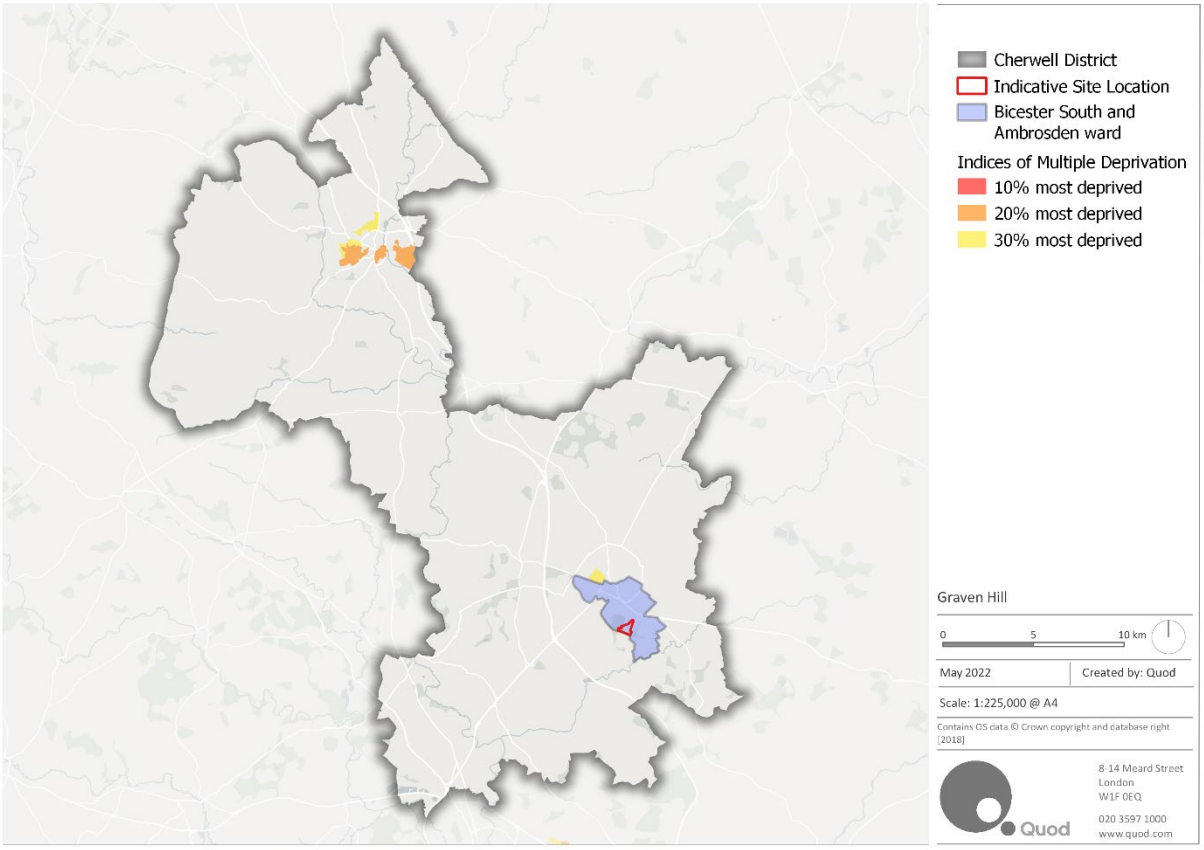
- Income deprivation;
- Employment deprivation;
- Education, skills and training deprivation;
- Health deprivation and disability;
- Crime;
- Barriers to housing and services; and
- Living environment deprivation.

17.6.18 All areas across England are then ranked relative to one another according to their level of deprivation. Figure 17.2 presents the relative levels of deprivation within Cherwell, with areas shaded yellow in the top 20% most deprived in England.

17.6.19 As shown in Figure 17.2, Cherwell does not suffer from high levels of deprivation, although there are some areas in Banbury, a settlement to the north-west of the Site in the north of the District, which falls within the top 20% most deprived in England.

17.6.20 When analysing the individual domains of the overall IMD, education is a significant factor within the deprivation scores, with some parts of Bicester and the surrounding area falling within the top 10-20% most deprived areas in relation to education.

Figure 17.2 Indices of Multiple Deprivation (2019)



Baseline Evolution

17.6.21 **Table 17.6** sets out the projected population for 2024, and growth over the 2020 base presented in the Baseline Conditions – Demographic Baseline Summary (**Table 17.4**). This shows that the District population is projected to increase by 2.9% by 2024, which is a higher rate of growth than that anticipated for Oxfordshire, at 1.8%, and the South East, at 2.0%.

Table 17.6 Future Baseline Population

Measure	Cherwell	Oxfordshire	South East
Population Growth			
2024 Total Population (growth over 2020 base)	156,219 (2.9%)	709,180 (1.8%)	9,405,255 (2.0%)

Source: ONS, 2024-based population projections

Receptors and Receptor Sensitivity

17.6.22 **Table 17.7** sets out the receptors and their receptor sensitivity.

Table 17.7 Receptors and Receptor Sensitivity

Receptor	Receptor Sensitivity	Rationale
The construction	Low (Regional)	The construction industry is assessed at a regional level due to the mobility of the construction workforce. There are 253,500 construction workers in the South East.

industry and its employees		
Local economy	Low (Local)	Accessibility of employment is key to the success of a population. Baseline analysis shows that the Local Area has a high proportion of economically active residents; a low average unemployment rate and a low claimant count rate, compared to other spatial scales. The Local Area has 10,720 jobs which represents 13% of jobs in Cherwell.

17.7 Primary Mitigation

17.7.1 The ways in which adverse socio-economic effects have been or will be avoided, prevented, reduced or offset through design and/or management of the Proposed Development are outlined below. These are inherent to the scheme and as such are taken into account as part of the assessment of potential effects. Proposed enhancements are also described where relevant.

Construction

17.7.2 Measures will be implemented to minimise disruption to neighbouring areas, as outlined in Chapter 4: Construction and Site Management, including:

- A Construction Environmental Management Plan (CEMP) will be implemented that will seek to avoid, minimise or mitigate disruption effects during construction on local residents and the community;
- A Construction Logistics Plan (CLP) or Traffic Management Plan (TMP) will seek to minimise disruption to existing transport routes;

17.7.3 Noise, vibration and dust will be controlled through measures including acoustic screens, dust minimisation measures and the setting of vibration limits. Whilst these interventions do not relate directly to socio-economics, they indirectly affect socio-economic receptors, including the local businesses, employees, the local economy, and community. The management of the construction site to minimise transport, noise, dust, air pollution and safety risks will help to reduce potential amenity and disruption effects on receptors in the Local Area.

Completed Development

17.7.4 There is no primary mitigation of relevance to the operational phase of the socio-economic assessment.

17.8 Assessment of Likely Effects

Construction Employment

17.8.1 The construction of the Proposed Development would generate employment within the construction industry. It is estimated that construction of the Proposed Development as a whole, including demolition works, is estimated to take approximately 22 months (worst case). Labour demands will vary between different phases as trades move on and off the site.

17.8.2 Overall, it is estimated that there would be an approximate average of 450 construction roles over the duration of the anticipated 22 month demolition and construction period. At its peak, when most trades are engaged, the demolition and construction period could support up to 640 jobs.

17.8.3 Construction employment is highly mobile and therefore assessment of the construction works is best considered at the Regional level. In a regional context (there are 253,500 jobs in the construction sector in the South East), the impacts of the construction jobs associated with the Proposed Development is considered to be 'low' magnitude of impacts on the construction industry (low sensitivity). Whilst additional employment generated within the construction sector will be beneficial, the scale and significance of the effect in the case of the Proposed Development would be direct, temporary (medium-term), and **Negligible (not significant)** at Regional level.

Completed Development

Employment

17.8.4 The Proposed Development will deliver up to 104,008 sqm GIA of warehousing and logistics floorspace (Use Class B8). The assessment of employment creation is based on the maximum floor area with further illustration provided by the indicative masterplan.

17.8.5 The number of jobs that would be accommodated by this floorspace has been calculated by applying job density ratios based on the HCA Guidance and Quod's own research, as set out in the Assessment Methodology (Para. 17.5.6).

17.8.6 As set out in the Baseline Conditions section, unemployment is relatively low in the Local Area as well as the Cherwell as a whole (low sensitivity receptor). As of February 2022, there were 165 residents claiming unemployment related benefits in the Local Area.

17.8.7 Whilst the Proposed Development will provide new employment opportunities for working age residents living in the local settlements surrounding the Site, for a scheme of this scale and nature the workforce will be drawn from a wider catchment – therefore the effect of employment has been assessed at a District level.

17.8.8 The Proposed Development as a whole is likely to accommodate between 1,150 and 2,430 FTE jobs. Assessed against the lower range of employment (worst-case scenario), the effect of 1,150 jobs (high magnitude impact) on the local and district economy (low sensitivity receptor) would be direct, permanent, **Moderate Beneficial** at the Local level and District level (**significant**), and **Negligible (not significant)** at all other spatial scales.

Employee Spending

17.8.9 The new floorspace created in the Proposed Development is estimated to generate between £3,314,000 and £7,003,000 annually in additional spending by employees. The spending impact of the Proposed Development (medium magnitude impact) on the local and district economy (low sensitivity receptor) would be indirect, permanent, **Moderate Beneficial (Significant)** at the Local level and District level, and **Negligible (not significant)** at all other spatial scales.

17.9 Secondary Mitigation and Enhancement

Construction

17.9.1 The likely effects of the Proposed Development as a whole during the construction phase are considered to be negligible beneficial (not significant). As no adverse effects are identified, no additional mitigation is required beyond the construction mitigation set out in the CEMP].

17.9.2 Cherwell's Developer Contributions SPD (2018) requires an Employment, Skills and Training Plan (ESTP) to be secured by Section 106 Agreement. The ESTP would enhance beneficial effects of employment creation, through helping local people better access job opportunities arising from the Proposed Development, including through providing construction apprenticeships.

Completed Development

17.9.3 The likely effects of the Proposed Development once completed and operational are considered to be **Moderate Beneficial (Significant).** As no adverse effects are identified, no additional mitigation is required beyond that inherent to the scheme.

17.9.4 CDC's Developer Contributions SPD (2018) require an Employment, Skills and Training Plan (ESTP) to be secured by Section 106 Agreement. The ESTP would enhance the beneficial effects of employment creation, through helping local people gain better access to job opportunities arising from the Proposed Development.

17.10 Residual Effects

Construction

17.10.1 All residual effects remain as stated for the potential effects. As a result, and under the EIA Regulations, no monitoring is considered necessary.

Completed Development

17.10.2 All residual effects remain as stated for the potential effects. As a result, and under the EIA Regulations, no monitoring is considered necessary.

17.11 Monitoring

17.11.1 Significant residual adverse effects are not considered likely to occur, so no monitoring is considered necessary.

17.12 Cumulative Effects Assessment

17.12.1 The assessment of cumulative effects considers all the cumulative schemes identified in Chapter 6: Assessment Method and Scope of the ES.

Demolition and Construction

17.12.2 The Proposed Development, together with the cumulative schemes identified in **Appendix 6.1,** would be expected to generate employment opportunities during construction. However, it is not possible to make a quantitative assessment of this level of employment. Variance in methodologies between projects for calculating construction jobs means that inaccuracies would arise from summing available figures. In addition, construction projects do not always occur concurrently due to differences in commencement date, programme length and potential stalling of projects. Fluctuation in the intensity of labour demand on construction sites can also enable contractors to move around between sites. Therefore, the employment generated through the construction of the cumulative schemes may not occur at the same time in a cumulative manner.

17.12.3 Given the size and mobility of the regional construction labour market, it is not expected that the cumulative schemes would generate any adverse effects with respect to socio-economics. All effects are likely to be **Negligible** or **Beneficial (Not Significant).**

Completed Development

Employment Creation

17.12.4 The cumulative effects on employment have been assessed by reviewing the planning applications relating to the cumulative schemes. Information on employment generation in the

application documentation has been used to inform the assessment. Should the identified cumulative schemes come forward, they would generate up to approximately 1,300 gross FTE jobs (high magnitude impact).

17.12.5 Considered alongside the Proposed Development, the cumulative effect of these schemes on employment (low sensitivity at the local level) is considered to be direct, permanent, **Moderate Beneficial** at the Local level and District level (**Significant**), and **Negligible (Not Significant)** at all other spatial scales.

Additional Spending

17.12.6 The new jobs to be delivered by the cumulative schemes alongside the Proposed Development would generate additional spending. It is estimated that the additional employees would generate up to approximately £3,747,000 per annum in additional spending (medium magnitude impact). This would have a positive effect on the local and district economy (low sensitivity receptor) and the effect would be indirect, permanent, **Moderate Beneficial (Significant)** at the Local level and District level, and **Negligible (Not Significant)** at all other spatial scales.

17.13 Comparison to 2014 Planning Permission

17.13.1 Planning permission was granted for development for a masterplan at Graven Hill in 2014 (extant permission reference 11/01494/OUT). The masterplan included the redevelopment of this site, known as “D1 Site”. For the purposes of comparison, this is broadly the same area as the application site, D1 Site. A Socio-Economics chapter was provided as part of the Environmental Impact Assessment (EIA) in the Environmental Statement submitted in 2011.

17.13.2 The chapter assessed the effects on the local economy and local services. In the assessment of the local economy, the chapter assessed the creation of construction and operational employment, and labour supply effects.

17.13.3 It is not possible to compare the number of construction jobs forecast to be created by the 2014 Planning Permission with the forecast set out in this assessment. This is because the methodology used in the 2014 Planning Permission ES calculates the number of construction jobs for the whole masterplan scheme, and not specifically for D1 Site. It also does not provide information on intended phasing and start and end dates for the construction of the buildings at D1 Site. Therefore, a comparison in construction jobs forecasts in this ES Chapter with the forecast in the 2014 Planning Permission ES has not been made.

17.13.4 The level of detail in the socio-economics chapter is not sufficient to be able to replicate the methodology used to forecast the number of operational jobs at D1 Site. The methodology does not provide the requisite level of detail to allow the same methodology to be followed and undertaken.

17.13.5 As it is not possible to replicate the methodology used in the original assessment, the methodology set out in this chapter has been applied to the floorspace areas for D1 Site in the 2014 Planning Permission, in order to identify a comparison figure of the number of jobs.

17.13.6 Using this methodology, the 2014 Planning Permission for D1 site would create between 1,540 and 2,440 jobs across B1(a)(b)(c), B2, B8 use classes.

17.13.7 In comparison with the Proposed Development, the upper end of the forecast for the number of jobs created on site is similar, at 2,430 jobs. At the lower end, the forecast for the number of jobs created on site is less for the Proposed Development compared to the 2014 Planning Permission, at 1,150 jobs.

17.14 References

- Ministry of Housing, Communities and Local Government (MHCLG), 2021, "National Planning Policy Framework"
- Cherwell District Council, 2015 "The Cherwell Local Plan 2011 to 2031"
- Cherwell District Council, 2018 "Developer Contributions Supplementary Planning Document"
- Office for National Statistics, 2011, "Census"
- Office for National Statistics, 2021, "Population Estimates – Mid 2020"
- Office for National Statistics, 2021, "Business Register and Employment Survey"
- MHCLG, 2019, "Indices of Multiple Deprivation"
- Office for National Statistics, 2022, "Claimant Count"
- Construction Industry Training Board (CITB), 2021, "Labour Forecasting Tool" (Accessed online by subscription: www.labourforecastingtool.com).
- Homes and Communities Agency, 2015, "Employment Density Guide"
- Visa Europe, 2014, "UK Working Day Spending Report" (adjusted for inflation according to the Bank of England)

18 Impact Interactions

18.1 Introduction

18.1.1 Significant environmental effects can result from incremental changes caused by the interactions between effects resulting from a development.

18.1.2 The direct and indirect effects of the Proposed Development have been assessed within the relevant topic chapters of the ES prepared by the competent experts identified in **Section 1.7**. Environmental effects are assessed relative to the topic under consideration. This approach can lead to the interaction of effects being reported in separate chapters but the collective effect on the same environmental resource(s) not being considered.

18.1.3 In response this chapter, prepared by Stantec, summarises the principal findings of each topic chapter of the ES to enable assessment of the potential for impact interactions. This chapter also provides a summary of the likely significant environmental effects identified throughout the ES.

18.2 Methodology

18.2.1 The assessment methodology involves the identification of impact interactions associated with the demolition, construction and operational phases of the Proposed Development upon one or more environmental resources. This is undertaken using a qualitative appraisal process.

18.2.2 Receptors have been grouped where residual effects occur so that interactions can be identified on these receptor groups. Where more than one residual effects is identified for a receptor group, there is potential for impact interactions.

18.2.3 Residual effects have been identified in **Chapters 7 – 17** and a summary of mitigation measures is provided in **Section 18.3** and **Section 18.4** which has been used to help identify where there is a likelihood for potential significant adverse impact interactions to occur. This has been determined by considering the capacity of the receptors to accommodate the changes likely to occur as a result of the identified impacts.

18.3 Demolition and Construction Effects

18.3.1 As set out in **Chapter 4**, careful management of the demolition and construction works, including the implementation of an Outline Construction Environment Management Plan will reduce the adverse effects of demolition and construction. As a result, the majority of the demolition and construction effects identified in **Chapters 7 – 17** are not significant. The following sections discuss, in more detail, impact interactions and effects associated with the demolition and construction phase.

18.3.2 The residual effects during demolition and construction on Natural Resources relate to the following receptor groups:

- Ecological sites and habitats;
- Protected species; and
- Landscape character within the Site and surrounding area.

18.3.3 The residual effects during demolition and construction on Human Beings and Society relate to the following receptor groups:

- Heritage assets in the surrounding area;

- Human receptors surrounding the Site;
- Future Site users; and
- Economic sectors and community.

Natural Resources

Ecological Sites and Habitats

18.3.4 **Chapter 7** (Ecology and Nature Conservation) considers impacts to non-statutory designated sites through air and water-borne pollution. This is considered to be negligible to minor adverse which is not significant. The assessment also considered the impact on habitats, as a result of the loss of habitat, and the degradation of habitats through air and water-borne pollution. Effects are considered to be minor adverse which is not significant.

Protected Species

18.3.5 **Chapter 7** (Ecology and Nature Conservation) considers disturbance to wildlife and protected species (through lighting, noise and visual impacts). There are no significant adverse impacts, except for effects to breeding birds and bats through loss of nests and roosts, and impacts resulting from construction and demolition through noise and visual disturbance.

Landscape Character within the Site and Surrounding Area

18.3.6 **Chapter 10** (Landscape and Visual) considers the potential for impacts on landscape characteristics within the Site and external to the Site. Given the introduction of demolition and construction activity within the landscape, there is anticipated to be negligible to minor adverse effects that are not significant on the Oxfordshire and Cherwell District landscape character, and negligible to major adverse effects which are not significant to significant to the landscape characteristics of the Site as a result of the loss of habitat.

Human Beings and Society

Heritage Assets Surrounding the Site

18.3.7 **Chapter 9** (Historic Environment) identified residual adverse effects with slight significance on Wretchwick Farmhouse, former military uses within the wider Graven Hill site, and unknown archaeological remains.

Human Receptors Surrounding the Site

18.3.8 **Chapter 10** (Landscape and Visual) identifies local residents in the area may experience minor to moderate adverse effects in relation to views from the PRoW, MoD sports pitches adjacent to St Davids Barracks, and representative viewpoints as a result of the visibility of demolition and construction activities. These effects are not considered to be significant however.

18.3.9 **Chapter 14** (Noise and Vibration) identifies minor to moderate adverse effects at St Davids Barracks during demolition and construction. St Davids Barracks is an operational site operated by the MoD and people working at the Site are sensitive to noise. Taking account of the absolute predicted noise levels and guidance, residual noise effects are considered to be not significant.

Future Site Users

18.3.10 **Chapter 12** (Hydrogeology, Geology and Ground Conditions) identifies moderate adverse effects related to localised areas of contamination. These impacts would be mitigated through

the preparation and implementation of a Remediation Strategy secured via condition which would result in negligible effects.

18.4 Operational Effects

18.4.1 The residual effects during operation on Natural Resources relate to the following receptor groups:

- Ecological sites;
- Protected species;
- Landscape character within the Site and surrounding area; and
- Global atmosphere.

18.4.2 The residual effects during operation on Human Beings and Society relate to the following receptor groups:

- Heritage assets in the surrounding area;
- Human receptors surrounding the Site.

Natural Resources

Ecological Sites

18.4.3 **Chapter 8 (**Ecology and Nature Conservation) identifies negligible to minor adverse effects which are not significant to non-statutory designated sites as a result of air and water-borne pollution at the operational stage.

Protected Species

18.4.4 **Chapter 8** (Ecology and Nature Conservation) identified that there would be negligible to minor adverse effects that are not significant on Great Crested Newts, Reptiles and Badgers. It is anticipated that there would be negligible to minor beneficial effects to Breeding Birds and Bats.

Landscape Character within the Site and Surrounding Area

18.4.5 **Chapter 10** (Landscape and Visual) identifies that there would be minor adverse effects that are not significant to the Oxfordshire and Cherwell District as a result of the introduction of new built form. Effects on the landscape character of the Site are anticipated to be major adverse (significant) to neutral (not significant) changing to minor beneficial over time.

Global Atmosphere

18.4.6 **Chapter 15** (Climate Change) identifies minor adverse effects that are not significant as a result of the carbon emissions generated during operation through energy use and transportation.

Human Beings and Society

Heritage Assets in the Surrounding Area

18.4.7 **Chapter 9** (Historic Environment) identified negligible adverse effects that have a slight significance on the setting of Wretchwick Farmhouse.

Human Residents Surrounding the Site

18.4.8 **Chapter 10** (Landscape and Visual) identifies major effects that are significant on people involved in recreational activities for users of the MoD sports pitches adjacent to St Davids Barracks in the worst case/maximum design scenario. For other views from human receptors, effects are anticipated to be minor adverse to moderate adverse which is not significant.

18.5 Conclusion

18.5.1 During demolition and construction significant temporary adverse residual effects have been identified in relation to landscape and visual resources, and temporary adverse residual effects of a slight significance have been identified in relation to historic environment.

18.5.2 During operation, significant landscape and visual effects to the landscape characteristics of the Site have been identified, however these will change from major adverse to minor beneficial over time. Additionally, effects with a slight significance in relation to historic environment have been identified during operation.

18.5.3 **Section 18.3** identifies that there would be construction related impact interactions to human receptors surrounding the site during demolition and construction. This is as a result of residual temporary moderate adverse effects related to visual impacts to users of the MoD sports pitches adjacent to St Davids Barracks and residual temporary negligible to minor adverse effects related to noise at St Davids Barracks. The level of combined effects to human receptors at St David's Barracks is considered to be temporary Minor to Moderate adverse.

18.5.4 **Section 18.4** does not identify any more than minor impact interactions to natural resources or human beings and society during operation.

19 Schedule of Mitigation and Monitoring

19.1 Introduction

19.1.1 This chapter provides a consolidated schedule of mitigation and enhancement measures proposed to avoid significant adverse effects and enhance beneficial effects from the Proposed Development. The chapter is provided to assist CDC with its obligation under the 2017 EIA Regulations to secure, as appropriate, mitigation measures and monitoring arrangements relating to significant adverse effects within any planning permission decision notice granted for the Proposed Development.

19.2 Proposed Mitigation

19.2.1 **Table 19.1** details all mitigation and enhancement measures committed to by the Applicant for the demolition and construction phase of the Proposed Development. **Table 19.2** details mitigation for the operational phases of the Proposed Development.

19.2.2 A summary of the nature of each measure and compliance mechanism is provided, together with a cross-reference to the relevant technical assessment section of this ES where further details of the required measure are set out. It is considered that most mitigation measures can be secured through conditions attached to any planning permission granted for the Proposed Development.

19.3 Proposed Monitoring

19.3.1 Part 1(2) of the EIA Regulations defines a 'monitoring measure' as a "*provision requiring the monitoring of any significant adverse effects on the environment of Proposed Development including any measures contained in— (a) a condition imposed on the grant of planning permission; or (b) a planning obligation".*

19.3.2 As required by the EIA Regulations, this chapter sets out any monitoring proposed during the demolition and construction (**Table 19.1**) and operation of the Proposed Development (**Table 19.2**), as identified in the relevant topic chapters.

Table 19.1: Summary of Proposed Mitigation and Proposed Monitoring During Demolition and Construction

Chapter Reference	Primary (inherent) Tertiary (inexorable) Mitigation	Secondary (foreseeable) Mitigation	Proposed Monitoring	Potential Compliance Mechanism (s)
Chapter 8: Ecology and Nature Conservation	Implementation of measures in the Outline CEMP. Controlled hours of work. An Ecological Clerk of Works (ECoW) will be employed to oversee key elements of enabling works and construction and would provide ecological advice and supervision for all relevant mitigation measures and monitoring. 'Toolbox Talks' conducted by ECoW to help workers understand how to minimise the occurrence of unpredictable/sudden bursts of noise. During construction, principles such as avoidance of night-time lighting and avoiding positioning near sensitive receptors.	Detailed CEMP for each phase of the Proposed Development. Construction Traffic Management Plan Employment of an Ecological Clerk of Works for advice and supervision of all relevant mitigation measures.	Ecological Clerk of Works	Planning Condition
Chapter 9: Historic Environment		Detailed CEMP for each phase of the Proposed Development Programme of archaeological investigation and/or mitigation. The scope of any investigation/mitigation may need to be undertaken as staged approach, starting with a programme of archaeological evaluation (i.e. trial trenching) to confirm the archaeological potential. This would inform an appropriate approach to any mitigation required either before or during the demolition or construction phase. The scope and methodology for archaeological investigations would be set out in a Written Scheme of Investigation and agreed with the OCCAS. This could	No monitoring is required as no adverse likely significant effects were identified.	Planning Condition

Chapter Reference	Primary (inherent) Tertiary (inexorable) Mitigation	Secondary (foreseeable) Mitigation	Proposed Monitoring	Potential Compliance Mechanism (s)
		be secured by CDC through a suitably worded planning condition.		
Chapter 10: Landscape and Visual		Detailed CEMP for each phase of the Proposed Development. Implementation of the Lighting Strategy. Landscape mitigation will be embedded in the overall project design and will be formulated to minimise potential landscape and visual impacts and maximise enhancement of landscape features, landscape character and biodiversity of the Site.	No monitoring is required as no adverse likely significant effects were identified.	Planning Condition
Chapter 11: Hydrology and Flood Risk	Implementation of measures in the Outline CEMP.	Detailed CEMP for each phase of the Proposed Development.	No monitoring is required as no adverse likely significant effects were identified.	Planning Condition
Chapter 12: Ground Conditions	Implementation of measures in the Outline CEMP.	Detailed CEMP for each phase of the Proposed Development. Standard construction protocols will be adopted during demolition and construction to protect workers from exposure to ground gases. These are in accordance with the requirements of CDM Regulations 2015.	No monitoring is required as no adverse likely significant effects were identified.	Planning Condition
Chapter 13: Traffic and Transport	It is known that highways capacity will be available on the local highway network for construction vehicles, as it has been designed for much larger volumes in the long term.	Preparation of a Construction Logistics Plan expected to be conditioned. The number of construction vehicles would be analysed when trip generation can be determined.	No monitoring is required as no adverse likely significant effects were identified.	Planning Condition
Chapter 14: Noise and Vibration	Implementation of measures in the Outline CEMP.	Detailed CEMP for each phase of the Proposed Development.	No monitoring required as the predicted levels are considered to be acceptable in the	Planning Condition

Chapter Reference	Primary (inherent) Tertiary (inexorable) Mitigation	Secondary (foreseeable) Mitigation	Proposed Monitoring	Potential Compliance Mechanism (s)
			context of BS5228 guidance.	
Chapter 15: Climate Change	Implementation of measures in the Outline CEMP	Detailed CEMP for each phase of the Proposed Development.	As part of the Outline CEMP and BREEAM assessment, the Contractor will be required to monitor material and waste transport to and from the site and record the total carbon emissions associated with this to help identify where savings can be made. The Contractor will also be required to monitor the site energy usage by all construction plant, equipment (mobile and fixed) and site accommodation to help identify where savings can be made.	Planning Condition
Chapter 16: Air Quality	Implementation of measures in the Outline CEMP.	Detailed CEMP for each phase of the Proposed Development..	No monitoring required, however a range of measures to minimise or prevent dust and reduce exhaust emissions generated from construction activities, inclusive of monitoring, would be set out in the detailed CEMP and implemented throughout the demolition and construction phase. CDC would continue to monitor local air quality using diffusion tubes across their administrative boundary.	Planning Condition

Chapter Reference	Primary (inherent) Tertiary (inexorable) Mitigation	Secondary (foreseeable) Mitigation	Proposed Monitoring	Potential Compliance Mechanism (s)
Chapter 17: Socio-Economics	Implementation of measures in the Outline CEMP.	Detailed CEMP for each phase of the Proposed Development.	No monitoring is required as no adverse likely significant effects were identified.	Planning Condition

Table 19.2: Summary of Proposed Further Mitigation and Proposed Monitoring During Operation

Chapter Reference	Primary and Tertiary Mitigation	Secondary Mitigation	Proposed Monitoring	Potential Compliance Mechanism (s)
Chapter 8: Ecology and Nature Conservation	Landscape mitigation has been embedded in the overall project design Parameter Plans Habitat Mitigation and Management Plan providing detailed methods on how new and retained habitats will be managed and maintained to optimise their value for biodiversity. Adherence to prepared Lighting Strategy. An operational drainage strategy has been prepared for the Site. The incorporation of appropriate and practicable SuDS mitigations measures in the built design.	Landscape Ecological Management Plan Habitat Mitigation and Management Plan	Future monitoring is likely to be required associated with the Natural England mitigation licences (see Paragraph 8.12.1) to be agreed with Statutory Consultees. A monitoring programme will be implemented following the completion of construction and habitat creation. The monitoring proposals would tie in with the duration of the Landscape Ecological Management Plan. Monitoring survey reports will be produced following the detailed surveys, a copy of which will be provided to the local planning authority and the results of the monitoring will be reviewed against the habitat creation objectives. Further monitoring required for BNG purposes will be agreed with Statutory Consultees	Planning Condition
Chapter 9: Historic Environment	A programme of archaeological building recording has been undertaken in 2015 by Waterman (Waterman, 2015). There are no embedded mitigation measures for archaeology and built heritage assets within the design.	No secondary mitigation is required as no adverse likely significant effects were identified.	No monitoring is required as no adverse likely significant effects were identified.	Planning Condition
Chapter 10: Landscape and Visual	A Landscape Strategy would be adhered to as an integral part of the design and would be implemented as part of the proposals.	No secondary mitigation is required as no adverse likely significant effects were identified.	Landscape management would be required for a period of five years following completion of the development to ensure that the newly planted areas become well established and	Planning Condition

Chapter Reference	Primary and Tertiary Mitigation	Secondary Mitigation	Proposed Monitoring	Potential Compliance Mechanism (s)
	Design principles will include features to promote green infrastructure and support ecological habitats. A Landscape Environmental Management Plan (LEMP) will accompany the landscape proposals.		meet their landscape potential. Management would include the replacement of dead, dying or damaged stock or those that fail to establish satisfactorily. Pruning that would be beneficial for plant growth, form and plant health would be promoted. A LEMP would be submitted as part of a detailed application. This would be a 'live' document, to guide the maintenance and long-term management of the proposed landscape.	
Chapter 11: Hydrology and Flood Risk	Implementation of the Surface Water Drainage Strategy for the Proposed Development as detailed in the Graven Hill Site D1, Bicester Outline SuDS Strategy Report.	No secondary mitigation is required as no adverse likely significant effects were identified.	No monitoring is required as no adverse likely significant effects were identified.	Planning Condition
Chapter 12: Ground Conditions	A new surface water drainage network would be constructed as part of the Proposed Development design which would incorporate proprietary pollution interceptors. All plant and equipment will be located on areas of hardstanding and within bunds. Operational management systems and procedures will include the use of accidental spill kits. An emergency pollution prevention plan will be prepared which will be adhered to in the event	No secondary mitigation is required.	No monitoring is required as no adverse likely significant effects were identified.	Planning Condition

Chapter Reference	Primary and Tertiary Mitigation	Secondary Mitigation	Proposed Monitoring	Potential Compliance Mechanism (s)
	of accidental leaks and spills. Where the handling / storage of hazardous substances is required as part of operations, this will be regulated under relevant legislation including COSHH.			
Chapter 13: Traffic and Transport	Primary mitigation includes the Employment Access Road, the upgrade to the Pioneer Roundabout, and other upgrades associated with this e.g. bus stops, and a new cycleway on the EAR.	Localised improvements such as the cycle crossings and routings within the Site will be additional mitigation as part of the new proposals.	As there are no significant residual effects, monitoring is not expected to be required. However, a Travel Plan (expected to be conditioned) will generally include monitoring of travel patterns as part of this.	Planning Condition
Chapter 14: Noise and Vibration	The units will be configured to screen noise from the service yard areas to the receptors.	No secondary mitigation is required as no adverse likely significant effects were identified.	No monitoring is required as no adverse likely significant effects were identified.	Planning Condition
Chapter 15: Climate Change	Measures incorporated to reduce the impact of transport associated with the development are detailed in The Interim Travel Plan (Alan Baxter Ltd, 2022). The Proposed Development will use the 'energy hierarchy' to reduce carbon emissions, as detailed in the Energy and Sustainability Statement (BWB, 2022). A Life Cycle Assessment will be undertaken to inform material selection to reduce the carbon footprint as far as possible at the detailed design stage. A Whole Life Carbon Assessment will then be undertaken of the final design to calculate the embodied carbon	No secondary mitigation is required as no adverse likely significant effects were identified.	No monitoring is required as no adverse likely significant effects were identified.	Planning Condition

Chapter Reference	Primary and Tertiary Mitigation	Secondary Mitigation	Proposed Monitoring	Potential Compliance Mechanism (s)
	footprint ($kgCO_{2eq}$) of the development. The building will be assessed under BREEAM and a minimum 'Excellent' rating targeted.			
Chapter 16: Air Quality	It is considered the effect of the Proposed Development on PM_{10} and $PM_{2.5}$ concentrations would be Negligible (Not Significant).	No secondary mitigation is required as no adverse likely significant effects were identified.	No monitoring is required as no adverse likely significant effects were identified.	N/A
Chapter 17: Socio-Economics	There is no primary mitigation of relevance to the operational phase of the socio-economic assessment.	No secondary mitigation is required as no adverse likely significant effects were identified.	No monitoring is required as no adverse likely significant effects were identified.	N/A

Appendix 1 Introduction

1.1 Site Location

1.2 Parameter Plans

1.3 Project Teams

Appendix 3 The Proposed Development

3.1 Illustrative Masterplan

Appendix 4 Demolition, Construction and Site Management

4.1 Outline Construction Environment Management Plan

Appendix 6 Assessment Method

6.1 Cumulative Development

Appendix 8 Ecology

8.1 Ecological Assessment

Appendix 9 Historic Environment

9.1 Historic Environment Desk Based Assessment

Appendix 10 Landscape and Visual

Appendix 11 Hydrology and Flood Risk

11.1 Flood Risk Report

11.2 SuDS Strategy

Appendix 12 Ground Condition

12.1 Ground Conditions Summary Report

Appendix 14 Noise and Vibration

Appendix 16 Air Quality

16.1 Figure 16.1 to 16.2: Construction Phase Assessment Bands and Construction Phase Assessment Bands

16.2 Air Quality Modelling