

Tritax Symmetry Limited

Symmetry Park, Ardley

Environmental Statement

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1 Environmental Statement for Symmetry Park, Ardley

1.1 Introduction

- 1.1.1 Tritax Symmetry Ardley Limited (the Applicant) has submitted a planning application to Cherwell District Council (CDC, the Council) seeking outline planning permission for the development of buildings on land either side of the B4100, to the east of the A43.
- 1.1.2 The proposal, known as Symmetry Park, Ardley, is for logistics use (Use Class B8), and ancillary office floorspace (Use Class E(g)(i)), an energy centre, HGV parking, and construction of new site access from the B4100. The planning application is in outline, with all detail reserved, including means of access.
- 1.1.3 The extent of planning application Site is edged red on Figure 1.1 below (see Figure 2.1 to view the full SGP drawing 131001-P2). In total, the area within the red line, including highway land, covers an area of 83.279 hectares (ha).



Figure 1.1 Site location (SGP dwg. SGP-XX-XX-DR-A-131001-P2)

- 1.1.4 The description of the Proposed Development is as follows:

Application for outline planning permission (all matters reserved except means of access (not internal roads) from B4100) for the erection of buildings comprising logistics (Use Class B8) and

ancillary offices (Use Class E(g)(i)) floorspace; Energy Centre, HGV parking, construction of new site access from the B4100; creation of internal roads and access routes; hard and soft landscaping; the construction of parking and servicing areas; substations and other associated infrastructure.

Environmental Impact Assessment

- 1.1.5 Environmental Impact Assessment (EIA) is a process that formally considers the construction and operational aspects of a proposal that may have significant effects on the environment. The findings of an EIA are described in a written report known as an Environmental Statement (ES). An ES provides environmental information about the scheme, including a description of the development, its predicted environmental effects and the measures proposed to mitigate adverse effects: information that is taken into account in the planning decision.
- 1.1.6 This document is the ES submitted with the planning application for the Proposed Development and sets out the results of the EIA undertaken. This ES is prepared in accordance with The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations'). A separate Non-Technical Summary (NTS) provides a summary of the main findings of the ES.
- 1.1.7 An EIA has been undertaken for the Proposed Development described in Chapter 3 and illustrated by the parameters shown on Figure 3.1. Subsequently, when the Council is deciding whether to grant planning permission, it has information of the environmental effects predicted, and take this into account in the decision-making process.

1.2 This Environmental Statement

- 1.2.1 This ES comprises the Main Report, Figures, supporting Appendices and a separate NTS. Following this introduction, the ES Main Report is arranged in the following chapters:

2. Site description
 3. Description of development
 4. Approach to assessment
 5. Transport
 6. Air quality
 7. Noise and vibration
 8. Biodiversity
 9. Landscape and visual effects (including Lighting)
 10. Heritage
 11. Hydrology, flood risk and drainage
 12. Socio-economic effects
 13. Climate change
 14. Ground conditions and soils
 15. Summary of mitigation, residual effects and interaction effects
- Glossary and abbreviations

- 1.2.2 Chapter 2 provides a description of the Site and its surroundings, and Chapter 3 explains the Proposed Development, which, with the parameters plan Figure 3.1, define the physical and

operational aspects assessed by the EIA. The alternative options considered during the site selection and scheme design process are also explained. Chapter 4 sets out the approach taken to the assessment.

- 1.2.3 Environmental issues assessed in the EIA process are then reported in Chapters 5 to 14, with the majority of associated figures provided as separate files (PDF), although some are set within the text of the Chapters. Chapter 15 provides a summary of the proposed mitigation, residual and interaction effects.

The project team

- 1.2.4 Those working on the EIA of the Proposed Development are as follows:

- Savills: EIA co-ordination; Socio-economic effects;
- Framptons: Reasonable alternatives;
- Stephen George & Partners: parameter plan, Design and Access Statement;
- Vectos: transport;
- SLR: air quality; noise;
- EDP: Landscape and visual; biodiversity; heritage;
- Tier: Hydrology, flood risk and drainage; ground conditions and soils;
- Ridge: Climate change.

- 1.2.5 The EIA has been coordinated by Savills with the technical assessments and input undertaken by the project team. An outline of the qualifications/experience of the assessors to demonstrate competency in accordance with the EIA Regulations is provided in Appendix 1.1.

Other planning application documents

- 1.2.6 The information included in the planning application to CDC includes: the Planning Statement; Design and Access Statement; Statement of Community Involvement; Market Analysis Assessment; Sustainability Statement; Waste Management Strategy; Agricultural Land Quality Report; and Health Impact Assessment.

Availability of information

- 1.2.7 The Environmental Statement and other planning application documents can be viewed on the Council's planning applications website:

<https://www.cherwell.gov.uk/info/115/planning/443/see-or-comment-on-a-planning-application>

- 1.2.8 A copy of the ES on USB Flash Drive can be obtained for a charge of £25 from: wimborneplanning@savills.com, Telephone 01202 856 800. A printed copy of the NTS can also be obtained free of charge from Savills.

2 Site description

2.1 Description of the Site

- 2.1.1 The Site comprises two parcels of land either side of the B4100, the larger one to the north of the B4100 and a smaller one to the south. The northern parcel of land is located east of the A43 and is bounded to the north and east by a bridleway and a small lane which branches off the B4100. The southern parcel of land borders the B4100 and agricultural land, with Cherwell Valley motorway services nearby to the south.
- 2.1.2 Including highways land, the total site area is 83.279 ha.
- 2.1.3 Ground levels fall from north to southeast, between 119 metres Above Ordnance Datum (mAOD) and 110 mAOD. The fields are in arable use: a site survey has identified the agricultural land quality as Grade 3b, which is not categorised as the best and most versatile. The arable use offers negligible ecological importance whilst the hedgerows and trees that enclose them are of local ecological importance.
- 2.1.4 The Environment Agency's flood map indicates that the Site is located within Flood Zone 1. It therefore has a 'low probability' of river flooding, with less than a 1 in 1,000 annual probability (<0.1%). A field drainage ditch located on the western boundary of the Site discharges into the Padbury Brook. The ditch is not known to carry significant flows of water: the majority of rainfall currently infiltrates into the ground where conditions allow, and then runs off once the infiltration capacity of the ground has been exceeded.
- 2.1.5 There are no designated heritage assets within the Site and it does not contribute to the heritage interest as part of the settings of any designated heritage assets or non-designated heritage assets in the wider landscape.

2.2 Local context

- 2.2.1 The Site is located approximately 6 km north-west of Bicester in Oxfordshire, adjacent to the A43 and M40 at Junction 10. The A43 is a dual-carriageway that connects the B4100 to the M40 via Junction 10 to the south of the Site. Junction 10 of the M40 Motorway provides north and south bound vehicle access and is broadly equidistant from Birmingham and London.
- 2.2.2 The B4100 is a two-way single lane carriageway road with a 50 mph speed limit. Currently there is no footway or cycle route present. To the south-east the B4100 connects to Bicester (5.3 km) and to the north-west it connects the Site to the A43 via Baynards Green roundabout. Oxfordshire Growth Board (OGB) has allocated funding to increase the capacity of the A43 Baynards Green roundabout. National Highways is planning to complete the design and start construction in 2022.
- 2.2.3 Bridleway 367/24/10 borders the northern boundary of the Site and meets the A43 to the west. Bridleway 367/21/10 is located nearby to the south of the site, running in an east-west orientation along the northern boundary of Cherwell Valley Services.
- 2.2.4 The landscape context includes a mix of rural features with major vehicular corridors to the north west and south west. The Site itself is generally flat with levels falling gently to the east and is typical of the surrounding area. Within the local context the Site sits on a broad plateau, with land to the south-east being gently undulating and land to the north generally being level. Far reaching views are limited owing to surrounding mature vegetation and blocks of woodland.

- 2.2.5 Stoke Bushes Local Wildlife Site (LWS) is located approximately 50m to the north east of the Site (Figure 8.3). It is considered in the assessment because of its geographical proximity to the north eastern extent of the Site. The LWS designation is for lowland mixed deciduous woodland (also designated as Ancient Semi-natural and Ancient Replanted Woodland). The closest national designation is the Ardley Cutting and Quarry SSSI, some 2 km south-west of the Site.
- 2.2.6 Users of the public rights of way and road routes in the locality, along with a residential property near to the Site's eastern boundary and, potentially, those on the north-western fringe of Stoke Lyne have been identified as potentially able to perceive a change because of the Proposals and have been considered in the assessment.
- 2.2.7 There are a small number of listed buildings nearby: a Grade II listed building on Baynards Green Farm on the western side of the A43 and Grade II and Grade II* listed buildings in Stoke Lyne.
- 2.2.8 The nearest surface watercourse is Padbury Brook, which is located adjacent to the south eastern boundary of the Site. Padbury Brook is a tributary of the River Great Ouse, and is designated as an Ordinary Watercourse. The Site falls within the Great Ouse Nitrate Vulnerable Zone (NVZ) and a Drinking Water Safeguard Zone for surface water.
- 2.2.9 CDC monitors air quality within the locale of the Site, and within Bicester. The Proposed Development is located approximately 6.5km north-west of the nearest Air Quality Management Area, AQMA No.4, located within Bicester.

Other potential development

- 2.2.10 The agricultural land adjacent to the western side of the Symmetry Park Ardley Site is subject to two current planning applications for proposed logistics use, registered under CDC references 21/03267/OUT and 21/03268/OUT (see Figure 4.1 Cumulative schemes). An associated planning application for new site access and infrastructure is also under consideration by CDC (reference 21/03266/F). The three planning applications have been submitted by Albion Land.

3 The Proposed Development

3.1.1 The EIA has assessed the development of:

- A site of 83.279 hectares;
- A new roundabout junction on the B4100;
- 300,000 m² of logistics floorspace (Use Class B8) and ancillary offices (Use Class E(g)(i));
- A building for use as an energy centre;
- HGV parking;
- Parking for electric cars, accessible parking, bicycles, cars and motorcycles;
- Landscaping including landscape mounds;
- Sustainable drainage.

3.1.2 The outline planning application seeks approval for a maximum of 300,000 m² of floorspace (gross external area (GEA)). The development will comprise logistics (Use Class B8) floorspace and ancillary office floorspace (Use Class E(g)(i)). The quantum of logistics and ancillary office floorspace will not exceed the proposed maximum permitted floorspace figures set out in the parameters plan for Zone A to the north of the B4100, and Zone B to the south of the B4100.

3.1.3 Figure 3.1, the parameters plan, is submitted for approval. It establishes the 'developable areas' within the Site and the maximum building heights, defined separately for three development zones in relation to Ordnance Datum (AOD). The extent of the application site area includes the land needed to undertake construction and landscaping including earth mounds.

3.1.4 The Parameters Plan retains a level of flexibility for the detailed design, which would be defined at a later date. This will need to be approved by the Council through subsequent reserved matters applications. All future reserved matters applications will be required to comply with the parameters plan.

3.1.5 An illustrative masterplan has been prepared to demonstrate one way in which the proposed parameters could be interpreted (see Figure 3.2).

3.1.6 The assessment has been prepared on the basis that the Proposed Development would be delivered from 2023 and become fully operational in 2025.

3.1.7 When complete and fully operational, the facility is expected to support 3,060 jobs directly on-site. Once leakage, displacement and multiplier effect are considered, it is anticipated that the net overall effect would be to support 2,430 jobs.

3.1.8 The parameters plan allows for the provision of a building to be used as an energy centre. Details of the approach to provide power and heat to businesses on the park is not known at this stage.

Mitigation measures

3.1.9 A series of environmental baseline studies informed the design framework within which the parameters plan has been prepared. The approach has been refined through various iterations to ensure that potentially significant ecological effects are avoided or minimised. Inherent mitigation measures are a fundamental part of the scheme and can generally be represented in the plans provided and the description of the development:

- Access: the creation a new junction on the B4100 which provides access to both development parcels;
- Building heights: Overall, the main built structures would be up to a maximum of 139.3 m

AOD in Zone A1; 137.5 m AOD in Zone A2; and a maximum of 135.85 m AOD in Zone B;

- Strategic landscape bund and planting along the eastern boundary: as a result of the assessment, the developable area was moved away from the boundary, resulting in a minimum buffer distance from the eastern planning boundary of 45.375m (Zone A);
- The Parameters Plan ensures that a minimum of 17.24ha, 20.70% of the site area, will be devoted to open space and managed for biodiversity purposes. Additional landscaping and open space will also be provided within the Developable Area once final site layouts are fixed at Reserved Matters Stage, further increasing the biodiversity potential of the proposals.

- 3.1.10 Additional mitigation is generally not capable of being shown in the plans because it may, for example, involve the provision of off-site measures, or require controls on the construction or operation of the Proposed Development that cannot be shown visually. The measures proposed as additional mitigation are identified in each of the assessment chapters within this ES, and a summary of them is incorporated in Chapter 15. The delivery of the necessary infrastructure and additional mitigation measures can be secured through the imposition of planning conditions or legal obligations associated with a grant of planning permission for the Proposed Development.

Highways and access

- 3.1.11 The proposal for access is to form a new junction on the B4100 which will provide access to both development parcels.
- 3.1.12 As part of the development proposals, a new bus stop/layby will be provided to improve accessibility by public transport for future employees and visitors of the site.
- 3.1.13 The proposals will include HGV, staff and visitor car parking areas (including disabled car parking spaces, electric charging point spaces and car share spaces), motorcycle parking spaces and cycle spaces.

Drainage

- 3.1.14 The Surface Water Drainage Strategy (Appendix 11.1) would ensure that a sustainable drainage solution can manage the surface water runoff via a combination of infiltration, discharge into the drainage ditch at Greenfield runoff rates, and attenuation basins and/or swales. The size of attenuation storage has been calculated such that it has the capacity to accommodate the 100 year rainfall event, including a 40% increase in rainfall intensity that is predicted to occur as a result of climate change.
- 3.1.15 The remainder of the site that is not formally drained, i.e., landscaped areas, will be permeable where the majority of rainwater will soak into the ground. Surface water runoff would be directed to the drainage system through drainage gullies located around the perimeter of the buildings and through contouring of the hardstanding areas.

Landscape strategy

- 3.1.16 The landscape strategy retains boundary hedgerows and trees where possible. At a broad scale, the landscape strategy (Appendix 9.6) aims to strengthen key strategic landscape corridors around the Site, contribute to the treed character of the local landscape, and serve to reduce adverse effects arising from the proposed development.
- 3.1.17 The landscape design principles include:

- Existing boundary hedgerows and trees would be retained where possible (with buffers to the proposed development), reinforced and brought into regular, long-term management.
- Creation of a landscaped buffer from proposed development zones to protect and enhance retained boundary features of landscape and ecological interest.
- Provision of landscape screening, in the form of landscaped bunds and native tree planting, to properties and PRow in close proximity to the Site.
- Native heavy standard tree planting is proposed within landscape buffers to fragment views of the proposed development, particularly for receptors in relatively close proximity to the east of the Site;
- Additional structural landscaping proposed to the eastern boundary would provide a new landscape corridor that would provide a connection between existing woodland blocks within the local landscape context.

Lighting

- 3.1.18 The external lighting has been designed in accordance with British Standards, CIBSE Codes and ILP Guidance Note 08/18 to limit the light pollution in the vicinity and in particular the eastern boundary of the Site. Here, shields will be fitted to luminaires to prevent light intrusion, and to limit lighting levels to 1.0lux.
- 3.1.19 Lighting will be operational every day of the week, including public holidays. All external lighting will be operated via photocells with each zone of lighting having its own time switch override control. Similarly, roadway lighting will be photocell controlled. The proposed lighting has been designed so as not to cause visual intrusion and to limit light pollution generally.

Climate Change and Energy Use

- 3.1.20 In terms of planning, addressing climate change is one of the core land use planning principles which the National Planning Policy Framework expects to underpin both plan-making and decision-taking. It recognises that planning plays a key role in minimising vulnerability, providing resilience and managing the risks associated with climate change.
- 3.1.21 An effective approach to reducing greenhouse gas emissions from new development is the use of efficient designs and insulation products to achieve high levels of thermal efficiency – the ‘fabric first’ approach. The buildings will be assessed under BREEAM with a target of a minimum rating of ‘Very Good’.
- 3.1.22 For the Proposed Development, the focus of the design would limit the energy consumption and carbon dioxide (CO₂) emissions through optimising the building performance together with energy efficiency measures following the steps of the energy hierarchy:
- Using less energy / demand reduction;
 - Supplying energy efficiently; and,
 - Using renewable energy.
- 3.1.23 Planning permission is sought for photovoltaics (PV) to cover 100% of the useable roof area (i.e. omitting the space taken by roof lights, safety equipment and any signage). The amount of PVs installed will be subject to individual occupier requirements or technical issues relating to the export of electricity generated by the PV array into the National Grid. This is to prevent installation of PV panels that would then not produce energy, and allows the most up to date technology to be fitted when required. PV would be installed over a minimum of 18% of the useable roof area. This will provide the normal base load of electricity prior to including any occupier specific requirements.

3.1.24 Chapter 13 reports the outcome of the assessment of likely significant environmental effects arising from the Proposed Development in relation to climate change and how these effects have been reduced.

3.1.25 Construction of the building will be delivered to Net Zero Carbon in Construction to accord with the UK Green Building Council's (UKGBC) definition.

Soils

3.1.26 All natural soils are finite resources, but where sites are to be developed, their quality as a resource for reuse varies. The primary measures to mitigate the impacts on soil resources during the site preparation, earthworks and construction activities will be to store and re-use surplus soils in a sustainable manner (for an after-use appropriate to the soil's quality) in accordance with Defra's Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. This approach will ensure that the quality of soils retained on-site and exported off-site (if required) is maintained by good soil handling and storage, particularly to avoid compaction and biodegradation of soils that are in storage.

Site remediation

3.1.27 There are localised areas identified with the potential to present areas of potential contaminants of concern – on-site, from a potentially infilled former quarry in the south east, and to the west of the Site from the offsite fuel filling station and site of a former garage. In the event that contaminated material is identified during the demolition/construction process, the contractor would follow the following standard procedure to:

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

Traffic Movements during Construction

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

3.1.29 For the construction phase of the Proposed Development it is considered that an average daily peak could total 100 HGV movements per day (AADT). All construction traffic for the Proposed Development would be expected to route along the A43 to/from the M40 J10, which provides the most direct access to the strategic road network.

Construction Management

3.1.30 A framework Construction Environmental Management Plan (CEMP) has been prepared to outline the control of construction activities on site. Should further detailed mitigation subsequently be identified for the construction phase, the CEMP can be a mechanism for the implementation of these measures. The appointed contractor would be required to comply with the CEMP.

- 3.1.31 The safe storage and use of fuels for the plant would be a priority in site management. Drainage within the temporary secure site compounds where construction vehicles would park and where any diesel fuel would be stored, would be directed to an oil interceptor to prevent pollution should any spillage occur. Diesel storage and refuelling would be within a designated area or a self-bunded tank in accordance with the Oil Storage Regulations. All oil storage tanks should be self-bunded to equal the quantity of oil held. This is regarded as industry standard practice and also includes mandatory legal requirements which are considered as integral to the development. Spill kits and mandatory spill reporting would also form part of the management regime in line with standard procedures.
- 3.1.32 Water used during construction would be sourced from existing grid connections, or, where this is not possible, water would be supplied by tankers. Primary uses for water during the construction phase would include: use in welfare facilities; dust suppression; cleaning (of plant, materials, surfaces etc.); wheel wash; commissioning/testing of water supply services, and the commissioning of mains and heating systems.

Construction waste management

- 3.1.33 In order to minimise the volume of waste generated, a Site Waste Management Plan (SWMP) would be prepared. The implementation of this would ensure that significant adverse effects from the management of waste would be unlikely.

3.2 Consideration of reasonable alternatives

- 3.2.1 The Applicant has carried out a search for suitable locations to accommodate a site of at least 10 ha. The proposals need to respond to the distinct locational requirements to accommodate national/regional scale logistics facilities which are not well suited to an edge of urban area location.
- 3.2.2 The criteria used in the exercise are set out below:
- 2.1 These locational and operations criteria are set out below:

- **The geographical proximity to a strategic highway network**

(Reason: To ensure shorter journeys, sites need to be accessible to the strategic highway network for both the receipt of goods by HGVs and the onward delivery of goods to customers, maximisation of access to potential markets and minimisation of drive times to potential markets, with ready access to a suitably skilled workforce (well-connected or capable of being well connected for the workforce). The quality of the route to the strategic highway network is important, for example torturous routes through villages are not acceptable).

- **Minimum site area of 10 hectares:**

(Reason: To ensure that the building components and infrastructure can be accommodated on the Site, and that at a minimum a regional development can be provided and the land is of a scale to meet potential occupier requirements, and the ability of a site to accommodate the necessarily large footprint and building height. In order to ensure a robust site assessment a threshold of 10 hectares has been set, but a site area of 20 hectares is more likely to be required).

- **The overall suitability of the location for B8 uses**

(Reason: To ensure that the Proposed Development is able to assimilate within the surrounding area effectively, including not giving rise to disturbance to neighbouring land uses, and having a landform suitable for B8 uses).

3.2.3

3.2.4 The suitability and availability of strategic employment allocations identified in the Cherwell Local Plan were assessed. The analysis concluded that there is no allocated employment site of a strategic scale and no other site committed for employment within Banbury, Bicester or Kidlington that can accommodate the requirements above.

3.2.5 Further investigation of potential sites within the rural area that may be suitable and available has been undertaken by a review of the Cherwell Housing and Economic Availability Assessment (HELAA) (February 2018). None of the sites approaches the suitability or scale of land that is required to accommodate the requirements.

3.2.6 The Ardley site is of the requisite size, it is close to Junction 10 of the M40 Motorway, and is considered to have a landform suitable for B8 uses.

4 The approach to assessment

- 4.1.1 This ES is prepared in accordance with The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the 'EIA Regulations').
- 4.1.2 The EIA Regulations specify those forms of development that always require EIA (Schedule 1) and lists other categories and thresholds of development where EIA is required when significant effects are considered to be likely (Schedule 2). The Applicant has taken the view that the proposal is EIA development, being development that falls within Schedule 2, and elected to prepare an ES.

Assessment of proposal at the outline planning stage

- 4.1.3 An appropriate way to link an outline planning permission to proposals that have been subject to EIA is through the plans that are included as part of the planning application. The plans define the development that is subject to EIA, and upon which the planning decision is based.
- 4.1.4 The overall development concept is expressed by a Parameter Plan that shows the distribution and scale of the development assessed (Figure 3.1). The Parameter Plan is submitted for approval by the Council, it is not illustrative.
- 4.1.5 Where planning permission is granted, it is anticipated that the decision notice will include a planning condition to ensure the development takes place in accordance with the approved Parameter Plan. Subsequently, the detailed design will evolve within the parameters defined by the plan.
- 4.1.6 The temporal scope considers the construction phase, and thereafter when the development is completed and occupied (often referred to as the 'operational' phase). For example, the assessment of landscape and visual effects considers residual effects at a future time when the landscaping within the scheme has had 15 years to mature.
- 4.1.7 The primary study area for the EIA covers the physical extent of the Site shown on Figure 2.1. Where necessary, each assessment topic defines its wider study area geographically in relation to the assessment of the Proposed Development. The proposed development is designed as a permanent provision i.e., decommissioning is not an aspect considered in the EIA.
- 4.1.8 In order to determine the scope of the assessment, the EIA process has identified:
- the key characteristics of the Site and the environmental baseline through a series of desk and field studies;
 - consideration of the potential sources and nature of environmental impacts; and
 - definition of the assessment methodologies to be used.
- 4.1.9 The framework used to express the predicted significance of the environmental effects identified and assessed is explained in each ES chapter. Effects can be either adverse or beneficial, and can be temporary or permanent.

The scope of the EIA

- 4.1.10 An EIA scoping opinion has not been requested from CDC. The scope of the assessment has been established using the experience of the Applicant and EIA team, based on other similar proposals in the District and elsewhere. In addition to published guidance, information available from the planning consultation responses received by CDC for planning applications currently under consideration for *Land at Junction 10, M40* – CDC Planning References 21/03267/OUT & 21/03268/OUT has provided additional context in relation to proposed development in the

locality and used to inform the assessments.

- 4.1.11 Specific consultation undertaken in addition to the above is set out below.

Pre-application consultation regarding heritage and archaeology

- 4.1.12 Pre-application consultation was carried out informally with Cherwell District Council's Conservation Officer, Oxfordshire County Council's Lead Archaeologist and Historic England's Inspector of Ancient Monuments, Berkshire, Buckinghamshire, Oxfordshire.
- 4.1.13 A request was made to CDC's Conservation Officer for comment on the scope of the assessment. A response described the scope of the assessment as 'sensible'.
- 4.1.14 Historic England was also consulted. A response stated that the approach for the assessment is supported, but that the potential for impacts on the settings of heritage assets located beyond 2km should also be considered. This response has been taken into consideration in the assessment and set out in Appendix 10.1.
- 4.1.15 Regarding the approach to archaeological investigation, consultation took place with Oxfordshire County Council's Lead Archaeologist during November and December 2021. Initially a Written Scheme of Investigation (WSI) (EDP, 2021a), in relation to the Archaeological and Heritage Assessment report, was issued to define the scope of that study and then subsequently agreed with the Lead Archaeologist.
- 4.1.16 Secondly, a WSI (ASWYAS, 2021a) was issued in relation to the Geophysical Survey which defined the survey's scope and methodology and was agreed with the Lead Archaeologist. Following the completion of the survey, the geophysical survey report was issued as a draft to the Lead Archaeologist for comment in December 2021.
- 4.1.17 In accordance with the advice received from the Lead Archaeologist, it is intended to submit a WSI for trial trenching for comment and agreement in due course. This will comprise the excavation of a series of evaluative trenches to determine the presence and significance of any assets of archaeological interest within the Site.
- 4.1.18 Based on the results of this initial trial trenching, the requirement and scope of any further archaeological mitigation will be determined through further consultation with the Lead Archaeologist, to be carried out after the submission of a report detailing the results of the trenching and, implemented either in advance of, or during, construction works.

Effects considered not significant

- 4.1.19 Several issues are considered unlikely to give rise to significant environmental effects and therefore have not been subject to detailed assessment in the EIA, as described below.

Waste

- 4.1.20 The development, being on a greenfield site, will not generate any unusual or complex waste requiring specialist control or management and will therefore be unlikely to result in significant adverse effects to the environment. The issue of waste disposal is not considered likely to result in significant effects and therefore the ES does not contain a specific chapter for waste.

Human health

- 4.1.21 The protection of human health is considered within the assessments of ground conditions, air quality, noise, in relation to relevant published standards and thresholds, so a specific chapter for human health is not required.

Accidents and Disasters

- 4.1.22 The potential for accidents or disasters resulting from the occupation and use of the Proposed Development is considered to be negligible.
- 4.1.23 Potential emergency situations are considered by the Thames Valley Local Resilience Forum and published in their community risk register. The risks identified as most relevant are considered below.
- 4.1.24 RIVER FLOODING – Whilst the Site is in an area that is at a low risk from flooding, a flood risk assessment is required for the proposal as it covers an area of more than 1 hectare. The FRA and drainage strategy demonstrate that the development will not result in flooding on the Site or elsewhere downstream. Reference to the flood risk information published by the Environment Agency shows that there is no potential for a reservoir breach to affect the application Site.
- 4.1.25 ENVIRONMENTAL POLLUTION – The drainage of surface water from the Site has the potential to lead to pollution. Measures designed to avoid this are identified in the assessment at Sections 11.5 and 14.5.
- 4.1.26 TRANSPORT ACCIDENTS – The proposal will deliver a new junction on a section of the B4100 Road. This will be designed to approved highway standards and subject to appropriate speed limits. There are no expected significant effects in relation to this.
- 4.1.27 Upon completion the potential for accidents or disasters affecting the development and resulting in adverse effects on human health, cultural heritage or the environment is considered to be negligible.

4.2 Cumulative assessment

- 4.2.1 Schedule 4(5)(e) of the 2017 EIA Regulations requires a description of the likely significant effects of the development on environment resulting from ‘*the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources*’.
- 4.2.2 In respect of potential cumulative effects with other development, national planning practice guidance advises that ‘*Each application (or request for a screening opinion) should be considered on its own merits. There are occasions, however, when other existing or approved development may be relevant in determining whether significant effects are likely as a consequence of a proposed development. The local planning authorities should always have regard to the possible cumulative effects arising from any existing or approved development.*’ (ID 4-024-20170728).
- 4.2.3 A list of approved development, planning applications, and a scheme for which an EIA scoping opinion has been adopted is shown in the table below, with their location in relation to the Application Site shown on Figure 4.1.

Table 4.1 Cumulative schemes

Development approved	Map	Description.
CDC Planning Ref 19/02550/F Great Wolf Leisure Resort	1	Leisure resort incorporating a waterpark, a family entertainment centre, a hotel, conferencing facilities, restaurants, access, parking and landscaping.
CDC Planning Ref 20/03199/OUT	2	Erection of up to 53,000 sqm of floor space to be for B8 and B2 with ancillary B1 (use classes) employment provision within two

Axis J9 Phase 1		employment zones covering an area of 9.45ha; parking and service areas to serve the employment zones; a new access off the Middleton Stoney Road (B4030); temporary access of Howes Lane pending the delivery of the realigned Howes Lane; 4.5ha of residential land; internal roads, paths and cycleways; landscaping including strategic green infrastructure (G1); provision of sustainable urban systems (suds) incorporating landscaped areas with balancing ponds and swales. Associated utilities and infrastructure.
Planning applications		Description.
CDC Planning Ref 18/00825/HYBRID Heyford Park	3	Hybrid planning application for development on land at the Former RAF Upper Heyford air base and adjacent land north and south of Camp Road. Mixed use application for up to: 1,175 dwellings, 60 close care dwellings, retail employment and community use spaces, school, energy facility and open space.
CDC Planning Refs 21/03267/OUT & 21/03268/OUT Junction 10, M40	4	Buildings comprising logistics (Use Class B8) and ancillary Office (Use Class E(g)(i)) floorspace and associated infrastructure; access from the B4100.
Symmetry Park, Oxford North. CDC Reference 22/01144/F	5	Application for full planning permission for research, development and production facility comprising of Class B2 floorspace and ancillary office floorspace with associated infrastructure including formation of signal-controlled vehicular access to the A41.
EIA Scoping Opinion		Description.
National Infrastructure Planning Scoping Opinion 15 th July 2021	6	Oxfordshire Strategic Rail Freight Interchange - https://oxsrfi.co.uk/ A new rail terminal and associated infrastructure, warehouses up to 675,000 sq.m and highways works: https://infrastructure.planninginspectorate.gov.uk/projects/south-east/oxfordshire-strategic-rail-freight-interchange/?ipcsection=docs

- 4.2.4 Each of the assessment chapters considers which other developments have the potential for cumulative effects when the construction and/or operational phases could be concurrent, and where there are sensitive receptors common to both developments within the Area of Influence.

4.3 Climate change

- 4.3.1 The Climate Change Act (2008) set up a framework for the UK to achieve its long-term goals of reducing greenhouse gases, and develop a climate change adaptation programme. The 2017 EIA Regulations require a description of 'the impact of the project on climate', and 'the vulnerability of the project to climate change' (Schedule 4, paragraph 5(f)).
- 4.3.2 Chapter 13 provides consideration of climate change mitigation, acknowledging that all greenhouse gas emissions play a part cumulatively in climate change, and identifying ways in which these can be reduced; and climate change resilience, i.e., the measures used to adapt to the manifestations of a changing climate.
- 4.3.3 For the other assessment topic chapters, these consider whether climate change may alter the predicted effects. The impact of climate change on the development is considered using the UKCP18 climate change projections for a medium emissions scenario for projected global mean warming of +2°C above pre-industrial levels.

5 Transport

5.1 Introduction

- 5.1.1 This ES chapter, which has been prepared by Vectos, assesses the effect of the Development from a traffic, transport and access perspective. In particular, it considers the potential effects of transport both in the immediate vicinity of the Site and also on the wider network and incorporates a summary of the Transport Assessment (TA) which is included as **Appendix 5.1**.
- 5.1.2 This ES chapter describes: the assessment methodology; the baseline conditions at the Site and surroundings; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.
- 5.1.3 Traffic and transport are key considerations in the delivery of any development. In this regard, consideration is given to the trips that will be made to and from the Site, during construction and once the Proposed Development is operational. The likely origins/destinations of the forecast trips are considered, as well as the modes of travel (walk, cycle, bus and car) that will be used.
- 5.1.4 This ES chapter (and its associated appendices) is not intended to be read as a stand-alone assessment and reference should be made to Chapters 1-4 of this ES, as well as the TA (see **Appendix 5.1**) that has been prepared in support of the application. In addition to this, it should be noted that the traffic flows provided in this ES chapter have informed the Air Quality and Noise and Vibration assessments, Chapters 6 and Chapter 7 respectively.

5.2 Legislative and Policy Framework

- 5.2.1 The list below identifies the legislation, policies and guidance that have influenced the approach to the TA and the methodology developed for identification of potentially significant effects: -
- National Planning Policy Framework (NPPF);
 - National Planning Practice Guidance (NPPG);
 - Department for Transport Circular – The Strategic Road Network and the Delivery of Sustainable Development, 2013;
 - Saved Policies of the Adopted Cherwell Local Plan, November 1996;
 - Adopted Cherwell Local Plan 2011-2031, Re-adopted December 2016.
- 5.2.2 A full detailed overview of these policies is provided within the TA (see **Appendix 5.1**).

5.3 Assessment Methodology

Approach and Method

- 5.3.1 An assessment of potential development impacts on Transport has been undertaken through a combination of desk-based analysis and traffic surveys and consideration of potential impact mitigation requirements.
- 5.3.2 Potential development effects have been defined by reference to baseline assessment parameters and detailed development design proposals. Where necessary, mitigation measures have been defined for any effects considered to be significant with the aim of

reducing any residual risk to an acceptable level.

Defining the Baseline

5.3.3 The existing baseline conditions on the highways and transport networks associated with and surrounding the Site have been informed by desktop research and review of relevant published information including:

- National Rail timetables;
- Local bus timetables;
- Google Maps;
- Discussions with OCC - the relevant Highway Authority;
- Discussions with National Highways (NH);
- Traffic surveys; and
- Accident Data (of the most recent five-year period between 2016 and 2020).

Study Area and Scope

5.3.4 The following junctions have been included within the assessment presented within the TA:

- Junction 1: Symmetry Park Ardley Proposed Roundabout Access;
- Junction 2: Land at Junction 10, M40 Proposed Eastern Roundabout Access;
- Junction 3: Land at Junction 10, M40 Proposed Western Roundabout Access;
- Junction 4: A43 / B4100 Roundabout;
- Junction 5: B4100 / Banbury Road.

5.3.5 The study area for junction capacity assessment is shown at **Figure 5.1**.

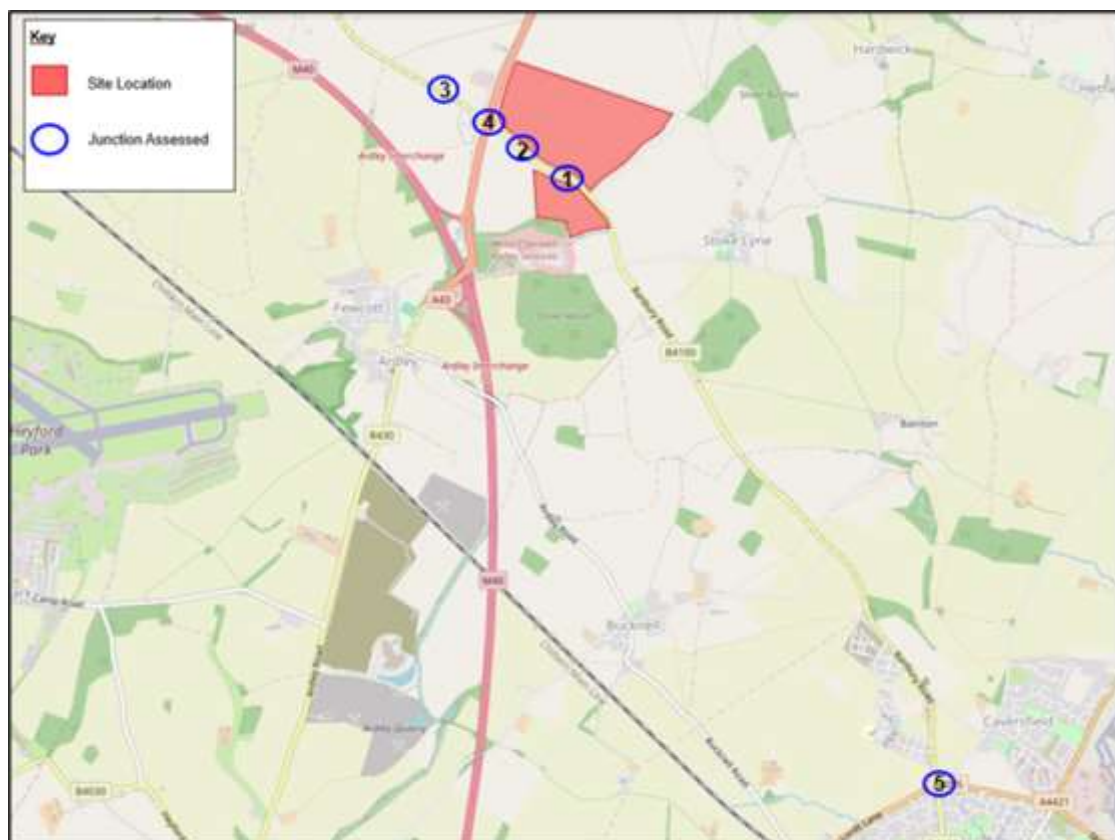


Figure 5.1 Scope of Junction Capacity Assessment

5.3.6 The study area that informs the analyses presented within this chapter includes the following links:

- Link 1 B4100 north west of A43/B4100 junction;
- Link 2 B4100 north west of site access;
- Link 3 B4100 south east of site access;
- Link 4 A4095 east;
- Link 5 A4095 west;
- Link 6 A43 south of A43/B4100 junction;
- Link 7 B430;
- Link 8 M40 south;
- Link 9 M40 north;
- Link 10 A43 north of A43/B4100 junction;
- Link 11 A43 north of A421 junction;
- Link 12 A421;
- Link 13 M40 northbound on-slip;
- Link 14 M40 southbound off-slip;
- Link 15 M40 northbound off-slip;
- Link 16 M40 southbound on-slip;
- Link 17 A43 bridge;
- Link 18 A43 adjacent to services.

5.3.7 The study area is also illustrated in **Figure 5.2**.

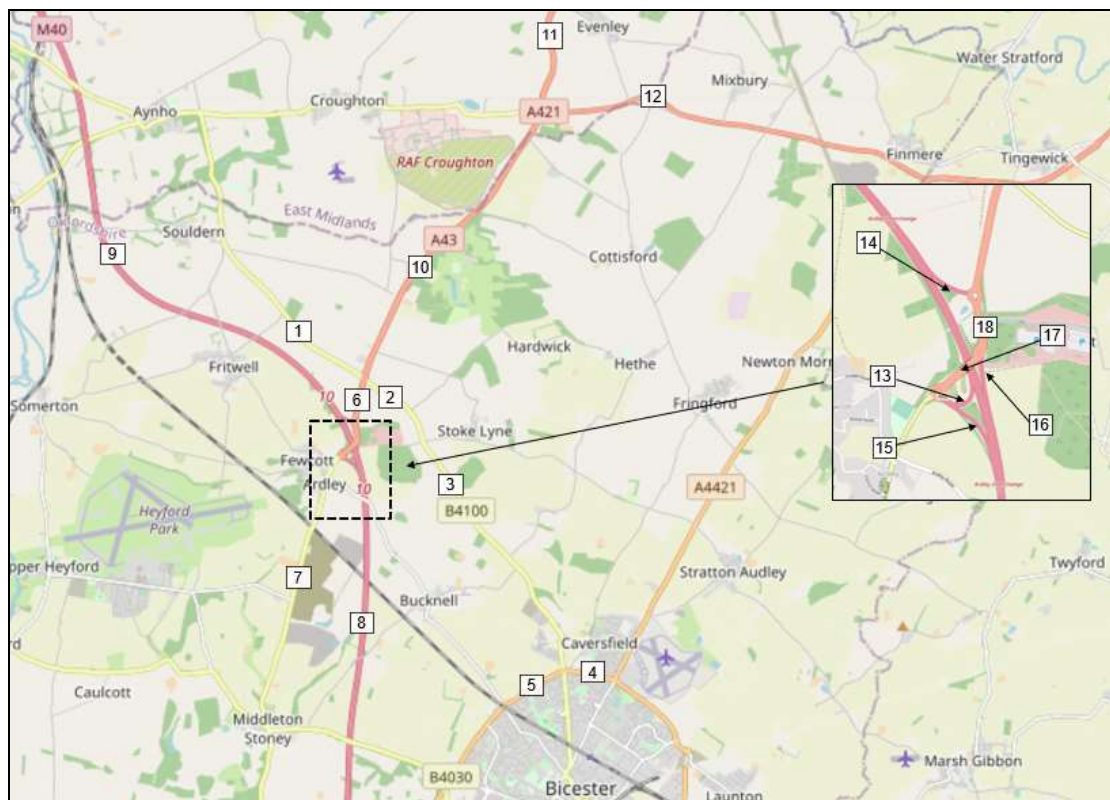


Figure 5.2 Study Area

- 5.3.8 For consistency, reference in relation to the study area has been made to the Land at Junction 10, M40 planning applications (21/03267/OUT and 21/03268/OUT), which were submitted in September 2021. The study area presented within this application is considered appropriate given the close proximity to the Application Site as well as the similarity in land use sought, i.e., logistics, Use Class B8.

Establishing Baseline Conditions

- 5.3.9 As set out above, the Land at Junction 10, M40 planning applications (21/03267/OUT and 21/03268/OUT) for the western and eastern land parcels off J10 of the M40 have been used to inform the assessment at the Site. This is to ensure consistency across the sites given the close proximity between the two.
- 5.3.10 Opening year assessments (further information provided below) factor up the baseline information using growth factors extracted from TEMPRO and include flows associated with relevant committed developments in the area.
- 5.3.11 The scenarios tested for the aforementioned junctions are as follows:
- 2019 Base;
 - 2025 Without Development;
 - 2025 With Development;
 - 2025 With Development and Committed Development (Land at Junction 10, M40).

Cumulative Effects

- 5.3.12 For reference, the committed developments included within the assessment are set out in the table below, with further information provided within the submitted TA (see **Appendix 5.1**).

Table 5.1 List of Committed Developments

Development Ref	Description
Great Wolf Leisure Resort (ref: 19/02550/F)	Leisure resort incorporating a waterpark, a family entertainment centre, a hotel, conferencing facilities, restaurants, access, parking and landscaping
Axis J9 Phase 1 (ref: 20/03199/OUT)	Erection of up to 53,000 sqm of floor space to be for B8 and B2 ancillary B1 (uses classes) employment provision within two employment zones; a new access off the Middleton Stoney Road (B4030); temporary access of Howes Lane pending the delivery of the realigned Howes Lane; 4.5ha of residential land; internal roads, paths and cycleways; landscaping including strategic green infrastructure (G1); provision of sustainable urban systems (suds) incorporating landscaped areas with balancing ponds and swales. Associated utilities and infrastructure.
Heyford Park (ref: 18/00825/Hybrid)	Hybrid planning application for development on land at the Former RAF Upper Heyford air base and adjacent land north and south of Camp Road. Mixed use application for up to 1,175 dwellings, 60 close care dwellings, retail employment and community use spaces, school, energy facility and open spaced.
Land at J10 M40 Developments (refs: 21/03267/OUT & 21/03268/OUT)	Buildings comprising logistics (Use Class B8) and ancillary Office (Use Class E (g) (i)) floorspaces and associated infrastructure; access from B4100.

- 5.3.13 In addition to the above committed schemes, it is understood that a Scoping Opinion has been sought with respect to a Strategic Rail Freight Interchange near to the Upper Heyford Former Airfield site referenced above. This scheme is summarised below as follows:

Oxfordshire Strategic Rail Freight Interchange Development Consent Order. A request for a Scoping Opinion for the Oxfordshire Strategic Rail Freight Interchange Development Consent Order was submitted in June 2021. The Proposed Development comprises a Strategic Rail Freight Interchange (SRFI) together with associated development on land south of the Chiltern Railway line, and west of the B430, east of Upper Heyford Former Airfield. The rail freight facility is expected to include a new rail terminal, large warehouses (providing a maximum of 675,000 sq.m of floorspace), a management building, rail reception sidings, container storage area and associated container transfer equipment and a refuelling facility. The development will also include a range of highway works including improvements at Junction 10 of the M40. Several options for these highways improvements are currently being considered. A Scoping Opinion was formally issued on behalf of the Secretary of State in July 2021 (case reference TR050008).

- 5.3.14 It should be noted that the Strategic Rail Freight facility is at a relatively early stage of the planning process and as such there is not anything in the public domain that outlines the likely traffic implications of this emerging scheme. As such, there is not any ability to predict the cumulative effects of this scheme. In any event, should this scheme come forward it is considered highly likely that it would need to provide major highway mitigation over and above anything identified in this assessment, as is usual with Development Control Order schemes.
- 5.3.15 For completeness, reference is made to another planning application scheme by TSL with respect to an additional employment site adjacent to Junction 9 of the M40. The scheme comprises:

“Full planning application for the erection of a new high quality combined research, development and production facility comprising of Class B2 floorspace and ancillary office floorspace with associated infrastructure including: formation of signal-controlled vehicular access to the A41 and repositioning of existing bus stops; ancillary workshops; staff gym and canteen; security gate house; a building for use as an energy centre (details of the energy generation reserved for future approval); loading bays; service yard; waste management area; external plant; vehicle parking; landscaping including permanent landscaped mounds; sustainable drainage details; together with the demolition of existing agricultural buildings within the red line boundary; and the realignment of an existing watercourse”.

Opening Year

- 5.3.16 An assessment has been undertaken to evaluate the effects of the Proposed Development in 2025 (i.e., under a future baseline which accounts for an element of background growth and committed developments).

Assessment Scenarios

- 5.3.17 For the purposes of this assessment, the following scenarios have been included:

- 2019 Base;
- 2025 Without Development;
- 2025 With Development.

5.4 Impact Assessment Methodology

5.4.1 The 'Guidelines for the Environmental Assessment of Road Traffic' sets out a number of potential effects relating to highways and transport considerations, which potentially require assessment.

5.4.2 Those which relate to this assessment are:

- Severance;
- Delay (Driver, Pedestrian, Cycle);
- Amenity;
- Fear and Intimidation; and
- Accidents and Safety.

5.4.3 It is considered unlikely that the construction, or operation, of the Site will generate or attract hazardous loads; therefore, on this basis, it is anticipated that there would be no significant effects relating to hazardous loads. An assessment of hazardous loads was therefore scoped out of the assessment and has not been considered any further in this ES chapter.

5.4.4 Severance is defined by the guidance in paragraph 4.27 of the Institute of Environmental Management Assessment (IEMA) guidelines:

"Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. The term is used to describe a complex series of factors that separate people from places and other people. 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".

5.4.5 The guidance refers to potential delays to drivers and to pedestrians. Users of other modes can also experience delays, such as cyclists and those travelling by bus and rail. Drawing upon the IEMA Guidelines and professional experience, driver delay and delay to bus users may change where:

- Traffic flows change at junctions;
- New junctions are introduced;
- Existing junctions are changed;
- Speeds on existing links are changed;
- Existing links are closed;
- New links are opened;
- Frequency of use of controlled pedestrian or cycle crossings change; and
- New controlled pedestrian or cycle crossings are introduced.

5.4.6 The IEMA Guidelines note that the Department for Transport (DfT) has assumed 30%, 60% and 90% changes in traffic levels should be considered as "slight", "moderate", and "substantial" impacts respectively. The IEMA Guidelines also note that increases in traffic of as little as 5% may be significant in terms of the capacity criteria of a highway but not its environmental effects, and the criteria set out within the guidance make the higher thresholds more relevant to the assessment of the environmental effects of traffic increases.

5.4.7 Pedestrian and cyclist delay may change where:

- Pedestrians and cyclists cross existing roads where traffic flows are projected to change;
- Pedestrians and cyclists cross new roads;

- Existing roads which pedestrians and cyclists would have crossed are removed;
 - Road speeds change;
 - Pedestrian and cycle volumes change;
 - New crossing facilities are provided; and
 - Existing pedestrian crossing facilities change.
- 5.4.8 Delay to bus users may also change where bus routes or bus stops are proposed to be changed or where demand for a bus exceeds capacity.
- 5.4.9 Rail delay may change where:
- Passenger areas within stations become congested; and
 - Demand for a train exceeds capacity.
- 5.4.10 Amenity is defined by the guidance in paragraph 4.39:
- “It 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. This definition also includes pedestrian fear and intimidation and, can be considered to be a much broader category including consideration of the exposure to noise and pollution, and the overall relationship between pedestrians and traffic.”*
- 5.4.11 Fear and intimidation is defined by the guidance in paragraph 4.40:
- “The impact of this 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.”*
- 5.4.12 Amenity, fear and intimidation may be considered for pedestrians, cyclists, bus passengers and rail passengers. Amenity, fear and intimidation can be considered together as they are strongly interrelated.
- 5.4.13 The key issue in assessing accidents and safety is in understanding the potential for change. There can be some small changes in prevailing road safety conditions arising simply due to having a greater number of journeys being made on a network; hence, the more people that are travelling, the more people that are liable to become involved in an accident. By far the more important issue to consider is how travel and the design of the transport networks interrelate to affect prevailing road safety.
- 5.4.14 In that context, prevailing road safety may change where:
- Material changes are proposed to the form of nature of a transport network such as changes to the geometry of a junction or changing the form of a junction; and
 - Material changes are proposed to prevailing travel patterns on transport networks not designed to cater for them such as introducing a pedestrian demand on a rural road without footways or introducing a pedestrian demand across a heavily trafficked and high-speed road without a suitable crossing provision.

Construction Phase

- 5.4.15 An outline of the construction of the Site will be presented in a Construction Traffic Management Plan, which will be secured by Condition. This document will include an indicative construction programme, predicted construction traffic flows, vehicle routing and access gate locations.
- 5.4.16 The traffic generation as set out in the Construction Traffic Management Plan, are anticipated to arise as a result of the construction of the Site and have been calculated based upon a

number of assumptions such as construction material quantities, number of construction workers, and the construction programme.

- 5.4.17 The effects of the traffic anticipated to be generated by the construction of the Site has been determined by comparing the estimated construction traffic against the existing baseline (2019).

Severance

- 5.4.18 Severance is broadly defined as the separation of residents from facilities and services they use within their community caused by new or improved roads or by changes in traffic flows.
- 5.4.19 Several factors are considered in determining the existing level of severance. These include road width, traffic flow and composition, traffic speeds and the availability of pedestrian crossing facilities.

Delay

- 5.4.20 IEMA guidelines note that changes in the volume, composition and/or speed of traffic may affect the ability of people to cross roads. Typically, increases in traffic levels result in increased pedestrian delay, although increased pedestrian activity itself also contributes. The guidelines do not set any thresholds, recommending instead that assessors use their professional judgement to determine the potential impact and likely effect.
- 5.4.21 The increased number of HGVs will be considered in comparison to the overall change in traffic compared to the baseline position to understand the estimated level of delay.

Amenity, Fear and Intimidation

- 5.4.22 IEMA guidelines define pedestrian amenity as the relative pleasantness of a journey and can include considerations of pedestrian fear and intimidation if they are relevant.
- 5.4.23 Thresholds for HGV increases that will heighten peoples fear and intimidation are 'Extreme' when a link road has a composition of 3,000+ average 18-hour flow, 'Great' for a 2,000-3,000 18-hour flow and Moderate for a '1,000-2,000' 18-hour flow. The number of HGVs and HGV increase as a result of the construction phase will be taken into account within the assessment. If the resultant increase in HGVs causes an increase into the next bracket, then further assessment on how to mitigate this will be undertaken.

Accidents and Safety

- 5.4.24 The IEMA guidelines do not include a definition in relation to accidents and safety, suggesting that professional judgement is required to assess the implications of local circumstance, or factors which may increase or decrease the risk of accidents.

Operational Phase

- 5.4.25 The assessment of potential highways and transport related effects, which may occur as a result of the Proposed Development, has been based on the number of trips anticipated to be generated by the completed and operational Site.
- 5.4.26 The effects of the traffic anticipated to be generated by the completed and operational Site has been determined by comparing the estimated operational traffic against the respective baseline positions outlined above.

Severance

- 5.4.27 Severance is broadly defined as the separation of residents from facilities and services they use within their community caused by new or improved roads or by changes in traffic flows.

5.4.28 Several factors are considered in determining the existing level of severance. These include road width, traffic flow and composition, traffic speeds and the availability of pedestrian crossing facilities.

5.4.29 **Table 5.2** outlines the thresholds of community severance that are typically referred to when evaluating the effects of a Proposed Development.

Table 5.2 Threshold of Severance Levels

Severance Level	Traffic Flow (AADT)	Length of Diversion
Slight	<8,000	<250m
Moderate	8-16,000	250-500m

Delay

5.4.30 IEMA guidelines note that changes in the volume, composition and/or speed of traffic may affect the ability of people to cross roads. Typically, increases in traffic levels result in increased pedestrian delay, although increased pedestrian activity itself also contributes. The guidelines do not set any thresholds, recommending instead that assessors use their professional judgement to determine the potential impact and likely effect.

5.4.31 The IEMA guidelines refer to a report published by the Transport Research Laboratory (TRL) as providing a useful approximation for determining pedestrian delay. The TRL research identified that mean pedestrian delay was found to be 8 seconds at flows of 1,000 vehicles per hour and below 20 seconds at 2,000 vehicles per hour for various types of crossing condition.

5.4.32 A two-way flow of 1,400 vehicles per hour has been adopted as a lower threshold for assessment (equating to a mean 10 second delay for a link with no pedestrian facilities) in the TRL report. Below this flow pedestrian delay is unlikely to be a significant factor. This is deemed a robust starting point for narrowing down the modelled routes within the Study Area and enabling identification of the rates which exceed the assessment threshold. It is assumed that for controlled forms of pedestrian crossing, the pedestrian delays are likely to be less.

Amenity, Fear and Intimidation

5.4.33 IEMA guidelines define pedestrian amenity as the relative pleasantness of a journey and can include considerations of pedestrian fear and intimidation if they are relevant.

5.4.34 As with pedestrian delay, pedestrian amenity is affected by traffic volumes and composition along with pavement width and pedestrian activity. The guidelines suggest tentative thresholds for determining the potential impact, including where the traffic flow is halved or doubled relative to the existing scenario.

5.4.35 Thresholds for vehicle increases that will heighten peoples fear and intimidation are 'Extreme' when a link road has a composition of 1,800+ average 18-hour flow, 'Great' for a 1,200-1,800 18-hour flow and 'Moderate' for a 600-1,200 18-hour flow. The number of vehicles and vehicle increase as a result of the Proposed Development will be taken into account within the assessment. If the resultant increase in vehicles causes an increase into the next bracket, then further assessment on how to mitigate this will be undertaken.

Accidents and Safety

5.4.36 The IEMA guidelines do not include a definition in relation to accidents and safety, suggesting that professional judgement is required to assess the implications of local circumstance, or factors which may increase or decrease the risk of accidents.

Type of Assessment: Summary

- 5.4.37 **Table 5.3** summarises the type of assessments that have been undertaken for each potential environmental (traffic and transport related) effect.
- 5.4.38 Qualitative assessments have been undertaken through the application of professional judgement to consider anticipated changes in the prevailing baseline conditions as defined in this chapter.
- 5.4.39 Quantitative assessments have been undertaken, with consideration of the sensitivity of the receptor that has been assigned based on that presented in **Table 5.4**. The magnitude of impact has been defined by reference to the IEMA Guidance as set out in **Table 5.5**.

Table 5.3 Type of Assessment: Summary

Potential Environmental Effect	Construction	Completed Development
Severance	Quantitative	Quantitative
Driver Delay	Quantitative	Qualitative & Quantitative
Pedestrian / Cycle Delay	Qualitative & Quantitative	Qualitative & Quantitative
Public Transport Delay	Qualitative	Qualitative
Amenity, Fear and Intimidation	Qualitative & Quantitative	Qualitative & Quantitative
Accidents and Safety	Qualitative	Qualitative
Potential Environmental Effect	Demolition and Construction	Completed Development
Severance	Quantitative	Quantitative

- 5.4.40 The criteria defining the sensitivity of the receptors are presented in Table 5.4.

Table 5.4 Description of the Sensitivity of Receptors

Receptor Sensitivity	Receptor Type
High	The receptor/resource has little ability to absorb change without fundamentally altering its present character. Receptors of greatest sensitivity to traffic flow: schools, colleges, playgrounds, accident clusters, retirement homes, roads without footways that are used by pedestrians.
Moderate	The receptor/resource has moderate capacity to absorb change without significantly altering its present character. Traffic flow sensitive receptors: congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, recreation facilities
Low	The receptor/resource is tolerant of change without detriment to its character. Receptors with low sensitivity to traffic flow: places of worship, public open space, tourist attractions and residential areas with adequate footway provision.
Negligible	Receptors with low sensitivity to traffic flows and those sufficiently distant from road affected roads and junctions.

Magnitude of Impact

- 5.4.41 Table 5.5 summarises the criteria that has been used to determine magnitude of impacts. However, consideration of the absolute level of an impact is also important e.g., the total flow of traffic or HGVs on a link. This is because an increase of, say, 100% in the traffic flow on a road is likely to still lead to negligible or minor effect if the existing flows are low.

Table 5.5 Magnitude of Impact

Effect	Very Low	Low	Medium	High
Severance	Change in total traffic or HGV flows of less than 30%	Change in total traffic or HGV flows of 30-60%	Change in total traffic or HGV flows of 60-90%	Change in total traffic or HGV flows over 90%
Pedestrian and Cyclist Delay	Two-way traffic flow < 1,400 vehicles per hour	Professional judgement based on the road links with two-way traffic flow exceeding 1,400 vehicles per hour in context of the individual characteristics		
Pedestrian Amenity	Change in total traffic or HGV flows < 100%	Professional judgement based on the routes with >100% change in context of their individual characteristics		
Driver Delay	Professional judgement based on the results of junction capacity assessments undertaken at the Junctions shown on Figure 7.2			
Fear and Intimidation	-	Moderate-Average flow over 18-hour day 600-1200 for vehicle and 1000-2000 for HGV	Great-Average flow over 18-hour day 1200-1800 for vehicle and 2000-3000 for HGV	Extreme-Average flow over 18-hour day 1800+ for vehicle and 3000+ for HGV
Accidents & Safety	Professional judgement based on qualitative analysis			
Public Transport	Professional judgement based on quantitative analysis presented in the TA and TAA (ES Volume 3, Appendix: Traffic and Transport - Annex 1)			

Magnitude of Impact - Screening Methodology

- 5.4.42 To assist with the judgement of magnitude of impact, reference has been made to the IEMA guidelines. This guidance sets out the effects considered, as well as thresholds, in respect to potential changes in the volume and composition of traffic, in order to facilitate a subjective judgement of the potential highways and transport effect. The thresholds described are guidance only and provide a starting point by which a detailed analysis will inform a qualitative assessment.

Potential Effect of Traffic Flows on the Local Highway Network

- 5.4.43 In relation to the potential effect of traffic flows generated by the Site on the local highway network, prior to determining the sensitive receptors and their associated sensitivity, and the magnitude of impact, an initial screening process is undertaken (as set out below).
- 5.4.44 The IEMA guidance identifies two broad rules which can be used as a screening process to ascertain the scale and extent of the assessment:
- "Rule 1: include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%); and
 - Rule 2: include any other specifically sensitive areas where traffic flows have increased by 10% or more".
- 5.4.45 Where the predicted increase in traffic flows (as a result of a Proposed Development) is lower than the above thresholds, the IEMA guidelines suggest the significance of the effects can be stated to be negligible and further detailed assessments are not warranted. Increases in traffic flows below 10% are generally considered to be insignificant in environmental terms given that daily variations in background traffic flow may vary by this amount.

Scale and Nature of Effect

- 5.4.46 The scale of the resulting effect is judged on the relationship of the magnitude of impact against the sensitivity and / or importance of the receptor. The predicted scale of effects is summarised in **Table 5.6**.

Table 5.6 Scale of Effects

Sensitivity of Receptor	Magnitude of Impact			
	High	Medium	High	Negligible
High	Major	High	Major	High
Moderate	Major	Moderate	Major	Moderate
Low	Moderate	Low	Moderate	Low

- 5.4.47 It should be noted that when evaluating effects such as Pedestrian and Cyclist Delay and Driver Delay, the above table is supplemented by professional judgements that takes into account actual changes over and above a baseline position. For example, a small reduction in junction capacity on a receptor of high sensitivity can still be classified as having a negligible effect on delays being incurred to road users.

- 5.4.48 The nature of effects is described as either:

- Beneficial – meaning that there is an overall positive impact;
- Adverse – meaning that there is an overall negative impact; or
- Negligible – meaning that there is an insignificant impact.

Significance of Effects

- 5.4.49 In accordance with the methodology set out within ES Chapter 3, the following criteria is applied in relation to the significance of effects:

- 'Moderate' or 'Major' effects are deemed to be 'significant' (see **Table 5.6**).
- 'Minor' effects are considered to be 'not significant', although they may be a matter of local concern; and
- 'Negligible' effects are considered to be 'not significant'.

Geographic Extent of Effect

- 5.4.50 The geographic extent of the effects is identified at a spatial level, 'Site' or 'local' effects are those affecting the Site and neighbouring receptors, while effects upon receptors beyond the vicinity of the Site and its neighbours are at a 'district' level. Effects affecting Cherwell are at a 'regional' level, whilst those which affect different parts of the country, or England, are considered being at a 'national' level. Given the scale of the development, its effects will be limited to the 'local' level.

Effect Duration

- 5.4.51 The temporal scope of the effect identified is described as either short, medium, long term or permanent as described below.

- 5.4.52 For the operational assessment the likely effects are deemed permanent whereas for construction effects they are likely to be medium term:

- Short term – < 12 months;
- Medium term – 1 to 5 years;
- Long term – + 5 years; and
- Permanent – effects that are considered to be 'irreversible' or extremely long-lasting.

Direct and Indirect Effects

- 5.4.53 The below assessment will also identify 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).

5.5 Assumptions and Limitations

- 5.5.1 The principal assumptions which form the basis of assessment are those used to derive the predicted trip generation of the Proposed Development. The consideration of cumulative effect is also based on reasonable assumption as to the likely timescales for planning consent and built out of these schemes in the future. This also extends to committed infrastructure such as the growth fund works and the proposed cycle route.
- 5.5.2 When estimating the traffic expected to be generated by the construction of the Site assumptions have been made in relation to material quantities, the number of construction workers, and anticipated programme of works, and the routing of vehicles. As these assumptions are informed by an experienced organisation, it is considered that these provide a realistic overview of the construction phase.
- 5.5.3 In addition, it is expected that any planning consent would include a condition that would require a Construction Traffic Management Plan (CTMP) to be agreed with CDC/OCC and that the Construction Traffic Management Plan would define a number of measures that would be implemented to manage construction related road traffic. In this respect, any effects can be suitably managed. A CTMP will be secured by a suitably worded condition.

5.6 Baseline Conditions

Existing Site

- 5.6.1 The Site is located in an area which is dominated by agricultural land, with sparsely located residential and commercial development. The nearest settlement is Stoke Lyne, approximately 800m east of the site(s). Ardley/Fewcott is located about 1.2km south-west and Fritwell is located circa 2km to the west, both of which are beyond the M40.
- 5.6.2 The Site consists of two parcels of land, a larger one to the north of the B4100 and a smaller one to the south. Both Sites can be access directly from the B4100. The northern parcel of land is located east of the A43 and north of the B4100. The Site is bounded to the north and east by a bridleway and small country lane. The southern parcel of land borders the B4100 and remaining agricultural land to the south and west.
- 5.6.3 The Moto Cherwell Valley service station is also located within 100m of the southern boundary of the site, and an Esso service station (Baynards Green Service Station) is located approximately 50m west of the northern sites' western boundary on the A43/B4100 roundabout junction. The location of the Site is shown in **Figure 5.3**.



Figure 5.3 Local Site Location

Local Highway Network

B4100

- 5.6.4 The B4100 is located between the two parcels of land that comprise the Site and is a two-way single lane carriageway road with a 50mph speed limit. To the south-east the B4100 connects the Site directly to Bicester (5.3km) and to the north-west it connects the Site to the A43 (0.6km) via Baynards Green roundabout.

A43

- 5.6.5 The A43 is accessed via the Baynards Green roundabout, a large four-arm, two-lane roundabout. The A43 is a dual-carriageway that connects the B4100 to the M40 via junction 10 to the south of the Site and also continues north connecting to the M1.

M40

- 5.6.6 Junction 10 of the M40 is located approximately 1.7km to the south west of the Site. The M40 runs south towards London and north towards Birmingham and hence can connect the Site to locations across the country.

Highway Improvements

A43/B4100 Baynards Green Roundabout

- 5.6.7 Oxfordshire Growth Board (OGB) have allocated funding to increase the capacity of the A43 Baynards Green roundabout.
- 5.6.8 Developments to the Baynards Green Roundabout will be closely associated with developments at Junction 10 of the M40. These developments will aim to increase network capacity, improve road safety at junctions and reduce journey times.
- 5.6.9 The upgrades of the junction will involve the signalisation of the roundabout, an additional lane on the northern arms and additional road markings.
- 5.6.10 This will support the ongoing housing development taking place at the former RAF base at the Upper Heyford site (Heyford Park).
- 5.6.11 National Highways are planning to complete the design by August 2022 and start construction by November 222, with delivery in 2023. The proposed layout is shown at **Figure 5.4**.



Figure 5.4 A43/B4100 Improvement Scheme

B4100/A4095 Banbury Road Roundabout

- 5.6.12 The revised junction will replace the existing roundabout with a new signalised four arm crossroad junction. There will be three lane entries at the B4100 northern and A4095 western approaches, and other arms would have two lane entries. The existing carriageways of both

the A4095 and the B4100 would be widened.

- 5.6.13 The existing shared footway/cycleway would be retained with some realignment, to the west of the southern arm and to the south of the western arm. Separate footway and cycleways are proposed along the southern side of the eastern arm and western side of the northern arm. A new shared footway/cycleway is proposed on the east of the northern arm and the north of the eastern arm.
- 5.6.14 The proposed layout is shown in **Figure 5.5**.



Figure 5.5 Banbury Road Improvement Scheme

- 5.6.15 OCC is undertaking the design work for the improvements, which is understood will be constructed between April 2022 and February 2023.

Accessibility by Non-Car Modes

Accessibility by Walking and Cycling

- 5.6.16 It is recognised that accessibility to the Site by walking and cycling is currently limited with no footway currently present along the B4100. However, it is noted that as part of the SES Land at Junction 10 M40 development, OCC has sought the provision of a new shared cycleway towards Bicester.
- 5.6.17 With regard to cycling, it is considered that this mode of transport is an option for trips up to around 5km in length, which equates to a 20-minute journey time in an urban environment. The 5km distance in this location would mean that employees could access by bicycle to local villages such as Stoke Lyne, Ardley and Bucknell.
- 5.6.18 As detailed above, it is noted that as part of the SES Land at Junction 10 M40 development (refs. 21/03266/F, 21/03267/OUT and 21/03268/OUT), OCC has sought the provision of a new shared footway/cycleway towards Bicester. The B4100 cycleway will be 3m wide with a

margin between the path and the edge of the carriageway.

- 5.6.19 It is understood that the final form of this link will be confirmed following the outcome of further detailed discussions with OCC that will take into account the usual technical and viability assessments associated with any new piece of significant infrastructure. However, an extract of the indicative design that has been submitted in support of the SES Land applications is provided at **Figure 5.6**.

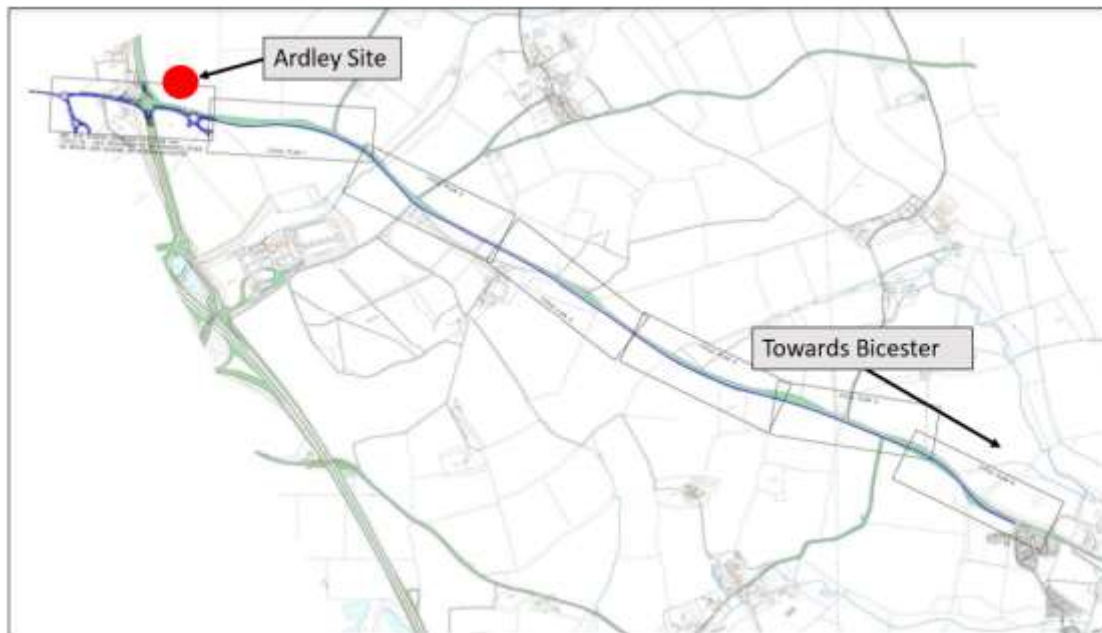


Figure 5.6 Proposed cycleway along the B4100 Map Extract

- 5.6.20 The B4100 cycleway will be 3m wide with a margin between the path and the edge of the carriageway and will provide connections towards National Cycle Network (NCN) Route 51 within Bicester. NCN Route 51 is a long-distance cycling route which begins in Oxford, passing Milton Keynes, Bury St Edmunds and Ipswich before reaching the coast at Felixstowe.
- 5.6.21 It is also recognised that the Bicester Local Cycling and Walking Infrastructure Plan (LCWIP) (adopted in September 2020) sets out a vision and plan to increase cycling and walking for the town of Bicester. With regard to cycling, the plan states that there is a target to increase cycle journeys in Bicester by 200%. As such, it is anticipated that cycling will become a more accessible mode of transport in the future as development is built out in Bicester.
- 5.6.22 To the west of the Site travel on foot or by bicycle will also be supported through improvements committed through a National Highways scheme at Baynards Green Roundabout. Such development will include signals to allow for effective travel flow. There is also the opportunity for signals to be associated with toucan crossings that would allow pedestrians and cyclists to navigate the roundabout safely and access the nearby service stations.
- 5.6.23 In addition to the above, it is noted that a number of Public Right of Way (PRoW) are located in the vicinity of the site as shown in Figure 5.7.

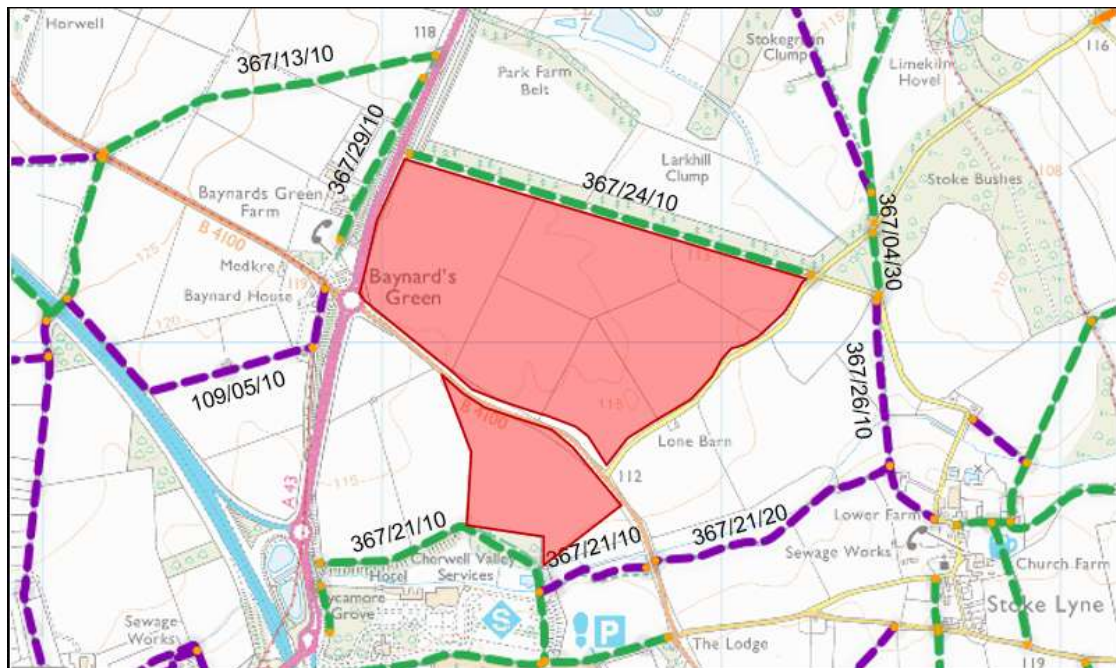


Figure 5.7 PRoW Routes Map Extract

- 5.6.24 PRoW route 367/24/10 runs along the northern boundary of the Site providing a secondary access to a farm and a potential recreational route. The bridleway measures 1.2km in length and could be used to provide an additional access to the Site to those on foot or bicycle.
- 5.6.25 Bridleway 367/21/10 is located to the south of the southern parcel of the Site, routing to Cherwell Valley Service Area and also connects to the Footpath 367/21/20, which routes to the nearby settlement of Stoke Lyne.

Accessibility by Bus

- 5.6.26 An existing bus service routes along the B4100 between the northern and southern parcels of the Site. The service is the 505, operated by Stagecoach. This route travels between Brackley and Bicester including a section along the B4100. The service also serves Bicester Village railway station (providing connections to Oxford and London) and the northern urban extension at Radstone Fields in Brackley. Currently no stops are present by the Site.
- 5.6.27 **Table 5.7** shows the service frequency of the 505 service.

Table 5.7 Existing Bus Services

Service	Route	Approximate frequency in both directions	
		Monday - Saturday	Sunday
505	Brackley - Bicester	Hourly service from 06:47 -17:32.	No Service

- 5.6.28 As part of the development proposals, a new bus stop/layby will be provided adjacent to the existing 505 route which will provide accessibility by public transport for future employees and visitors of the Site.

Accessibility by Rail

- 5.6.29 The closest railway station to the Site is Bicester North located 6.8km to the south-east of the Site. This station is managed by Chiltern Railways. The station provides 575 car parking

spaces and 65 cycle parking spaces that are sheltered and monitored by CCTV.

- 5.6.30 This station has bus services, including the 505 Stagecoach service that would allow employees to potentially travel towards the Site to Charlotte Avenue bus stop, Elmsbrook (this is the closest bus stop to the Site that is also on the 505 route). The station also has step free access. Table 5.8 shows the frequency of services available at Bicester North railway station.

Table 5.8 Existing Rail Services

Service	Route	Approximate frequency in both directions		
		Monday - Friday	Saturday	Sunday
Chiltern Railways	Bicester North – London Marylebone	2 per hour	1 per hour	1 per hour
Chiltern Railways	Bicester North - Banbury	2 per hour	1 per hour	1 per hour
Chiltern Railways	Bicester North – Birmingham Snow Hill	2 per hour	1 per hour	1 per hour

- 5.6.31 As shown in **Table 5.8**, Bicester North is well connected to a number of locations including London and Birmingham. Smaller local towns such as Banbury can also be accessed by train via Bicester North station. These services run Monday through to Sunday at a frequency of one or two trains per hour.

Personal Injury Collisions

- 5.6.32 Personal Injury Collision (PIC) data has been obtained for the latest 5-year period (2016-2020) from Crash Map. The study area obtained comprised the B4100 and the A43 including the Baynards Green Roundabout. An extract of the study area is shown within **Figure 5.8**.

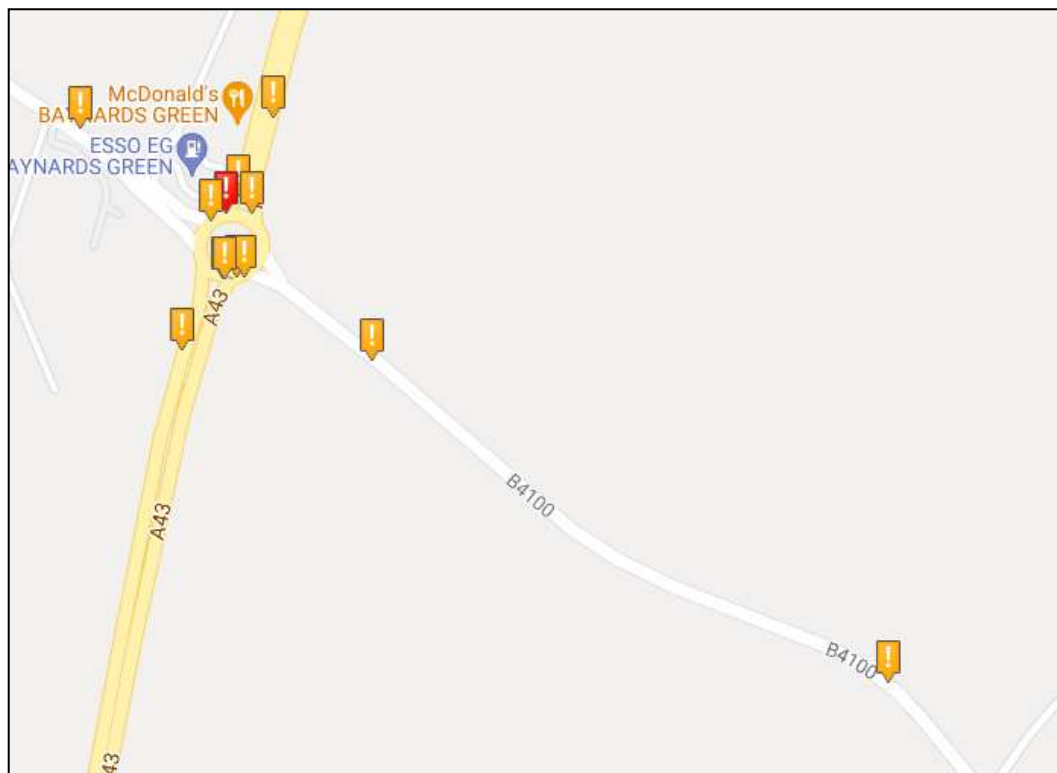


Figure 5.8 Crash Map Study Area Extract

- 5.6.33 At the nearby Baynards Green Roundabout located approximately 400m to the west of the Site, there was an average of two reported incidents per year between 2015 and 2020, with most incidents determined as 'slight' in severity.
- 5.6.34 There are a cluster of incidents at the A43 exit arms.
- 5.6.35 In regard to the cluster at the A43 exit arm to the north, three incidents occurred from 2016-2019, with one identified as serious and two identified as slight in severity. It is noted that for the southernmost slight incident that road conditions were damp/wet therefore resulting in a slippery surface. A review of the collisions did not determine a trend in causes of collision.
- 5.6.36 In regard to the A43 exit arm to the south, four incidents took place between the years of 2017-2019. These were all identified as slight in severity. A review of the collisions did not determine a trend in causes of collision.
- 5.6.37 There are two reported incidents on the B4100 in proximity to the Site access, both determined as slight in severity.
- 5.6.38 Overall, given the relatively low number of incidents, this would not suggest a design flaw or existing road safety issues which could be exacerbated by the proposed development.

Local Amenities

- 5.6.39 The number of local amenities within 500m of the site are limited, but facilities are present. The Moto Cherwell Valley service is located to the south of the site. Here there are a number of food outlets including M&S food, Costa and Pret a Manger. To the west Baynards Green services include a McDonalds and ESSO fuel garage.

Summary

- 5.6.40 It is recognised that accessibility to the Site by walking and cycling is currently limited with no footway currently present along the B4100. However, it is noted that as part of the SES Land at Junction 10 M40 development, OCC has sought the provision of a new shared cycleway towards Bicester. The final form of this link will be confirmed following the outcome of further detailed discussions with OCC that will take into account the usual technical and viability assessments associated with any new piece of significant infrastructure.
- 5.6.41 With regard to bus travel, service 505 currently routes past the site at a half hourly frequency. Whilst there are currently no bus stops in the vicinity of the site, the proposed development will seek to provide new bus stop and layby facilities to facilitate travel by bus to and from the site.
- 5.6.42 Finally, it has been shown through reference to recent accident statistics that the study area is not subject to any inherent design issues that results in clusters of accidents. Indeed, the causation factors for all of the accidents recorded in the last five years can be classified as being driver error.

5.7 Baseline Traffic Flows

- 5.7.1 The existing baseline 24-hour two-way Annual Average Daily Traffic (AADT) flows for vehicles and Heavy Goods Vehicles (HGVs) are provided in **Table 5.9**.
- 5.7.2 As outlined above, baseline data has been extracted from the adjacent Land at Junction 10, M40 applications for consistency purposes.

Table 5.9 Baseline Traffic Flows 24 Hour Annual Average Daily Traffic

Reference	Road Link	Annual Average Daily Traffic	
		Total Vehicles	HGV %
Link 1	B4100 north west of A43/B4100 junction	6,900	3%
Link 2	B4100 north west of site access	12,350	4%
Link 3	B4100 south east of site access	12,000	4%
Link 4	A4095 east	17,700	4%
Link 5	A4095 west	13,772	2%
Link 6	A43 south of A43/B4100 junction	33,800	15%
Link 7	B430	8,150	5%
Link 8	M40 south	11,4859	14%
Link 9	M40 north	88,396	12%
Link 10	A43 north of A43/B4100 junction	37,000	12%
Link 11	A43 north of A421 junction	33,655	12%
Link 12	A421	11,839	8%
Link 13	M40 northbound on-slip	5,213	15%
Link 14	M40 southbound off-slip	6,029	16%
Link 15	M40 northbound off-slip	16,770	17%
Link 16	M40 southbound on-slip	16,112	18%
Link 17	A43 bridge	29,728	13%
Link 18	A43 adjacent to services	45,840	15%

5.8 Receptors and Receptor Sensitivity

Existing

- 5.8.1 **Tables 5.10** and **Table 5.11** present the receptors likely to be affected by the development, and their sensitivity. This takes into account the location of the receptor in question and its relationship with the Site.

Road Links

- 5.8.2 The sensitivity of a road being considered can be defined by the vulnerability of the user groups who may use it, such as elderly people or children, e.g., a road where pedestrian activity is high in the vicinity of a school, or where there is already an existing accident issue may be highly sensitive. It also takes account of the existing nature of the road e.g., an existing "A" road is likely to have a lower sensitivity than a minor residential road.

Table 5.10 Sensitivity of Road Links in Study Area

Reference	Road Link	Sensitivity
Link 1	B4100 north west of A43/B4100 junction	Low
Link 2	B4100 north west of site access	Low
Link 3	B4100 south east of site access	Low

Link 4	A4095 east	Low
Link 5	A4095 west	Low
Link 6	A43 south of A43/B4100 junction	Low
Link 7	B430	Low
Link 8	M40 south	Negligible
Link 9	M40 north	Negligible
Link 10	A43 north of A43/B4100 junction	Low
Link 11	A43 north of A421 junction	Low
Link 12	A421	Low
Link 13	M40 northbound on-slip	Medium
Link 14	M40 southbound off-slip	Medium
Link 15	M40 northbound off-slip	Medium
Link 16	M40 southbound on-slip	Medium
Link 17	A43 bridge	Low
Link 18	A43 adjacent to services	Low

Other Sensitive Receptors

- 5.8.3 Based on a review of the baseline conditions, the following additional receptors and their sensitivity have been identified.

Table 5.11 Additional Receptors in the Study Area

Resource / Receptor	Sensitivity
Pedestrian Network	Low
Cycle Network	Low
Bus Services	Low
Rail Services	Low

- 5.8.4 The IEMA guidelines highlight that sensitive receptors can include congested junctions, hospitals, community centres, conservation areas, schools, colleges, churches and accident black spots. The Proposed Development will not affect any sensitive receptors.

5.9 Assessment of Proposed Development Impacts and Evaluation

Embedded Mitigation

- 5.9.1 The way that potential environmental impacts have been or will be avoided, prevented, reduced or off-set through design and / or management of the Site are outlined below and will be taken into account as part of the assessment of the potential transport effects. Proposed environmental enhancements are also described where relevant. These are essentially measures committed to reduce the potential for residual significant effects.
- 5.9.2 The measures accounted for in the construction phase and once the development is complete and occupied are outlined below.

Construction

Construction Traffic Management Plan (CTMP)

- 5.9.3 A draft CTMP has been prepared in support of the application, which sets out measures to control the potential impacts of the construction process. A summary of these is provided below as follows:

- Temporary traffic control measures (if required);
- Timing controls (e.g., limiting peak period vehicle movements);
- Temporary and permanent access to the works for personnel/vehicles;

- Traffic management procedures for waste disposal vehicles;
- Personnel and vehicle segregation;
- Traffic Management Equipment, e.g., road cones, temporary fencing and signage etc.;
- Provision would be made to ensure that vehicles can be loaded and unloaded off the public highway:
- The Site labour force would be encouraged to use public transport to travel to and from the Site where possible. There would only be limited vehicle parking permitted on-Site for visitors;
- HGV wheels will be washed prior to vehicles leaving the Site;
- Road sweepers will be used on adjacent roads at an appropriate frequency depending on the stage of construction to keep the roads clean and free from mud etc. (if necessary);
- Traffic management plans would be implemented to minimise the potential effect of the works. This would include ensuring that any lane closures (following approval) are undertaken outside of peak hours where considered necessary and appropriate; and
- Pedestrian and cycleways would be temporarily diverted during the public highway works where necessary (following approval).

5.9.4 The provision of a CTMP would ensure that a strategy for planning the construction access routes will be implemented, to take into account current legislation, and the feedback from consultation with relevant stakeholders.

Operation

Improvements

5.9.5 As part of the development proposals at the site, bus stops will be provided in the vicinity of the proposed site access roundabout.

5.9.6 It is understood that as part of the planning applications at the Land at Junction 10, M40 schemes (references: 21/03267/OUT and 21/03268/OUT), a shared pedestrian/cycle route along the B4100 towards Bicester is being discussed with OCC. The proposal is currently in an early stage.

5.9.7 It is also understood that the A43/B4100 roundabout is to be upgraded. National Highways is undertaking design work for a Growth Fund improvement of the junction to facilitate planned growth. There is a commitment for its delivery by 2023. For the purposes of this assessment reference has been made to the following design, see **Figure 5.4**.

Management Plans

5.9.8 As is set out in the TA, the Proposed Development will operate a range of management plans that will:

- Encourage use of modes of transport other than the private car to be used by employees and visitors.
- Outline the measures that will be adopted to ensure the efficient use of the service yard.

5.9.9 Whilst draft reports (CTMP and a Travel Plan) have been prepared in support of the application, it is expected that these will be secured by a suitably worded condition with the content agreed with OCC and NH prior to the Proposed Development becoming operational.

5.10 Construction Phase Impacts

Impact 1: Construction Traffic on Environment/Receptors

- 5.10.1 As the trip generation from the construction works would fluctuate through the implementation of the development, a reasonable assessment has been undertaken of the highest daily construction trip two-way flows. This has been completed in advance of appointing a contractor or defining the detailed construction activities and programme.
- 5.10.2 A first-principles approach has been applied to assess the highest likely daily construction trip generation from the proposed development. It has been assumed that the activities that would generate the greatest construction vehicle movements are:
- construction workers travelling to and from the Site;
 - on-site earthworks and landscaping; although there is an expectation that a cut and fill materials balance will be achieved on-site;
 - construction of the proposed development access roads;
 - utilities work; and
 - construction and fit out of the new buildings.
- 5.10.3 In order to provide a comparison, daily two-way construction vehicle movements have been extracted from the Land at Junction 10, M40 proposed development for the construction of circa 280,000sqm of logistics floor space as it reflects a similar land use to what is being proposed at the Application Site.
- 5.10.4 The daily number of HGV movements will depend on the preferred construction methods and will vary between construction phases, which will be informed by the contractor (to be appointed an appropriate time in the programme). However, based on other developments and the Land at Junction 10, M40 scheme, it is considered that an average daily peak could total circa 100 two-way HGV movements.
- 5.10.5 Construction staffing would also fluctuate through the construction phase, however at the peak it is estimated that there would be approximately 150 vehicles associated with construction personnel. This assumes an element of construction personnel travelling to the Site by alternatives to the private car and also assumes an element of car sharing between site employees.
- 5.10.6 Of the flows summarised above, only a limited number of light vehicle and HGV movements would typically occur during the peak hours. Working patterns for construction workers are unlikely to coincide with the network peak, and construction processes would be programmed to avoid reliance on deliveries of large loads, such as concrete and bituminous materials during peak times.
- 5.10.7 For the purposes of this assessment, it has been assumed that all construction traffic would route along the A43 to/from the M40 J10, which provides the most direct access to the strategic road network.
- 5.10.8 On the basis of the maximum number of construction activities occurring on-site at the same time, a worst-case assessment of the likely impact on daily traffic flows is provided in **Table 5.12**.

Table 5.12 Worst Case Construction Traffic Impacts (Daily)

Road Affected	2019 Base Year Flows (Two-way)		Estimated Construction Traffic (Two-way)		% Increase	
	All Vehicles	HGVs	All Vehicles	HGVs	All Vehicles	HGVs
A43 South (towards M40)	37,000	4,440	150	100	0.4%	2.3%

5.10.9 With regard to construction, the maximum impact is on the A43 west of the proposed Site access with daily flows increasing by less than half a per cent if used by all vehicles, and HGVs increasing by approximately two per cent.

5.10.10 Again, this assessment assumes a worst-case scenario that would only occur for a short amount of time should all operatives associated with the maximum construction activities onsite at the same time; therefore, the significance of effect from construction activities is negligible.

5.10.11 On this basis, it is considered that the effect of the construction traffic upon the receiving environment/receptors will be temporary and Negligible (Not Significant):

- Pedestrian severance – Very limited pedestrian activity in the area combined with the effects being temporary and it has been shown that the increases in traffic and HGV activity on all links will not exceed Rule 1 of the IEMA thresholds;
- Pedestrian delay – Very limited pedestrian activity in the area combined with the effects being temporary and it has been shown that the increases in traffic and HGV activity will not materially change on the links assessed;
- Pedestrian amenity – Very limited pedestrian activity in the area combined with the effects will be temporary and it has been shown that the increases in traffic and HGV activity will not double on the links across the construction period;
- Driver delay - as the effects will be temporary and it has been shown that the level of vehicular activity will be modest on the local highway network, particularly when compared to that associated with the operational phase of the Proposed Development;
- Fear and intimidation - Very limited pedestrian activity in the area combined with the modest increases in vehicular and HGV activity and will not lead to any links to transfer into another bracket of the thresholds outlined in **Table 5.5**;
- Road safety - as the increases in temporary activity will not increase the likelihood of accidents occurring, on a network that has been found not to have any underlying safety issues that lead to an abnormally high accident rate.

5.10.12 There is the potential that mud and debris could be deposited on the surrounding roads by construction vehicles transporting waste away from the Site. It is generally accepted that there are no simple formulae to predict the level of dust and dirt which might arise from vehicle movements. However, given the scale of the development it is considered, based on our professional judgement, that the potential effects of this from a road safety perspective will be temporary and Negligible (Not Significant). Indeed, it should be noted that the CTMP that will be operated will include construction management measures such as the use of wheel washing facilities and keeping fine materials damp to minimise the amount of material that is deposited on the surrounding road network including the A41 that provides access into the Site.

Impact 1: Mitigation

5.10.13 No further mitigation is required.

Impact 1: Residual Effect

5.10.14 As no further mitigation is proposed the residual effect remains Negligible and Not Significant.

5.11 Operational Phase Impacts

Impact 2: Operational Traffic - Opening Year 2025

Opening Year 2025

5.11.1 In relation to the opening year assessment, there will be change on the highway network in the absence of the Proposed Development. These changes are due to the vehicle movements arising from other committed developments (i.e., cumulative schemes) and general growth in traffic in the area. The opening year traffic flows for 2025 take into account expected traffic growth in the area from both background traffic growth and additional growth from committed developments. Full details are provided in the TA.

5.11.2 The assessment year for the opening year traffic flows is 2025 and these traffic flows are based on the specific data relating to the effects of committed development within the study area and background growth in the area.

5.11.3 Traffic flows for the Opening Year 2025 are summarised in **Table 5.13** (24-hour AADT).

Table 5.13 2025 Traffic Flows 24 Hour Annual Average Daily Traffic

Reference	Road Link	Annual Average Daily Traffic	
		Total Vehicles	HGV %
Link 1	B4100 north west of A43/B4100 junction	12,187	2%
Link 2	B4100 north west of site access	7,937	7%
Link 3	B4100 south east of site access	17,897	4%
Link 4	A4095 east	17,377	4%
Link 5	A4095 west	18,947	2%
Link 6	A43 south of A43/B4100 junction	43,381	16%
Link 7	B430	16,120	5%
Link 8	M40 south	138,709	15%
Link 9	M40 north	107,845	12%
Link 10	A43 north of A43/B4100 junction	46,007	12%
Link 11	A43 north of A421 junction	42,161	12%
Link 12	A421	13,393	10%
Link 13	M40 northbound on-slip	7,656	14%
Link 14	M40 southbound off-slip	7,834	15%
Link 15	M40 northbound off-slip	21,939	15%
Link 16	M40 southbound on-slip	20,758	17%
Link 17	A43 bridge	45,185	11%
Link 18	A43 adjacent to services	65,348	13%

5.12 Assessment of Effects

- 5.12.1 The total traffic generated by the Proposed Development once completed, operational and fully occupied (2025) has been based on data extracted from the industry standard TRICS database. Full details are provided in the TA with a summary of the resulting trip generation for the presented in **Table 5.14**, the number of HGVs is presented in brackets.

Table 5.14 Forecast AM, PM and Daily Vehicle Movements to and from the Site

Period	Total Vehicle (Two-way)
AM Peak Hour (08:00-09:00)	472 (114)
PM Peak Hour (17:00-18:00)	466 (93)
24 hours	8,007 (2,241)

- 5.12.2 Having regard to the information provided above, **Tables 5.15** present the percentage increase in total vehicle flows and HGVs by link in 2025 as a result of the Proposed Development for the daily 24-hour AADT.
- 5.12.3 It is noteworthy that future traffic flows for 2031 are only produced to allow junction capacity assessments to be undertaken in the TA. These are not considered relevant for ES purposes and as such have not been included in this ES chapter.

Table 5.15 Summary of Impact as a Result of the Proposed Development (2025 AADT)

Reference	Road Link	Annual Average Daily Traffic	
		Total Vehicles	HGV
Link 1	B4100 north west of A43/B4100 junction	+2.8%	+0.0%
Link 2	B4100 north west of site access	+55.9%	+383.2%
Link 3	B4100 south east of site access	+20.0%	+15.7%
Link 4	A4095 east	+5.1%	+4.0%
Link 5	A4095 west	+4.7%	+7.4%
Link 6	A43 south of A43/B4100 junction	+6.4%	+20.3%
Link 7	B430	+1.4%	0.0%
Link 8	M40 south	+1.2%	+4.7%
Link 9	M40 north	+0.9%	+3.3%
Link 10	A43 north of A43/B4100 junction	+2.8%	+13.0%
Link 11	A43 north of A421 junction	+2.2%	+10.2%
Link 12	A421	+2.8%	+15.1%
Link 13	M40 northbound on-slip	+12.3%	+39.7%
Link 14	M40 southbound off-slip	+12.1%	+36.2%
Link 15	M40 northbound off-slip	+4.5%	+10.9%
Link 16	M40 southbound on-slip	+4.8%	+10.2%
Link 17	A43 bridge	+2.6%	+8.6%
Link 18	A43 adjacent to services	+4.3%	+16.6%

- 5.12.4 The results of the predicted traffic flows arising from the Proposed Development indicate that the potential impact on all assess links range from 0.9% to 55.9%. In addition to this, HGV flows are expected to increase by 0% to 383.2%. It should be noted that in this instance, the large percentage change is from a relatively low base of 555 HGVs (AADT).
- 5.12.5 As set out above in this Section, the IEMA Guidelines suggest that detailed environmental

studies will only be triggered where road links experience a change in traffic greater than 30%, or more than 10% where links contain sensitive interest.

- 5.12.6 On this basis, links 2, 13, 14, 15 and 16 have been examined in more detail. Whilst it is noted that the 10% is increased on other links, these are considered to be low sensitivity receptors and have therefore been discounted from this assessment.

Severance

- 5.12.7 There is no existing requirement to cross any of the links including the B4100, A43 and M40 on and off slips. It is also expected that future users of the Proposed Development will not be required to cross any of the links and therefore no severance effects are predicted. The impact on Severance is therefore considered to be negligible.

Pedestrian and Cyclist Delay and Amenity

- 5.12.8 The Proposed Development will provide a safe environment for pedestrians and cyclists by delivering a well connected set of footways and cycleways within the site. This will also provide connections to the proposed shared ped/cycle link along the B4100, which is proposed to be delivered by Albion Land as part of the Junction 10, M40 scheme. As is noted in the TA, the Applicant is willing to work with Albion Land and OCC to develop this link in more detail through the determination of the application.
- 5.12.9 The Applicant has committed to bring a bus service to the site with a proposed bus stop and layby in the vicinity of the proposed site access roundabout. This will be supported by pedestrian crossing facilities across the eastern arm (i.e., the B4100 south link).
- 5.12.10 The effects of the Proposed Development are permanent on pedestrians and cyclists. The sensitivity of the B4100 is low and the magnitude of change is high in terms of HGVs and medium in relation to vehicles. The sensitivity of the M40 is medium and the magnitude of change is low.

Driver Delay

- 5.12.11 Peak hour operational assessments are presented within the TA at a number of junctions on the local network in the future assessment years of 2025 and 2031. The results of these are included within the TA and show there is no material increase to driver delay on the road network.

Accidents and Safety

- 5.12.12 The proposed access will act as a natural speed restraint given it is likely vehicles will have to stop at the roundabout before continuing their journey. It has been designed in accordance with the relevant design guidance and has been subject to a Road Safety Audit. Full details of this, which has identified only minor observations that can be addressed at the Detailed Design stage, are provided in the TA.
- 5.12.13 Whilst it is noted that the adjacent network (A43 and M40 J10) carries a relatively large level of traffic, it is not subject to an inherently poor accident history. The effects of the Proposed Development are permanent on road users. The impact on accidents is low.
- 5.12.14 The Growth Fund scheme at the A43/Baynards Green will introduce traffic signal control, removing existing elements of vehicle conflict. With this scheme in place, the effects of the Proposed Development may change, subject to the final design of the Growth Fund Scheme. However, as the design will need to accord with the usual requirements of the DMRB there is

nothing to suggest that these changes will be detrimental to road safety and/or affect the overall effect of the Proposed Development from a safety perspective.

Impact 2: Mitigation

5.12.15 The operation of the site will be governed by a Travel Plan which will be implemented to ensure that future occupiers are advised of the sustainable travel options that are available to them when travelling to and from the Site.

5.12.16 Ongoing monitoring will take place through the Travel Plan including regular mode share surveys with the results reported to OCC.

Impact 2: Residual Effect

5.12.17 As no further mitigation is proposed the residual effect remains as follows in **Table 5.16**.

Table 5.16 Residual Effects

Receptor	Description of the Residual Effect	Scale and Nature	Beneficial / Adverse	Geo	D / I	P / T	St / Mt / Lt
Construction							
All of the options listed in Table 5.4	Pedestrian severance	Negligible	Adverse	L	D	T	St
	Pedestrian delay						
	Pedestrian amenity						
	Driver delay						
	Fear and Intimidation						
	Road Safety						
Completed Development							
All of the options listed in Table 5.4	Pedestrian severance	Minor	Adverse	L	D	P	Lt
	Pedestrian delay						
	Pedestrian amenity						
	Road Safety						
	Fear and Intimidation	Negligible	N/A				
	Driver delay						
Notes: Residual Effect, Scale = Negligible / Minor / Moderate / Major; Nature = Beneficial or Adverse; Geo (Geographic Extent) = Local (L), Borough (B), Regional (R), National (N); D = Direct / I = Indirect ;P = Permanent / T = Temporary; St = Short Term / Mt = Medium Term / Lt = Long Term N/A = not applicable / not assessed.							

5.13 Cumulative Effects

Inter-topic Relationship Effects

- 5.13.1 The cumulative effects on air quality and the noise environment are evaluated in Chapters 6 and 7.

Third Party Development Cumulative Effects

- 5.13.2 This section of the chapter assesses the Transport effects of the Proposed Development in combination with other Transport effects of committed developments (**Table 5.1**). For the purposes of this assessment, consideration is given to both the construction and operational phases.

Construction Phase

- 5.13.3 The location of the Committed Developments to the Site is such that the potential for any overlap of construction vehicles associated with the committed developments and that of the Proposed Development will be focused on J10 of the M40.
- 5.13.4 Given the increases in construction traffic associated with the Proposed Development are comfortably within the increases in traffic associated with its operational phase (i.e., circa 8,000 vehicles per day), which have been established to have, at worse, a negligible effect upon the surrounding transport networks, it is considered that the cumulative construction effects of these schemes would be Negligible and temporary in nature. This is particularly evident given that the Proposed Development and committed schemes will be expected to operate CTMPs that minimise the effects of construction traffic.

Operational Phase

- 5.13.5 The location of the Proposed Development with respect to the committed developments is such that there will inevitably be some overlap in the origin and destination profiles of people that will travel to and from these developments once they are operational. This is evident when considering the distribution profiles of development set out in the TA.
- 5.13.6 Moreover, on-site observations have established the study area is characterised by relatively low pedestrian/cyclist activity and as such it is considered that there are no inherent capacity constraints that will be exacerbated by the committed developments. Similarly, safety records do not suggest that there is any particular safety concern with respect to pedestrians and cyclists.
- 5.13.7 In this regard, it is considered that the cumulative effects of the major developments identified are likely to have a permanent and negligible (Not Significant) effect on the pedestrian and cycle networks in environmental terms. This is particularly evident given that it has been established that the Proposed Development will deliver a comprehensive package of improvements to the existing network that will benefit future users of the Site and the existing local residents through enhanced access to the PRoW and public transport networks.
- 5.13.8 When considering the cumulative impact of the Proposed Development upon public transport, it should be noted that on-site observations suggest that the bus services that operate within the vicinity of the Site do not currently operate at capacity. As such, the cumulative effects of the Proposed Development will result in a permanent and negligible (Not Significant) effect on the local bus services in environmental terms.
- 5.13.9 The cumulative effects of the committed developments upon the adjacent highway network

has already been taken into in the analyses presented above. The cumulative effect of the Proposed Development is thus considered to be permanent and Negligible (Not Significant) given the conclusions reached with respect to 'Driver Delay' and 'Accidents and Safety'.

5.14 Implications of Climate Change

- 5.14.1 As part of the proposals at the Site, a Travel Plan will be in operation. This will seek to encourage future employees at the Site to travel by sustainable methods and away from the private car. In addition, there are a number of EV parking spaces proposed at the Site, which aligns with government policy. Furthermore, there are bus stops located adjacent to the Site and as such there are opportunities to facilitate travel by bus to and from the Site. As bus fleets across England become electrified, this will assist with further reducing greenhouse gas emissions associated with bus travel.
- 5.14.2 On the basis of the above, there are a range of measures and opportunities at the Site, which will assist with reducing greenhouse gas emissions in line with the targets set by the government.
- 5.14.3 It is noted that there will be unavoidable greenhouse gas emissions resulting from the construction of the Proposed Development. It is expected that the CTMP will encourage construction workers to travel to the Site using sustainable modes of travel where feasible to do so.

5.15 Summary

- 5.15.1 None of the residual effects of the development at the Site are considered to be significant.

6 Air quality

6.1 Introduction

- 6.1.1 This chapter of the ES considers the potential air quality effects associated with the construction and operation of the Proposed Development (see Chapter 3 for a detailed description of the Proposed Development).
- 6.1.2 The chapter describes the scope, relevant legislation and planning policy, assessment methodology and the baseline conditions currently existing at the Site and the surrounding area. It then considers any potentially significant environmental effects that the Proposed Development would have on this baseline environment and the mitigation measures required to prevent, reduce, or offset any significant adverse effects; and the likely residual impacts after those measures have been employed. The chapter is supported by Figures 6.1 to 6.3 and Appendices 6.1 to 6.4.

Assessment Scope

- 6.1.3 The assessment scope has been developed on the basis of published guidance (see paragraph 6.2.1), a review of consultation responses to the planning application on the adjoining site (CDC ref. 21/03267/OUT), in addition to direct consultation with the CDC Environmental Health department. The scope comprises:
- Baseline evaluation – assessment of existing air quality in the local area;
 - Construction phase assessment – identification and assessment of potential air quality impacts and effects associated with the construction phase of the Proposed Development;
 - Operational phase assessment – identification and assessment of potential impacts and effects of pollutant emissions from the traffic associated with the operational phase of the Proposed Development; and
 - Mitigation Measures – Identification of appropriate mitigation measures.

Legislation and Local Policy

Legislative Context

Air Quality Strategy

- 6.1.4 The 'Air Quality Strategy for England, Scotland, Wales and Northern Ireland' (AQS) 2007, contains air quality objectives based on the protection of both human health and vegetation (ecosystems).
- 6.1.5 The AQS provides the over-arching strategic framework for air quality management in the UK and contains statutory national air quality Objectives established by the UK Government and Devolved Administrations for the protection of public health and the environment.
- 6.1.6 The AQS objectives apply at locations outside buildings or other natural or man-made structures above or below ground, where members of the public are regularly present and might reasonably be expected to be exposed to pollutant concentrations over the relevant averaging period – herein referred to as relevant exposure. Table 6.2 provides an indication of those locations.
- 6.1.7 The ambient air quality standards of relevance to human receptors in this Chapter (collectively termed Air Quality Assessment Levels (AQALs) throughout this report) are provided in Table 6.1.

Table 6.1 AQALs of relevance

Pollutant	Standard ($\mu\text{g}/\text{m}^3$)	Measured As	
Nitrogen Dioxide (NO_2)	40	Annual Mean	-
	200	1-hour Mean	Not to be exceeded more than 18 times a calendar year
Particles (PM_{10})	40	Annual Mean	-
	50	24-hour mean	Not to be exceeded more than 35 times a calendar year
Particles ($\text{PM}_{2.5}$)	25	Annual Mean	-

Table 6.2 Human health relevant exposure

AQAL Averaging Period	AQALs should apply at	AQALs should not apply at
Annual Mean	Building facades of residential properties, schools, hospitals etc.	Facades of offices Hotels Gardens of residences Kerbside sites
24-hour Mean	As above together with hotels and gardens of residential properties	Kerbside sites where public exposure is expected to be short term
1-hour Mean	As above together with kerbside sites of regular access, car parks, bus stations etc.	Kerbside sites where public would not be expected to have regular access

Local Air Quality Management

6.1.8 Part IV of the Environment Act 1995 places a statutory duty on local authorities to undergo a process of Local Air Quality Management (LAQM). This requires local authorities to Review and Assess air quality within their boundaries to determine the likeliness of compliance, regularly and systematically.

6.1.9 Where any of the prescribed AQS objectives are not likely to be achieved, the authority must designate an Air Quality Management Area (AQMA). For each AQMA, the local authority is required to prepare an Air Quality Action Plan (AQAP), which details measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the objective. AQMAs can give rise to potential constraints to development, or at least a higher degree of scrutiny to air quality assessment work. Local authorities therefore have formal powers to control air quality through a combination of LAQM and through application of wider planning policies.

Clean Air Strategy

6.1.10 The Clean Air Strategy (CAS), published in 2019, sets out the Government's proposals aimed at delivering cleaner air in England, and indicates how devolved administrations intend to make emissions reductions. It sets out the comprehensive action that is required from across all parts of government and society to deliver clean air.

General Nuisance Legislation

6.1.11 Part III of the Environmental Protection Act (EPA) 1990 (as amended) contains the main legislation on Statutory Nuisance and allows Local Authorities and individuals to take action to prevent a statutory nuisance. Section 79 of the EPA defines dust as a potential Statutory Nuisance amongst other things emitted from industrial, premises so as to be prejudicial to health or a nuisance. It also defines as a nuisance, accumulation or deposit, which is prejudicial to health.

6.1.12 In contrast to suspended particulate matter, there are no UK or European statutory standards

that define the point at which deposited dust causes annoyance or affects amenity. Nuisance is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred.

Planning Policy

- 6.1.13 The following policies have been considered within this assessment.

National Policy

- 6.1.14 The 2021 update to the National Planning Policy Framework (NPPF) describes the policy context in relation to air pollutants:

'Para 174: Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of [...] air [...] pollution [...]. Development should, wherever possible, help to improve local environmental conditions such as air [...] quality [...].'

'Para 185: 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.'

- 6.1.15 Specifically, in terms of development with regards to air quality:

'Para 186: 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.'

- 6.1.16 The NPPF is accompanied by web based supporting Planning Practice Guidance (PPG) which includes guiding principles on how planning can take account of the impacts of new development on air quality. In regard to air quality, the PPG states:

'Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values [...] It is important that the potential impact of new development on air quality is taken into account [...] where the national assessment indicates that relevant limits have been exceeded or are near the limit.'

'Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impacts in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of the EU legislation (including that applicable to wildlife).'

- 6.1.17 The PPG sets out the information that may be required within the context of a supporting air quality assessment, stating that "assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality [...] mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact."

- 6.1.18 The policies within the NPPF and accompanying PPG in relation to air pollution are considered within this Chapter.

Local Policy

- 6.1.19 The Cherwell Local Plan 2011 - 2031 was re-adopted by CDC incorporating policy Bicester 13 on 19th December 2016. The following policy relates to air quality:

Policy ESD10: Protection and Enhancement of Biodiversity and the Natural Environment Air Quality:

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

[...]

Air quality assessments will also be required for development proposals that would be likely to have a significant adverse impact on biodiversity by generating an increase in air pollution.’

- 6.1.20 The above policy is addressed by this Chapter.

6.2 Assessment methodology

Key Assessment Guidance

- 6.2.1 This assessment has been carried out in accordance with the principles contained within the guidance documents below:

- Department for Environment Food and Rural Affairs (Defra): LAQM Technical Guidance (2016) (LAQM.TG(16));
- Defra: COVID-19: Supplementary Guidance. Local Air Quality Management Reporting in 2021;
- Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM): Land-use Planning & Development Control: Planning and Development Control: Planning for Air Quality (2017);
- IAQM: A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites v1.1 (2020);
- Highways England: Design Manual for Roads and Bridges (DMRB) LA 105 Air; and
- IAQM: Guidance on the Assessment of Dust from Demolition and Construction (2016).

Construction Phase

- 6.2.2 The assessment of impacts associated with the generation of dust as a result of the construction phase has been undertaken with reference to the IAQM construction dust guidance. The assessment of risk is determined by considering the risk of dust effects arising from four activities, initially in the absence of mitigation:

- demolition;
- earthworks;
- construction; and
- trackout.

- 6.2.3 The assessment methodology considers three separate dust impacts with account being taken of the sensitivity of the area that may experience these effects;

- annoyance due to dust soiling;
- the risk of health effects due to an increase in exposure to PM₁₀; and

- harm to ecological receptors.

6.2.4 The first stage of the assessment involves a screening to determine if there are sensitive receptors within threshold distances of site activities associated with the construction phase of the scheme (See Figure 6.1). A detailed assessment is required where a:

- human receptor is located within 350m of the Site, and/or within 50m of routes used by construction vehicles, up to 500m from the Site entrance(s); and/or
- ecological receptor is located within 50m of the Site, and/or within 50m of routes used by construction vehicles, up to 500m from the Site entrance(s).

6.2.5 The dust emission class (or magnitude) for each activity is determined based on the guidance, indicative thresholds and expert judgement. The risk of dust effects arising is based upon the relationship between the dust emission magnitude and the sensitivity of the area.

6.2.6 Heavy Duty Vehicle (HDV = vehicles >3.5t gross weight) movements on the A43 or B4100 are predicted to be less than 100 Annual Average Daily Traffic (AADT) two-way movements. Therefore, according to EPUK-IAQM screening guidance the requirement for a detailed assessment can be screened out from further detailed assessment.

Construction Phase Assessment of Significance

6.2.7 The potential for significant construction dust effects has been assessed using the IAQM guidance. The risk of dust effects arising is based upon the relationship between the dust emission magnitude and the sensitivity of the area, and is classified as negligible risk, low risk, medium risk, or high risk. The risk of impact is then used to determine the appropriate mitigation requirements, whereby through effective application, residual effects are considered to be 'not significant'.

Operational Phase

6.2.8 In order to assess the potential effects on human receptors from road traffic emissions associated with the operational phase of the Proposed Development, a screening for 'affected' roads has first been undertaken to inform the spatial extent of the assessment. Affected roads have been identified by reference to EPUK-IAQM screening criteria for 'significant changes' in traffic, i.e.:

- a change of Light Duty Vehicles (LDV = vehicles <3.5t gross weight) flows of more than 500 AADT (outside an AQMA);
- a change of HDV flows of more than 100 AADT (outside an AQMA);
- a change of LDV flows of more than 100 AADT (within or adjacent to an AQMA); and/or
- a change of HDV flows of more than 25 AADT (within or adjacent an AQMA).

6.2.9 The extent of the affected road network encompasses the A43 north and south of Baynards Green and the B4100 south to Bicester, and the Bicester ring road, the A4095 (Figure 6.2).

6.2.10 The potential impact at receptors in proximity to 'affected' roads, has been assessed using detailed dispersion modelling undertaken using the Cambridge Environmental Research Consultants (CERC) ADMS-Roads version v5.0.0.1, focussing on concentrations of NO₂, PM₁₀ and PM_{2.5} for the following scenarios:

- 2019 Baseline / model verification (2019 BC) – Base flows for the year 2019;
- 2025 Do Minimum (2025 DM) – Without development flows for the assumed year of opening (2025), inclusive of any relevant committed development flows; and

- 2025 Do Something (2025 DS) – With development flows for the proposed year of opening (2025), inclusive of any relevant committed development flows.
- 6.2.11 For the 2025 future year scenario, 2025 projected emission factors and background pollutant concentrations have been applied. The assessment of road traffic emissions addresses cumulative effect, in that the future scenarios (DM and DS) take account of committed developments (and associated traffic flows) within the study area.
- 6.2.12 Further details of the road traffic emissions assessment methodology applied are provided in Appendix 6.1, whilst the modelled roads in relation to the Site are presented in Appendix 6.5.
- 6.2.13 For ecological receptors an initial screening was undertaken to identify links above the DMRB / LA105 traffic screening criteria of a change in AADT flows on a given road of 1,000 vehicles or 200 HDVs. These links were then screened for relevant ecological designations of either European or National conservation status within 200m. These sites were then reviewed for qualifying features sensitive to air pollution. On the basis of this screening, impacts were assessed on the 'Ardley Cutting and Quarry' Site of Special Scientific Interest (SSSI) that passes underneath the M40 south of Junction 10, only (Figure 6.3). Further details of the assessment methodology are presented in Appendix 6.3.

Assessment of Significance

- 6.2.14 Significance criteria as provided within EPUK-IAQM guidance has been used for the purpose of informing effects arising from road traffic emissions on human receptors.
- 6.2.15 The guidance provides a method for identifying impacts at a specific receptor, taking into account the resultant total concentration as well as the magnitude of change in relation to the respective AQAL (see Table 6.3).

Table 6.3 EPUK-IAQM impact descriptors for receptors

Long Term Average Concentration at Receptor in Assessment Year	Change in Concentration Relative to AQAL			
	1% (A)	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial
Table note: (A) Changes of 0%, i.e., less than 0.5% will be described as Negligible.				

- 6.2.16 Following derivation of impacts at all receptor locations assessed, the overall significance of the 'effect' is determined based upon consideration, as necessary, of the following factors:
- the existing and future air quality in the absence of the development;
 - the extent of current and future population exposure to the impacts;
 - the worst-case assumptions adopted when undertaking the prediction of impacts; and
 - the extent to which the Proposed Development has adopted best practice to eliminate and minimise emissions.

Consultation

- 6.2.17 Consultation has been undertaken directly with the Environmental Health Officer (EHO) at CDC to agree on the scope and methodology of the assessment. .

Assumptions and Limitations

Construction Phase Assessment

- 6.2.18 The construction dust assessment is primarily a tool to identify the proportionate level of mitigation required for anticipated construction activities. Resultant effects ultimately depend on the effective application of this mitigation. Therefore, there can be uncertainty on the representativity of the assessment procedure and associated post-mitigated outcomes if mitigation is not implemented. In response to this limitation, construction dust mitigation is typically secured by a planning condition and/or included within a Construction Environmental Management Plan (CEMP) (or similar).
- 6.2.19 It is acknowledged that there may be current uncertainties surrounding the proposed construction activities which may affect the validity or representativity of the assessment and associated outcomes. Where Site specific information is not known, a worst-case approach has been adopted with regards anticipated construction activities. Furthermore, the Site boundary has been used for the purposes of defining the distance to potential dust sources (i.e. decreasing the separation distance(s) to nearby sensitive receptors applied in the assessment). As such, potential risks calculated are intended to be precautionary (worst case), which may result in a higher level of mitigation being recommended than would realistically be required, providing greater confidence in the representativity of the assessment outcomes.

Operational Phase Assessment

- 6.2.20 Dispersion modelling is principally reliant on the accuracy and representativity of its inputs. In acknowledgement of this, the ADMS-Roads dispersion model has been verified with the latest representative publicly available local monitoring data, as collected by CDC – to ensure consistency.
- 6.2.21 In addition, there is a widely acknowledged disparity between emission factors and ambient monitoring data. To help minimise any associated uncertainty when forming conclusions from the results, this assessment has utilised the latest Emissions Factors Toolkit (EFT) version 11.0 utilising COPERT 5.3 emission factors, and associated tools/datasets published by Defra.
- 6.2.22 In addition, from review of local monitoring data presented, NO₂ concentrations are broadly reducing, correlating to national projections and assumptions embedded within the tools and datasets employed within this assessment. This provides a greater confidence and certainty in the use of these national datasets within the local setting.
- 6.2.23 The study area, was defined with reference to the EPUK-IAQM road traffic screening criteria (as described in Sections 6.2.8 to 6.2.13). However, a number of roads or sections of roads were excluded from study area. The initial sections of the A43 north of the Baynards Green roundabout where impacts are expected to be greatest were assessed, however further north the areas surrounding the roads are very rural in nature, with no identified sensitive receptors at the roadside. Furthermore, roads in Bicester south of the junction of the B4100 and A4095 were excluded from the study area, on the basis that it is not possible to predict car driver trip origins and destinations with sufficient accuracy through Bicester residential areas. It was therefore assumed that Development-generated vehicle movements south of the B4100 / A4095 would distribute across residential areas in Bicester within a short distance to below the EPUK-IAQM road traffic screening criteria.
- 6.2.24 The assessment of potential impact on the 'Ardley Cutting and Quarry' SSSI, has adopted a 'simple assessment' approach as defined by the IAQM conservation guidance to address the

contribution of Development-generated trips on the M40 south of Junction 10. Although the cumulative assessment is limited in this regard, the approach provides context to the relative increase in nitrogen pollution at sensitive habitats as a result of the Development. In addition, there are no suitable nitrogen oxide (NO_x) monitoring locations adjacent to the motorway to undertake a verification calculation, which is also acknowledged as a limitation.

6.3 Baseline conditions

- 6.3.1 Monitoring data collected prior to the COVID-19 pandemic (i.e. pre-2020) has been used to characterise the baseline environment, as pollutant concentrations monitored during 2020 and 2021 are expected to be atypical, and not representative of the local environment and have therefore not been considered.

LAQM Review and Assessment

- 6.3.2 CDC, in fulfilment of statutory requirements, has conducted an on-going exercise to review and assess air quality within their administrative area. The latest publicly available LAQM report for CDC (not impacted by the COVID-19 pandemic) at the time of writing is the 2020 Annual Status Report (ASR).
- 6.3.3 CDC has designated four AQMAs due to elevated annual mean NO₂ concentrations at locations of relevant exposure. The Proposed Development is located approximately 6.5km north-west of the nearest AQMA (AQMA No.4) located within Bicester.
- 6.3.4 The Site is not located within an AQMA.

Review of Air Quality Monitoring

- 6.3.5 A review of both national and local monitoring networks has been undertaken for monitoring locations suitable to characterise the Site and surrounding areas.
- 6.3.6 Passive NO₂ diffusion tube monitoring is currently undertaken by CDC within the Site locale, although most are situated within Bicester and not within the spatial extent of the model domain.
- 6.3.7 The details and results of the monitoring locations of relevance to the Site are presented in Table 6.4 and Table 6.5 respectively, whilst their locations are illustrated in Appendix 6.5.
- 6.3.8 All monitoring data presented has been ratified by CDC.

Table 6.4 Local diffusion tube monitoring sites: details

Site ID	Site Name	Site Type	NGR (m)		Height (m)	Within AQMA?
			X	Y		
DT26	Tamarisk Gardens	Urban Background	458333	224432	2	N
DT27	Howes Lane 2014	Roadside	457956	224362	2	N
DT39	Ardley (B430)	Roadside	454301	227498	2	N

Table 6.5 Local diffusion tube monitoring sites: results

Site ID	2019 Data Capture %	Annual Mean NO ₂ Concentration (µg/m ³)				
		2015	2016	2017	2018	2019
DT26	100	15.7	17.2	16.3	15.9	15.0
DT27	83	23.9	25.6	25.6	24.5	20.7
DT39	100	29.6	28.7	27.2	26.0	24.4

- 6.3.9 Annual mean NO₂ concentrations at the considered diffusion tube monitoring locations have reduced over the period assessed, correlating to national projections, placing greater confidence in the applied assessment inputs and projections.
- 6.3.10 The empirical relationship given in LAQM.TG(16) states that exceedances of the 1-hour mean AQAL for NO₂ is unlikely to occur where annual mean concentrations are <60µg/m³. This indicates that an exceedance of the 1-hour mean AQAL was unlikely to have occurred at the above locations for the period assessed.

Defra Mapped Background Concentrations

- 6.3.11 Defra maintains a nationwide model of existing and future background air quality concentrations at a 1km grid square resolution.
- 6.3.12 The Defra mapped background concentrations of NO₂, PM₁₀ and PM_{2.5} for the baseline year of 2019 and the predicted opening year of the development (2025) are presented in Table 6.6 for those grid square of relevance to the assessment.
- 6.3.13 All of the mapped background concentrations presented are well below the respective annual mean AQALs.

Table 6.6 Defra mapped background pollutant concentrations

Grid Square (X,Y)	Year	Annual Mean Background Concentration (µg/m ³)		
		NO ₂	PM ₁₀	PM _{2.5}
454500, 229500	2019	11.9	16.5	10.0
	2025	8.8	15.5	9.1
454500, 228500	2019	16.7	16.3	10.2
	2025	11.9	15.2	9.3
457500, 226500	2019	8.5	14.6	9.2
	2025	6.8	13.6	8.3
457500, 225500	2019	8.7	14.8	9.3
	2025	6.9	13.7	8.4
458500, 224500	2019	10.0	15.2	10.2
	2025	7.9	14.1	9.4
457500, 224500	2019	9.5	15.4	9.8
	2025	7.5	14.3	8.9

Future Baseline

- 6.3.14 Baseline air quality conditions are expected to evolve during the interim period, prior to construction and operation commencing.
- 6.3.15 As discussed above, NO₂ concentrations monitored in proximity to the Site remain stable, with a long-term downward trend between the year 2015 and 2019 observed at key roadside locations.
- 6.3.16 Air quality is expected to improve in future years, with the introduction of electric vehicles and more stringent emission standards, as well as the recent enforcement of local and national policy and initiatives. With the introduction of these initiatives and cleaner technologies, pollutant concentrations reported locally are expected to reduce further, or at least remain comparable to those presented.
- 6.3.17 Local background future year projections provided by Defra (based upon semi-empirical

evidence) are provided in Table 6.6. These data demonstrate the anticipated improvement in background pollutant concentrations for the local area, particularly for NO₂; given current emphasis, such as the Air Quality Plan for NO₂ in UK (Defra and DfT 2017).

6.4 Assessment of Likely Significant Effects

Construction Phase Dust Assessment

- 6.4.1 Where figures relating to area of the site, volume of the site, approximate number of construction vehicles or distances to receptors are given, these relate to thresholds as defined in the IAQM guidance to guide the assessor to define the dust emissions magnitude and sensitivity of the area.

Assessment Screening

- 6.4.2 There are 'human receptors' within 350m of the Site and a Local Wildlife Site (LWS) within 50m of the Site boundary. Therefore, an assessment of impacts on human and ecological receptors has been undertaken.

Potential Dust Emissions Magnitude

- 6.4.3 The potential dust emission magnitude for each activity has been assessed and assigned on the basis of the criteria presented in the IAQM guidance and is presented in Table 6.7.

Table 6.7 Potential dust emission magnitude

Activity	Considerations	Magnitude
Demolition	There is no demolition of buildings required.	Not applicable
Earthworks	The majority of the Site is agricultural land. Site earthworks are required over an area >10,000m ² . It is assumed that >10 heavy earth moving vehicles may be active at any one time	Large
Construction	The total building volume associated with the Proposed Development is >100,000m ³ , i.e. falling into the 'Large' magnitude category. However, construction materials largely consist of a steel frame and metal cladding of lower dust potential, therefore an overall 'medium' classification is considered appropriate.	Medium
Trackout	Given the scale and nature of works required, it is likely that there will be between 10 and 20 HDV outward movements on a worst-case day. Although, access roads will be paved following initial construction phases and therefore HDVs will travel over minimal unpaved areas for the majority of the construction phase period, during initial phases there is the potential for HDV's to track over a significant length (>100m) of unpaved road.	Large

Sensitivity of the Area

Dust Soiling Impacts

- 6.4.4 There are two high sensitivity receptors (i.e. residential dwellings) within 100m of the Site, one of which is within 20m. There is a medium sensitivity receptor (the fast-food restaurant at Baynards Green to the north) within 100m. There are no sensitive receptors within 50m of the access routes within 500m of the Site. The sensitivity of the area with respect to dust soiling effects on people and property in relation to demolition, earthworks construction and trackout, according to the IAQM guidance, is therefore considered to be 'low'.

Human Health Impacts

- 6.4.5 The maximum 2019 Defra mapped background PM₁₀ concentration (2018 reference year) for the 1km² grid squares centred on the Site is 16.8µg/m³ (i.e. falls into the <24µg/m³ class).

- 6.4.6 Given the above information regarding the number of residential receptors within 100m of the Site and within 50m of the identified trackout routes, the sensitivity of the area with respect to human health impacts for all activities is therefore considered to be 'low'.

Ecological Impacts

- 6.4.7 There is one ecological designation within 20m of the Site boundary. This relates to a LWS designation, situated on the north eastern extent of the Site. No ecological designations are within 50m of the identified trackout routes.
- 6.4.8 The sensitivity of the area with respect to ecological impacts for all non-trackout activities is therefore considered to be 'low'.

Summary

- 6.4.9 A summary of the sensitivity of the surrounding area is detailed in Table 6.8, whilst the spatial density of nearby receptors is provided in Appendix 6.5.

Table 6.8 Sensitivity of the area

Potential Impact	Earthworks	Construction	Trackout
Dust Soiling	Low	Low	Low
Human Health	Low	Low	Low
Ecological	Low	Low	-

Risk of Impacts (Unmitigated)

- 6.4.10 Table 6.9 presents the risk of impacts which is used to inform the selection of appropriate mitigation.

Table 6.9 Risk of Dust Impacts

Potential Impact	Earthworks	Construction	Trackout
Dust Soiling	Low Risk	Low Risk	Negligible
Human Health	Low Risk	Low Risk	Negligible
Ecological	Low Risk	Low Risk	-

- 6.4.11 The construction phase is found to be 'Low Risk' in relation to dust soiling effects on people and property, human health and ecological impacts. Potential dust effects during the construction phase are considered to be temporary in nature and may only arise at particular times (i.e. certain activities and/or meteorological conditions).

Construction Phase Dust Assessment

- 6.4.12 The Proposed Scheme is not anticipated to result in a significant increase in movements or be above the EPUK and IAQM criterion. The duration of movements will be short-term in nature and are not considered further within the context of this assessment. Furthermore, whilst compared to the operational phase (for which a full assessment has been undertaken), generated vehicle volumes are likely to be lower. No detailed assessment of air quality impacts associated with construction phase road traffic emissions has, therefore, been undertaken.

6.5 Operational Phase Assessment

- 6.5.1 This section presents the potential air quality impacts and effects associated with the operation of the Proposed Development.

NO₂ Modelling Results

6.5.2 Table 6.10 presents the annual mean NO₂ concentrations predicted at all assessed receptor locations for the 2019 BC, 2025 DM and 2025 DS scenarios.

Table 6.10 Predicted annual mean NO₂ concentrations

Receptor	Predicted Annual Mean NO ₂ Concentration (µg/m ³)			% Change of AQAL	% of 2025 DS Relative to AQAL	Impact Descriptor
	2019 BC	2025 DM	2025 DS			
DR1	19.1	14.2	14.6	+0.8	36.5	Negligible
DR2	23.7	16.7	17.3	+1.4	43.3	Negligible
DR3	23.6	16.5	17.1	+1.4	42.8	Negligible
DR4	22.1	15.3	15.6	+0.8	39.0	Negligible
DR5	24.4	16.8	17.2	+1.1	43.0	Negligible
DR6	29.6	17.6	17.9	+0.9	44.8	Negligible
DR7	21.2	16.3	18.1	+4.5	45.3	Negligible
DR8	12.7	10.0	10.6	+1.5	26.5	Negligible
DR9	15.2	12.3	13.2	+2.4	33.0	Negligible
DR10	15.4	12.5	13.4	+2.5	33.5	Negligible
DR11	20.4	16.7	18.3	+4.2	45.8	Negligible
DR12	18.0	14.6	15.8	+3.0	39.5	Negligible
DR13	18.0	14.5	15.7	+2.8	39.3	Negligible
DR14	17.6	14.1	15.1	+2.5	37.8	Negligible
DR15	17.6	13.0	13.2	+0.6	33.0	Negligible
DR16	15.4	11.8	12.0	+0.6	30.0	Negligible
DR17	15.4	11.7	12.0	+0.6	30.0	Negligible

6.5.3 The maximum predicted annual mean NO₂ concentration at the existing receptors of relevant exposure during the 2019 BC scenario is at Receptor DR6 with a predicted concentration of 29.6µg/m³; this represents 45% of the AQAL. Receptor DR6 is located at a façade of a residential property closest to the A43 east of the roundabout at Baynards Green.

6.5.4 The maximum predicted annual mean NO₂ concentration at existing receptors of relevant exposure with the development in place (2025 DS) is at Receptor DR11 with a predicted concentration of 18.3µg/m³; this represents 46% of the AQAL. The greatest predicted increase in annual mean NO₂ concentrations relative to the AQAL due to the Proposed Development (2025 DM vs. 2025 DS) at relevant receptor locations is 4.5% at Receptor DR7. Both DR11 and DR7 are situated at the façades of residential properties closest to the B4100 south of the Site.

6.5.5 In accordance with EPUK-IAQM guidance, the impact of the development on annual mean NO₂ concentrations at all assessed existing receptors is considered to be 'negligible'. Given the marginal increase in annual mean NO₂ concentrations associated with the Proposed Development, and that there are no predicted exceedances of the annual mean NO₂ AQAL, unmitigated effects associated with annual mean NO₂ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

6.5.6 The empirical relationship given in LAQM.TG(16) states that exceedances of the 1-hour mean NO₂ AQAL are unlikely to occur where annual mean concentrations are <60µg/m³. Annual mean NO₂ concentrations predicted at all receptor locations are well below this limit. Therefore, it is

unlikely that an exceedance of the 1-hour mean objective will occur. Effects associated with likely 1-hour mean NO₂ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

PM₁₀ Modelling Results

- 6.5.7 Table 6.11 presents the annual mean PM₁₀ concentrations predicted at all assessed receptor locations for the 2019 BC, 2025 DM and 2025 DS scenarios.

Table 6.11 Predicted annual mean PM₁₀ concentrations

Receptor	Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)			% Change of AQAL	% of 2025 DS Relative to AQAL	Impact Descriptor
	2019 BC	2025 DM	2025 DS			
DR1	17.5	17.0	17.1	+0.2	42.8	Negligible
DR2	18.1	17.4	17.6	+0.4	44.0	Negligible
DR3	18.0	17.3	17.5	+0.4	43.8	Negligible
DR4	17.2	16.2	16.4	+0.3	41.0	Negligible
DR5	17.5	16.6	16.8	+0.4	42.0	Negligible
DR6	18.6	17.3	17.4	+0.3	43.5	Negligible
DR7	16.4	15.9	16.3	+1.1	40.8	Negligible
DR8	15.4	14.5	14.6	+0.4	36.5	Negligible
DR9	15.8	15.1	15.4	+0.6	38.5	Negligible
DR10	15.8	15.2	15.5	+0.7	38.8	Negligible
DR11	16.6	16.4	16.8	+1.2	42.0	Negligible
DR12	16.5	16.0	16.3	+0.8	40.8	Negligible
DR13	16.6	16.0	16.3	+0.8	40.8	Negligible
DR14	16.5	15.9	16.2	+0.7	40.5	Negligible
DR15	16.9	16.0	16.1	+0.2	40.3	Negligible
DR16	16.6	15.9	16.0	+0.2	40.0	Negligible
DR17	16.6	15.9	16.0	+0.2	40.0	Negligible

- 6.5.8 In accordance with EPUK-IAQM guidance, the impact of the development on annual mean PM₁₀ concentrations at all assessed existing receptors is considered to be 'negligible'. Given the marginal increase in annual mean PM₁₀ concentrations associated with the Proposed Development, and that there are no predicted exceedances of the annual mean PM₁₀ AQAL, unmitigated effects associated with annual mean PM₁₀ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.
- 6.5.9 Based upon the maximum predicted annual mean PM₁₀ concentration of 17.6µg/m³ (predicted at Receptor DR2 – 2025 DS), this equates to 1 day where 24-hour mean PM₁₀ concentrations are predicted to be greater than 50µg/m³. This is well below the 35 permitted exceedances, and therefore the number of maximum exceedances is in compliance with the 24-hour mean AQAL. Effects associated with likely 24-hour mean PM₁₀ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

PM_{2.5} Modelling Results

- 6.5.10 Table 6.12 presents the annual mean PM_{2.5} concentrations predicted at all assessed receptor locations for the 2019 BC, 2025 DM and 2025 DS scenarios.

Table 6.12 Predicted annual mean PM_{2.5} concentrations

Receptor	Predicted Annual Mean PM _{2.5} Concentration (µg/m ³)			% Change of AQAL	% of 2025 DS Relative to AQAL	Impact Descriptor
	2019 BC	2025 DM	2025 DS			
DR1	10.7	10.0	10.1	+0.2	40.4	Negligible
DR2	11.0	10.3	10.4	+0.4	41.6	Negligible
DR3	11.0	10.3	10.4	+0.4	41.6	Negligible
DR4	10.8	10.0	10.0	+0.3	40.0	Negligible
DR5	11.0	10.2	10.3	+0.4	41.2	Negligible
DR6	11.4	10.3	10.3	+0.3	41.2	Negligible
DR7	10.3	9.6	9.9	+1.0	39.6	Negligible
DR8	9.7	8.9	9.0	+0.3	36.0	Negligible
DR9	9.9	9.3	9.4	+0.6	37.6	Negligible
DR10	9.9	9.3	9.5	+0.6	38.0	Negligible
DR11	10.4	10.0	10.3	+1.1	41.2	Negligible
DR12	11.1	10.5	10.7	+0.7	42.8	Negligible
DR13	11.1	10.5	10.7	+0.7	42.8	Negligible
DR14	11.0	10.4	10.6	+0.6	42.4	Negligible
DR15	11.2	10.4	10.5	+0.2	42.0	Negligible
DR16	10.5	9.8	9.8	+0.2	39.2	Negligible
DR17	10.5	9.8	9.8	+0.2	39.2	Negligible

6.5.11 In accordance with EPUK-IAQM guidance, the impact of the development on annual mean PM_{2.5} concentrations at all assessed existing receptors is considered to be 'negligible'. Given the marginal increase in annual mean PM_{2.5} concentrations associated with the Proposed Development, and that there are no predicted exceedances of the annual mean PM_{2.5} AQAL, unmitigated effects associated with annual mean PM_{2.5} concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

Assessment of Effects on Designated Ecological Sites

6.5.12 The findings of the assessment are that the Development traffic contribution to annual mean NO_x concentrations, and nitrogen deposition is less than 1% of the Critical Levels and Critical Loads at the identified sensitive habitats within the 'Ardley Cutting and Quarry' SSSI. Appendix 6.3 details the results in full. On this basis the impacts are considered negligible and the effect 'not significant'.

6.6 Mitigation

Construction Phase

- 6.6.1 Commensurate with the calculated dust risk (i.e. low risk), mitigation measures, as described in IAQM guidance as representing best practice, have been identified to ensure that any potential impacts arising from the construction phase of the Proposed Development are reduced, and removed where possible.
- 6.6.2 These mitigation measures are presented in Appendix 6.4.

Operational Phase

- 6.6.3 In accordance with EPUK-IAQM guidance, the overall effect of the development on NO_x (for ecological receptors), NO₂, PM₁₀ and PM_{2.5} concentrations at all assessed receptor locations is considered to be 'not significant'. As such, additional long-term scheme-specific mitigation measures are therefore not considered to be necessary.
- 6.6.4 Notwithstanding the above, mitigation measures include:
- a Travel Plan with the aim of reducing single occupancy private car trips to/from the Site in favour of more sustainable modes of transport; and
 - Electric Vehicle (EV) charging enabled parking spaces, which aligns with government policy, to facilitate the use of EVs by future employees and reduce reliance on conventional Internal Combustion Engine (ICE) vehicles.

6.7 Residual effects

Construction Phase

- 6.7.1 With the effective application of the dust mitigation measures, as recommended in Appendix 6.4, it is considered that the overall effect at all receptors will be 'not significant'.

Operational Phase

- 6.7.2 Given the outcomes of the assessment, long-term scheme-specific mitigation measures in relation to operational effects arising from road traffic emissions are therefore not considered to be necessary. No mitigation is therefore required (although measures are proposed to align with government policy), and residual effects are not applicable in this instance, but can otherwise be assumed to be 'not significant' in the absence of mitigation.

6.8 Implications of Climate Change

- 6.8.1 The impact of climate change in respect of the UKCP18 climate change projections for central England is broadly described as resulting in '*greater chance of hotter, drier summers and warmer, wetter winters*' by year 2070. Hotter drier summers would potentially influence the dust mitigation requirements during construction operations, however given the short timescale with opening by 2025 the long-term climate change predictions are not considered to be of relevance to the assessment and will not affect the overall conclusions regards the significance of effects.

6.9 Cumulative effects

Construction Phase

- 6.9.1 Cumulative construction dust effects from neighbouring schemes may potentially occur where

the zone of influence of concurrent activities overlap at an affected receptor. Based on the IAQM approach of applying a 350m screening distance for the zone of influence, a neighbouring construction site would need to be within 700m. Therefore should the 'Land at Junction 10, M40' proposed development be under construction concurrently there would, in the absence of mitigation, be the potential for cumulative impacts. The 'Land at Junction 10, M40' proposed development included a construction dust assessment following the IAQM approach relating to site activities and associated risks, with the recommendation of best practice mitigation to render residual effects not significant. These measures would be integrated into a CEMP or similar, to be adhered to during construction, as part of the environmental responsibilities and commitment.

- 6.9.2 In accordance with IAQM guidance, following the implementation of the recommended mitigation, effects will be not significant. As such, it is not anticipated that there would be significant cumulative effects associated with construction phase dust emissions.

Operational Phase

- 6.9.3 In considering the likely changes in road traffic flows that may occur on the local highway network as a result of the Proposed Development, consideration has been given to the potential maximum traffic flows that are likely to occur in the future assessment year (i.e. 2025) should the Proposed Development become fully operational. This has included vehicle movements associated with relevant and committed developments in the assessment area.
- 6.9.4 As such, the dispersion modelling results presented are inherently cumulative in nature. The cumulative operational effect of the Proposed Development is therefore considered to be 'not significant'.

6.10 Summary

- 6.10.1 A summary of the assessment is set out in Table 6.13.

Construction Phase

- 6.10.2 A qualitative assessment of the potential dust impacts during the construction phase of the Proposed Development has been undertaken following the IAQM guidance.
- 6.10.3 Following the construction dust assessment, in the absence of mitigation the Site is found to have a 'Low Risk' in relation to dust soiling effects on people and property and human health.
- 6.10.4 Providing mitigation measures are implemented, such as those outlined in Appendix 6.4, residual effects from dust emissions arising during the construction phase are considered to be 'not significant'.
- 6.10.5 Given the short-term nature of the construction phase, there is predicted to be an insignificant effect on air quality from construction-generated vehicle emissions.

Operational Phase

- 6.10.6 The assessment of operational phase effects considered impacts on all relevant existing receptors from road traffic emissions associated with the Proposed Development.
- 6.10.7 The ADMS-Roads dispersion model was used to determine the likely NO₂, PM₁₀ and PM_{2.5} concentrations at human receptor locations for a series of scenarios, in accordance with technical guidance presented in LAQM.TG(16). Further, the ADMS-Roads dispersion model was used to determine the likely air quality impacts at the 'Ardley Cutting and Quarry' SSSI

adjacent to M40.

- 6.10.8 Predicted pollutant concentration changes at existing human receptor locations as a result of the Proposed Development were assessed using the EPUK-IAQM significance criteria.
- 6.10.9 In accordance with EPUK-IAQM guidance, the impacts of the Proposed Development on NO₂, PM₁₀ and PM_{2.5} concentrations at all assessed existing human receptor locations are considered to be 'negligible'. Development traffic contribution to annual mean NO_x concentrations, and nitrogen deposition at the identified sensitive habitats within the 'Ardley Cutting and Quarry' SSSI is predicted to be negligible. The unmitigated effects associated with NO_x, NO₂, PM₁₀ and PM_{2.5} concentrations at all assessed receptor locations are therefore considered 'not significant'.

6.11 References

CDC (2020). 2020 Annual Status Report.

Defra (2007). UK Air Quality Strategy.

Defra (2021). Local Air Quality Management Technical Guidance (TG16), April 2021.

Defra (2019). Clean Air Strategy.

Defra (2020). Defra Supplied Background Maps <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>

Defra and DfT (2017). Air Quality Plan for Nitrogen Dioxide in UK.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2019). Design Manual for Roads and Bridges LA105 Air Quality.

IAQM (2016). Guidance on the Assessment of Dust from Demolition and Construction.

IAQM and EPUK (2017). Land-Use Planning & Development Control: Planning for Air Quality.

IAQM: A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites v1.1 (2020)

Table 6.13 Summary of effects

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction phase					
Human receptors	High	Temporary / direct	Construction dust mitigation measures (Appendix 6.4)	Negligible	Not significant
Ecological receptors	Low	Temporary / direct	Construction dust mitigation measures (Appendix 6.4)	Negligible	Not significant
Operational phase					
Human receptors located adjacent to the affected road network.	High	Permanent / direct	Not required based on negligible impacts. Measures proposed include Travel Plan and Electric Vehicle charging spaces.	Negligible	Not significant
'Ardley Cutting and Quarry' SSSI adjacent to M40	High	Permanent / direct	Not required based on negligible impacts.	Negligible	Not significant

7 Noise

7.1 Introduction

- 7.1.1 This chapter of the ES has been produced by SLR Consulting Limited, to assess the Proposed Development in relation to the likely significant effects on noise.
- 7.1.2 In the context of this assessment, noise is defined as unwanted or undesirable sound derived from sources such as road; commerce; and construction works that interfere with normal activities, including conversation, sleep or recreation.
- 7.1.3 This chapter of the ES describes the legislative and planning policy relevant to the Proposed Development in the context of noise; the baseline conditions currently existing at the Site; the methods used to assess the potential impacts arising from the Proposed Development; and the residual effects following consideration of proposed mitigation measures.
- 7.1.4 Whilst reasonable effort has been made to ensure that this chapter is easy to understand, it is technical in nature; to assist the reader, a glossary of terminology and abbreviations used are included in Appendix 7.1.
- 7.1.5 The assessment is based on environmental noise measurements undertaken at the Site and predictive modelling of future noise levels.
- 7.1.6 In summary, the noise assessment assesses the likely significant noise effects of the Proposed Development on existing sensitive receptors during construction (temporary) and operation (permanent) phases of the Proposed Development, including off-site changes in road traffic noise and, where necessary, sets out the types of mitigation measures that would be adopted to mitigate likely significant effects.
- 7.1.7 The study area comprises the Site, adjacent roads used by vehicles accessing the Proposed Development and the following sensitive receptor locations around the Site:
- Lone Barn, Stoke Lyne. OX27 8SD;
 - Existing dwellings at Baynard's Green;
 - Travel Lodge, Cherwell Valley Services
- 7.1.8 The assessment has been completed by a member of SLR's Acoustics Team who is a Corporate Member of the Institute of Acoustics (MIOA).

7.2 Guidance

- 7.2.1 This section of the chapter references relevant National Planning Policy, and Local Planning Policy. British Standards and Guidance documents that the Application Site will be assessed against are then discussed.

National Planning Policy Framework

- 7.2.2 The NPPF (2021) does not specify any noise limits to be applied to new development, rather at Paragraph 174 it states:
- 7.2.3 *"Planning policies and decisions should contribute to and enhance the natural and local environment by:...e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water*

or noise pollution...”.

7.2.4 At Paragraph 185 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:

- *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;*
- *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

Noise Policy Statement for England

7.2.5 The Noise Policy Statement for England (NPSE) (2010) states that noise impacts should be assessed based on adverse and significant adverse effect. The NPSE does not provide any specific guidance on assessment methods or noise limits. However, the concepts summarised in Table 7.1 are introduced and can be applied when considering the significance of noise impacts.

Table 7.1 NPSE Observed Effect Levels

Effect Level	Description
No Observed Effect Level (NOEL)	This is the noise level below which no effect can be detected. In simple terms, below this level of noise, there is no detectable effect on health and quality of life due to the noise being assessed.
Lowest Observed Adverse Effect Level (LOAEL)	This is the level of noise above which adverse effects on health and quality of life can be detected.
Significant Observed Adverse Effect Level (SOAEL)	This is the level of noise above which significant adverse effects on health and quality of life occur.

Planning Practice Guidance

7.2.6 Planning Practice Guidance (PPG) (2014) provides greater details in relation to the relevance of noise to the planning process following the introduction of the NPPF and NPSE.

7.2.7 The PPG states that the following should be considered by local authorities:

- *“whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.*

In line with the Explanatory note of the noise policy statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.”

7.2.8 The PPG provides further guidance on each of the various observed effect levels set out in the

NPSE. This is summarised in Table 7.2.

Table 7.2 PPG Example Effect Outcomes

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g., turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g., avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g., regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g., auditory and non-auditory	Unacceptable Adverse Effect	Prevent

7.2.9 It is important to note that no specific noise parameters are defined; and no target noise levels are provided in PPG, it is the role of the acoustic consultant, as Competent Expert, to define the specific thresholds for assessment.

7.2.10 When considering appropriate thresholds guidance can be taken from PPG under the heading 'What factors influence whether noise could be a Concern?'. PPG refers to the subjective nature of noise, stating that there is no simple relationship between noise levels and the impact on those affected. This depends on how various factors combine in particular situations, including:

“the source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day - this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night;...

for non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise; ...

the spectral content of the noise (i.e., whether or not the noise contained particular high or low frequency content) and the general character of the noise (i.e., whether or not the noise contains particular tonal characteristics or other particular features).”

Cherwell District Council Local Plan

- 7.2.11 The Cherwell Local Plan 2011-2031 Part 1 was adopted 20 July 2015 and sets out the Council's policies for development in the district. Policy SLE 1: Employment Development of the Local Plan confirms that new employment proposal in rural areas will be supported if they meet certain criteria, including, but not limited to, any associated employment activities being carried out without undue detriment to residential amenity.

British Standard (BS) 5228 Parts 1 and 2

- 7.2.12 BS 5228-1: 2009+A1: 2014 'Code of practice for noise and vibration control on construction and open sites - Part 1: noise' provides guidance on a range of considerations relating to construction noise including the legislative framework; general control measures; example methods for estimating construction noise levels; and example criteria which may be considered when assessing the significance of any effects.
- 7.2.13 BS5228-1:2009+A1:2014 gives several examples of acceptable noise limits for construction or demolition noise. For this assessment as baseline noise data will be available, it is proposed that the ABC method will be used to determine the threshold value at the receptor locations.
- 7.2.14 Under the ABC method, a threshold value noise level is determined by establishing the existing ambient noise level at each location. This measured ambient noise level is then rounded to the nearest whole 5 dB(A) and the threshold noise value for each receptor is then established from Table E.1 of BS5228-1:2009+A1:2014. This threshold value is the $L_{Aeq,T}$ noise level that should not be exceeded at the receptor location by operations at the site. In accordance with this method the threshold noise levels for a potentially significant effect are as detailed in Table 7.3.

Table 7.3 Construction Noise Residential Receptors – Example Threshold Values

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A ^{A)}	Category B ^{B)}	Category C ^{C)}
Night-time (23.00-07.00)	45	50	55
Evenings and weekends ^{D)}	55	60	65
Daytime (07.00-19.00) and Saturdays (07.00-13.00)	65	70	75
NOTE1 A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level. NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e., the ambient noise level is			

<p>higher than the above values), then a significant effect is deemed to occur if the total LAeq noise level for the period increases by more than 3 dB due to construction activity.</p> <p>NOTE 3 Applied to residential receptors only.</p>
<p>A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.</p> <p>B) Category B: threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.</p> <p>C) Category C: threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.</p> <p>D) 19.01-23.00 weekdays, 13.01-23.00 Saturdays and 07.01-23.00 Sundays.</p>

7.2.15 If the threshold value is exceeded, then the effect of construction noise upon nearby receptors may be significant. BS5228-1:2009+A1:2014 states that the significance of the effect will depend upon “other project-specific factors, such as the number of receptors affected and the duration and character of the impact” (Paragraph E.3.2). Whereby professional judgement will be used to determine whether an effect is considered to be significant, and commentary explaining the reasons for this judgement will be provided.

7.2.16 BS 5228-2: 2009+A1: 2014 ‘Code of practice for noise and vibration control on construction and open sites.

BS 4142

7.2.17 BS 4142: 2014+A1 2019 'Methods for rating and assessing industrial and commercial sound' provides an objective method for rating the likelihood of complaint from industrial and commercial operations. It also describes the means of determining noise levels from fixed plant installations and determining the background noise levels that prevail on a site.

7.2.18 Current Government advice to local planning authorities in England makes reference to BS 4142 as being the appropriate guidance for assessing commercial operations and fixed building services plant noise.

7.2.19 The assessment of impacts is based on the subtraction of the measured background noise level from the rating level determined. The rating level is the source noise level, which can be either measured or predicted, corrected for tone or character, if necessary. The difference is compared to the following criteria to evaluate the impact:

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

7.2.20 To account for the acoustic character of proposed sound sources, BS4142:2014+A1:2019 provides the following with respect to the application of penalties to account for “the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention”.

- *Tonality – “For sound ranging from not tonal to predominantly tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible;*

- *Impulsivity – A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible;*
- *Intermittency – When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied; and*
- *Other Sound Characteristics – Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.”*

Calculation of Road Traffic Noise

- 7.2.21 In England and Wales, the standard method for predicting road traffic noise levels is given in the Calculation of Road Traffic Noise, 1988 (CRTN). The CRTN methodology utilises several input parameters (e.g., road traffic flow, composition, speed, gradient road, road surface, distance of receptor from road, etc.) to enable predictions of noise levels due to road traffic to be produced. This method enables the calculation of average levels over a period of either 18 hours or 1 hour. Predictions are produced in terms of the L_{A10} noise parameter as this is considered the measurement descriptor that best describes road traffic noise.

Design Manual for Roads & Bridges LA 111

- 7.2.22 The Design Manual for Roads and Bridges (DMRB) was originally published by the Department for Transport in 1993 and sets out procedures for undertaking the design of road schemes. LA 111 (2020) sets out a methodology for assessing the impacts of noise of such road schemes. This methodology can provide guidance in the assessment of schemes that result in changes in traffic flows on existing road links.
- 7.2.23 Table 3.54a of the LA 111 provide guidance on the magnitude of short-term road traffic noise impacts. This is set out in Table 7.4 below.

Table 7.4 LA 111 Magnitude of Change of Traffic Noise in the Short Term

Short term magnitude	Short term noise change (dB $L_{A10, 18\text{hour}}$)
Major	≥ 5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	< 1.0

7.3 Assessment Methodology

Consultation

- 7.3.1 Unfortunately, it has not been possible to arrange consultation on the development proposals prior to submission of the application in this instance. However, the scope of the assessment has been informed by previous scoping opinions on similar assessments in Cherwell District, in addition to consultation responses to the 'Land at Junction 10, M40' planning application (CDC ref. 21/03267/OUT).

Method

- 7.3.2 In this section, the methodologies for the noise impact assessments are presented. There are three distinct assessments which cover:

Assessment one: Construction noise;

Assessment two: On-site operational noise; and

Assessment three: Off-site operational noise.

- 7.3.3 It is noted that in addition to the three assessments above, consideration will also be made of the cumulative impact of any identified nearby schemes. As such, a standalone review of these impacts is provided in Section 7.9 utilising, for ease of understanding, the same assessment method and terminology as introduced below.

Assessment One: Construction Noise

- 7.3.4 For the purposes of this construction noise assessment, SLR has determined the noise level during three typical construction phases detailed below. The following Tables outline the items of plant which would typically be utilised during each activity, and the equipment sound power levels (determined from BS5228:2009+A1:2014), and the percentage on-time off each item of plant.

- Phase 1: Site Clearance and Enabling Works.
- Phase 2: Substructure Works.
- Phase 3: Superstructure Works.

- 7.3.5 For the purposes of the noise assessment, it is assumed in the first instance that the construction of each element will be in isolation.

- 7.3.6 It is accepted that the construction activities may vary from the activities presented, but as it would not be feasible to assess all construction configurations, the assessments undertaken in this assessment are considered a robust representation of anticipated construction noise levels.

Phase 1 - Site Clearance and enabling works

- 7.3.7 Site clearance and enabling works typically include:

- Site working area establishment / securement.
- Service relocation and/or stopping up.
- Soft strip of retained features.
- Demolition (where applicable) and site clearance.
- Site investigation works / remedial activities (where required).

7.3.8 Table 7.5 details plant that is typically utilised during site clearance and enabling works.

Table 7.5 Site Clearance and Enabling Works - Plant List

Type of Machinery	Quantity on Site	Sound Power Level, dB	Percentage Use
Large Excavator Mounted Breaker	1	110	20%
Tracked Excavator	2	107	80%
Handheld Circular Saw	2	109	15%
Spreading Fill (Dozer)	2	109	25%
Vibratory Roller	1	102	30%
Lorry (Unloading Tipper Truck)	2	108	40%
Concrete Truck Mixer	1	103	5%
Concrete Crusher	2	110	40%
Road Sweeper	1	104	5%

Phase 2 – Substructure Works

7.3.9 Substructure works typically include:

- Creation of foundations, excavation or earthworks to form finished floor levels; and
- Laying out/down of services.

7.3.10 Table 7.6 details the plant utilised during this phase.

Table 7.6 Substructure Works - Plant List

Type of Machinery	Quantity on Site	Sound Power Level, dB	Percentage Use
Concrete Truck Mixer	2	103	25%
Small Breaker	2	110	20%
Compressor	2	106	70%
Lorry (Unloading)	2	108	40%
Petrol Saw	2	109	40%
Tracked Excavator (Rubber Tracks)	2	107	80%
Dumper Trucks	2	106	25%
Vibratory Roller	2	102	30%
Poker Vibrator	2	97	40%
Mobile Crane	1	103	100%
Telescopic Forklift (17m) JCB 540	2	107	80%
Hand Tools (Hammers)	8	98	80%

Phase 3 - Superstructure Works

7.3.11 Substructure works typically include:

- Creation and installation of new concrete / steel superstructure (i.e., concrete boxes, steel frames etc.).
- Application of façades and finishes to newly construction-built form.
- Internal fit outs and plant/machinery installations.

7.3.12 It is envisaged that this phase would include the erection of buildings. Table 7.7 details the plant utilised during this phase.

Table 7.7 Superstructure Works - Plant List

Type of Machinery	Quantity on Site	Sound Power Level, dB	Percentage Use
Concrete Truck Mixer	2	103	25%
MEWP-Cherry Picker Genie	2	95	60%
Lorry (unloading)	3	108	20%
Petrol Saw	2	109	40%
Tracked Excavator (rubber tracks)	2	107	70%
Dumper Trucks	2	106	25%
Poker Vibrator	2	97	40%
Mobile Crane Operation	2	103	90%
Telescopic Forklift (17m) JCB 540	1	107	80%
Hand Tools (hammers)	8	98	40%
Concrete Pump (pumping)	2	112	70%

7.3.13 At this stage it is envisaged that all activities will take place within normal daytime working hours (07:30 to 18:00 hours, Monday to Friday and 08:00 to 13:00 on a Saturday). It has also been reasonably assumed that each unit will be constructed at separate times.

Noise Prediction Methodology

7.3.14 Using the sound power levels and associated percentage on-times shown in Table 7.5 to Table 7.7, noise levels from each construction activity have been predicted at the nearest noise sensitive receptors to the Site.

7.3.15 The predictions have been undertaken using the proprietary noise modelling software CadnaA which incorporates the methodology outlined in BS5228:2009+A1:2014. The model assumes hard ground on-site and applies the screening effect of barriers from Figure F.3 of BS5228:2009+A1:2014 at 500Hz.

7.3.16 During Phase 1 and 2 it has been assumed that most of the plant will be operating at ground level. A height of 2 m above ground level of each item of plant has been assumed.

7.3.17 During Phase 3, superstructure works, some plant will be operating at increased heights. A height of 12 m above ground level of each item of plant (that will operate at height) has been assumed.

7.3.18 A receiver height of 1.5 m has been assumed, which is representative of a ground-floor window.

- 7.3.19 The location of each item of plant during each phase of construction has been positioned across the Site. At times plant would be closer and further away from the receptor.

Assessment Two: On-site Operational Noise

- 7.3.20 Noise generated within the site during its operation has been considered using BS 4142. It is assumed that each HGV visiting the site would drive around the estate roads to reach the desired Unit, manoeuvre into a loading bay during which time sounding a reversing alarm, and then be unloaded. Traffic data has been provided by Vectos to inform the number of HGVs likely to visit the site during a daytime 1-hour period and night-time 15-minute period. This aligns with the assessment periods defined in BS 4142, where daytime is between 0700 hours and 2300 hours and night-time between 2300 hours and 0700 hours.
- 7.3.21 In addition to vehicle related noise described above, general operational noise would be present within the unit buildings. The Energy Centre building has the potential to generate noise, albeit at low levels due to the nature of the energy handling on site (photovoltaics). However, the equipment that will be installed in this building are currently not known. As such, an assessment of the Energy Centre is not considered within this report. Table 7.8 details the overall sound power levels assumed for each of the on-site operational noise activities and are based on empirical data.

Table 7.8 Noise Levels of Proposed Site

Area / Plant	Number / Attribute	Location	L _w , dB(A)
Warehouse	Vertical and Area Sources, radiated from all external walls and roof of each unit	All units	72.9
HGV Arrival / Departure	Moving Point Source Daytime peak: 141 per hour Night time peak: 24 per hour	Access Road to Docking/Parking Bays	93.7
Car Arrival / Departure	Moving Point Source Daytime peak: 487 per hour Night time peak: 95 per hour	Access Road to Car Park	80.2
HGV Reversing with Beeper	Point Source Daytime 161 per hour Night time: 28 per hour	Reversing in Bays	80.5

Noise Prediction Methodology

- 7.3.22 The sound predictions in this assessment have been undertaken using a proprietary software-based noise model, CadnaA, which implements the full range of UK calculation methods. The calculation algorithms set out in ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2 General method of calculation have been used and the model assumes:
- a ground absorption factor of 0;
 - a reflection factor of 2;
 - a daytime receiver height of 1.5 m; and
 - a night-time receiver height of 4 m.

Assessment Three: Road Traffic Noise

- 7.3.23 The proposed development would alter traffic flows on some of the nearby roads and therefore have the potential to change noise levels experienced at neighbouring noise sensitive receptors. In accordance with the Design Manual for Roads and Bridges LA 111 Noise and Vibration, SLR would undertake an assessment to include all roads where it is anticipated that noise from traffic may change.
- 7.3.24 Road traffic noise levels have been predicted using traffic data provided by Vectos for the opening year, 2025, with and without development traffic. A summary of traffic data used in the assessment is provided in Table 7.9.

Table 7.9 Road Traffic Data

Link (See Figure 7.1)	Without Scheme (2019)			With Scheme (2025)		
	18-hour	% HGV	Average Speed (km/h)	18-hour	% HGV	Average Speed (km/h)
1 - B4100 north of A34 junction	6,222	3%	81	6,490	3%	81
2 - B4100 north of site access	11,141	4%	70	14,446	15%	70
3 - B4100 south of site access	10,824	4%	70	13,585	4%	70
4 - A4095 east	15,964	4%	70	16,654	4%	70
5 - A4095 west	12,426	2%	70	13,116	2%	70
6 - A43 west of B4100 junction	32,068	15%	70	34,146	17%	70
7 - B430	7,348	5%	81	7,527	5%	81
8 - M40 south	108,971	14%	108	110,165	15%	108
9 - M40 north	83,864	12%	108	84,569	12%	108
10 - A43 east of B4100 junction	33,388	12%	88	34,345	13%	88
11 - A43 north of A421 junction	30,369	12%	88	31,050	13%	88
12 - A421	10,684	8%	81	10,962	9%	81
13 - M40 Northbound on slip	4,946	15%	50	5,652	19%	50
14 - M40 Southbound off slip	5,720	16%	50	6,426	19%	50
15 - M40 Northbound off slip	15,911	17%	50	16,658	18%	50
16 - M40 Southbound on slip	15,286	18%	50	16,033	19%	50
17 - A43 bridge	28,204	13%	70	29,089	14%	70
18 - A43 north of services	43,490	15%	70	45,569	16%	70

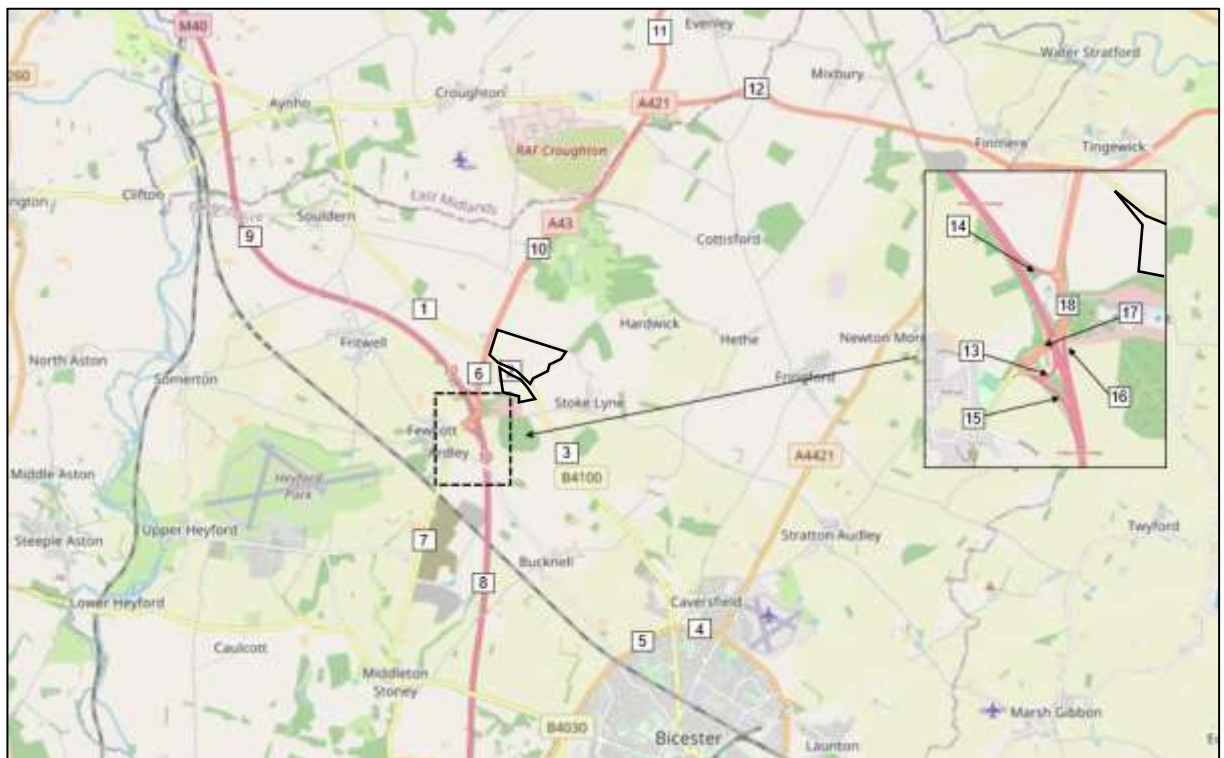


Figure 7.1 Road Links (See Table 7.9) – Approximate Site Boundary Indicated

Noise Prediction Methodology

7.3.25 The sound predictions in this assessment have been undertaken following the method set out in CRTN to determine the Basic Noise Level (BNL) from vehicles travelling on roads. As the proportion of HGVs is likely to change because of the altered traffic flows, the correction for HGV percentage has also been applied. The difference in the HGV corrected BNL is the impact assessed.

Sensitivity of Receptors

7.3.26 The sensitivity of receptors is shown in Table 7.10.

Table 7.10 Sensitivity Criteria for Acoustic Receptors

Sensitivity	Receptor Type
High	Residential properties, Schools and healthcare building (daytime)
Medium	SAC, SPA, SSSI (or similar areas of special interest), Hotels
Low	Offices and other non-noise producing employment areas
Negligible	Industrial areas

7.3.27 The receptors considered in this assessment, as listed in 7.1.7, are all classed as High Sensitivity to noise, except for the Travel Lodge at Cherwell Valley Services which is classed as medium sensitivity.

Impact Magnitude

7.3.28 The Guidelines for Environmental Noise Impact Assessment published by IEMA list the following generic noise impacts:

- Negligible Impact: *“Noise impacts can be heard, but do not cause any change in*

behaviour or attitude, e.g., turning up volume on television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is perceived change in the quality of life”;

- Minor Impact: “Noise impact can be heard and causes small changes in behaviour and/ or attitude, e.g., turning up volume of television; speaking more loudly; closing windows. Potential for non-awakening sleep disturbance. Affects the character of the area such that there is a perceived change in the quality of life”;
- Moderate Impact: “Causes a material change in behaviour and/or attitude, e.g., voiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area”; and
- High Impact “Significant changes in behaviour and/or inability to mitigate effect of noise leading to psychological stress or physiological effects e.g., regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g., auditory and non-auditory”.

Assessment One Impact Magnitude Definition

- 7.3.29 The impact of construction noise upon existing residential receptors, assessed in accordance with the ABC method presented in BS5228-1:2009+A1:2014, is as detailed in Table 7.11.

Table 7.11 Construction Noise – Noise Impact Magnitude

Magnitude	Increase in the $L_{Aeq,T}$ Noise Level
High	Threshold value exceeded by more than 5 dB
Medium	Threshold value exceeded between 3.0 and 4.9 dB
Low	Threshold value exceeded between 0.1 and 2.9 dB
Negligible	Threshold value not exceeded

Assessment Two Impact Magnitude Definition

- 7.3.30 Based on the guidance presented in BS4142:2014+A1:2019 the impact of commercial/industrial noise upon noise sensitive receptors (NSRs) will be determined with reference to Table 7.12.

Table 7.12 Commercial/Industrial Noise Upon Residential Receptors – Noise Impact Magnitude

Magnitude	Description
High	A Rating level is 10 dB(A) or more above the background
Medium	A Rating level is between 6 and 9 dB(A) above the background
Low	A Rating level is between 1 and 5 dB(A) above the background
Negligible	A Rating level equal to or below the background

Assessment Three Impact Magnitude Definition

- 7.3.31 The impact of development related traffic noise upon existing receptors in the short-term is based on LA 111, as detailed in Table 7.13.

Table 7.13 Development Related Traffic – Short-Term Magnitude of Change (Impact)

Magnitude	Noise Change L _{A10,18hr} dB
High	5.0+
Medium	3.0 – 4.9
Low	1.0 – 2.9
Negligible	0.1 – 0.9

Level of Effect

- 7.3.32 The sensitivity of the receptor together with the magnitude of impact defines the significance of effect as shown in Table 7.14.

Table 7.14 Level of Effect

Receptor Sensitivity	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

- 7.3.33 Where an effect is classified as Major or Moderate, this is considered to represent a ‘significant effect’ in terms of the EIA Regulations. Where an effect is classified as Minor or Negligible, this would not be considered to represent a ‘significant effect’.
- 7.3.34 Impacts and effects can be beneficial, neutral or adverse and these would be specified where applicable. Effects can also be temporary, intermittent or permanent in nature. It should be noted that significant effects need not be unacceptable or irreversible.

Survey

- 7.3.35 A baseline noise survey was carried out at the Site to establish the prevailing environmental noise conditions. The survey comprised 11 days, between Friday 26th November and Tuesday 7th December 2021, of unmanned automatic noise measurements at two locations by two separate noise monitors. The positions of these monitors are shown in Figure 7.2.
- 7.3.36 Also indicated in Figure 7.2 is the attended noise measurement location at Position 3, adjacent to the Travel Lodge Hotel.



Figure 7.2 Survey Locations

7.3.37 The noise survey equipment used during the survey is detailed in Table 7.15. All measurement instrumentation was calibrated before and after the measurements. No significant drift was observed. The calibration chain is traceable via the United Kingdom Accreditation Service to National Standards held at the National Physical Laboratory.

Table 7.15 Survey Equipment

Location	Equipment	Serial Number
Unmanned Monitoring Equipment		
Location 1	Cirrus CR:171B Type 1 Sound Level Meter	G061094
	Cirrus CR:515 Acoustic Calibrator	72210
Location 2	Rion NL-52 Class 1 Sound Level Meter	00331823
	Rion NC-74 Acoustic Calibrator	34336013
Attended Monitoring Equipment		
Location 3	Cirrus CR:831B Class 1 Sound Level Meter	C17175FF
	Cirrus CR:511E Acoustic Calibrator	036342

7.3.38 At the survey locations the microphone was placed 1.5m above the local ground level in free-field conditions, i.e., at least 3.5 m from the nearest significant acoustically reflective surface, other than the ground. The following noise level indices were recorded:

- $L_{Aeq,T}$: The A-weighted equivalent continuous noise level over the measurement period.
- L_{A90} : The A-weighted noise level exceeded for 90% of the measurement period. This

parameter is often used to describe background noise.

- L_{A10} : The A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe road traffic noise.
- L_{Amax} : The maximum A-weighted noise level during the measurement period.

7.3.39 Additionally, short sample attended measurements were undertaken at Position 3 on Friday 3rd December 2021, considered representative of the Travel Lodge at Cherwell Valley Services.

7.3.40 During the noise measurements, windspeed and direction, precipitation and temperature was monitored using a Davis Vantage Vue weather station situated within the site. The weather was monitored between Friday 3rd December and Tuesday 7th December 2021. Additional information was obtained through public weather data published online for the periods without weather station monitoring. Periods where less-suitable weather occurred (rain, or wind speeds greater than 5 m/s, or temperatures below 5°C) were inspected and if considered to be extraneous excluded from the assessment.

Assumption and Limitations

7.3.41 No significant information gaps were identified, and the assessment was undertaken in line with relevant standards and policy documents.

7.3.42 The road traffic noise model used in this assessment is dependent upon the predicted future traffic data, which will have inherent uncertainties associated with them, details of which are set out in the supporting transport assessment.

7.3.43 Details of specific construction activity, plant used or likely programme are not available at this stage of the Proposed Development. The construction noise assessment assumes typical activity for the type and scale of the Proposed Development and that all plant and equipment used are operated continuously throughout the 10-hour working day and are located at the same distance from the noise sensitive receptor. This is unlikely to occur in practice and therefore represents a likely worst-case scenario.

7.3.44 Details of specific on-site operational activity, noisy equipment or plant to be used, and exact timing of any such activity are not available at this stage of the Proposed Development. The on-site operational noise assessment assumes typical activity for the type and scale of the Proposed Development and uses traffic data to inform the timing of such activity. Loading / unloading noise is assumed to take place in the bays closest to noise sensitive receptors as a worst case.

7.3.45 Details relating to the Energy Centre are not available at this stage of the Proposed Development. Namely, this includes potential noise generating items of plant, the construction materials of the external elements of the building and the exact location of the building. As such, it is not appropriate to assess noise egress resulting from the Energy Centre at this stage.

7.4 Baseline conditions

7.4.1 During the noise survey it was noted that road traffic noise from vehicles travelling on the A43 were generally dominant. During peak traffic flows, noise from vehicles travelling along the B4100 were noted to be the dominant audible source at Position 2. Distant road traffic noise from vehicles travelling along the M40 were also noted to be significant. Table 7.16 presents a summary of the daytime and night-time measured noise levels at the two unmanned logger positions. Further details of the measured baseline noise levels are provided in Appendix 7.2.

Table 7.16 provides the logarithmic average of the ambient (L_{Aeq}) noise level for the period; the range of background noise levels (L_{A90}); measured during the period.

Table 7.16 Summary of Unmanned Measured Sound Levels, free-field, dB

Position	Period	$L_{Aeq,T}$	L_{A90}
Location 1, Baynard's Green	Daytime	62	57
	Night-Time	58	49
Location 2, Lone Barn	Daytime	54	49
	Night-Time	50	42

7.4.2 Between Friday 3rd and Tuesday 7th December, in which weather monitoring was taking place on site, no significant wind or rain was noted. As such, noise levels measured during this period are considered representative. It is also noted that the noise levels measured between Friday 26th November and Thursday 2nd December were not significantly different to those measured between Friday 26th November and Friday 3rd December. On this basis, it is considered that all measured data are suitable for consideration in this chapter.

7.4.3 In addition to the unmanned logger data, the results of the short-term attended measurements toward the south of the site, near to the Travel Lodge, are provided in Table 7.17.

Table 7.17 Summary of Attended Measured Sound Levels, free-field, dB

Position	Period, T	$L_{Aeq,T}$	L_{A90}
Location 3, Travel Lodge	03/12/21 15:15 – 15:30	58	56
	03/12/21 15:30 – 15:45	58	57
	03/12/21 15:45 – 16:00	59	57
	03/12/21 16:00 – 16:15	59	57
	03/12/21 16:15 – 16:30	60	59

Future Baseline

7.4.4 The soundscape is dominated by road traffic noise. The future baseline is unlikely to be notably different to that which exists today unless traffic flows change in the area change significantly. For reference, in the guidance set out in the Calculation of Road Traffic Noise (CRTN) indicates that a 25% increase in traffic flow would yield a 0-1 dB increase in noise levels. This increase in noise level is insignificant.

7.4.5 Therefore, it is not reasonably expected that the future baseline would alter the noise environment on the Site.

7.5 Mitigation

Construction Phase

7.5.1 No Primary mitigation has been included in the assessment. Tertiary measures will include a Construction Environmental Management Plan (CEMP). The adoption of Best Practicable Means, as defined in the Control of Pollution Act 1974, is usually the most effective means of controlling noise from sites. Within the constraints of efficient site operations and the requirements of the relevant British Standards, the following is advisable:

- limit the use of particularly noisy plant, i.e., do not use particularly noisy plant early in the morning;

- limit the number of plant items in use at any one time;
- plant maintenance operations should be undertaken as far away from noise-sensitive receptors as possible;
- phasing the works to maximise the benefit from perimeter structures;
- any compressors brought on to site should be silenced or sound reduced models fitted with acoustic enclosures;
- reduce the speed of vehicle movements;
- all pneumatic tools should be fitted with silencers or mufflers;
- ensure that operations are designed to be undertaken with any directional noise emissions pointing away from noise-sensitive receptors where practicable;
- when replacing older plant, ensure that the quietest plant available is considered wherever possible; any deliveries/spoil removal vehicles should be programmed to arrive and depart during daytime hours only.
- drop heights must be minimised when loading vehicles with rubble.
- care should be taken when loading vehicles to minimise disturbance to local residents. Vehicles should be prohibited from waiting within the site with their engines running;
- all plant items should be properly maintained and operated according to the manufacturers' recommendations in such a manner as to avoid causing excessive noise. All plant should be sited so that the noise impact at nearby noise-sensitive properties is minimised;
- local hoarding, screens or barriers should be erected as necessary to shield particularly noisy activities; and
- any problems concerning noise from construction works can sometimes be avoided by taking a considerate and neighbourly approach to relations with local residents. Works should not be undertaken outside of the hours agreed with the local authority.

Operational Phase

7.5.2 No Primary mitigation has been included in the assessment.

7.6 Operational Effects

Assessment One: Construction

- 7.6.1 The construction noise threshold at each receptor is detailed in Table 7.18. The threshold has been determined using the ABC method detailed in of BS5228-1:2009+A1:2014.

Table 7.18 Daytime Construction Noise Thresholds dB(A)

Receptor	Baseline Daytime Ambient Noise Level	Threshold Noise Limit
Location 1, Baynard's Green	62	65
Location 2, Lone Barn	54	65
Location 3, Travel Lodge	59	65

- 7.6.2 The predicted noise levels for each Activity of the construction works at each of the nearest noise-sensitive receptors are shown in Table 7.19 to Table 7.21 for the three main construction phases. The Tables also compare the predicted noise levels with the threshold value adopted for the assessment.

Table 7.19 Construction Phase 1 Predicted Noise levels and Assessment, L_{Aeq} dB(A)

Receptor	Predicted Noise Level	Threshold Value	Difference
Location 1, Baynard's Green	55.9	65.0	-9.1
Location 2, Lone Barn	65.8	65.0	+0.8
Location 3, Travel Lodge	57.9	65.0	-7.1

Table 7.20 Construction Phase 2 Predicted Noise levels and Assessment, L_{Aeq} dB(A)

Receptor	Predicted Noise Level	Threshold Value	Difference
Location 1, Baynard's Green	57.8	65.0	-7.2
Location 2, Lone Barn	68.2	65.0	+3.2
Location 3, Travel Lodge	59.6	65.0	-5.4

Table 7.21 Construction Phase 3 Predicted Noise levels and Assessment, L_{Aeq} dB(A)

Receptor	Predicted Noise Level	Threshold Value	Difference
Location 1, Baynard's Green	57.2	65	-7.8
Location 2, Lone Barn	67.7	65	+2.7
Location 3, Travel Lodge	60.4	65	-4.6

- 7.6.3 It can be seen from Table 7.19 to Table 7.21 that the construction noise threshold during all phases is predicted to be exceeded at Lone Barn and not at the other locations. The assessment represents a worst case when all construction activity is taking place at the closest feasible point to the receptor, in reality distances will be greater and therefore actual noise levels for the duration of the construction programme lower. Taking this into account it is considered that there would be a Low impact at Lone Barn and a Negligible impact at other locations. This results in a Temporary Minor Significant Effect at Lone Barn and a Negligible Significant Effect at all other locations, which is Not Significant.

Assessment Two: Operation

- 7.6.4 The predicted sound levels of the noise sources associated with the on-site operational activity are shown in Table 7.22 below.
- 7.6.5 Daytime sound levels have been predicted at 1.5 m above local ground level, which is the approximate height of a ground floor window. Night-time sound levels have been predicted at 4 m above local ground level, which is the approximate height of a first-floor window.

Table 7.22 Predicted On-Site Operational Specific Sound Levels

Location	Period	Predicted Sound Level, $L_{Aeq,T}$
Location 1, Baynard's Green	Daytime	39
	Night-Time	38
Location 2, Lone Barn	Daytime	44
	Night-Time	42
Location 3, Travel Lodge	Daytime	37
	Night-Time	34

- 7.6.6 A graphical image of the predicted specific sound level during the daytime and night-time using an indicative development layout can be seen in Figure 7.3 and Figure 7.4, respectively. It is noted that the specific sound level predictions are based on an indicative layout and in a way to represent a reasonably worst-case scenario, i.e., minimal distances from transient noise sources to NSR locations, and simultaneous operation of noise sources. Although the final layouts may differ from those considered within this chapter, the results from this assessment are considered to reasonably represent the intent and philosophy of the proposals with regard to noise.

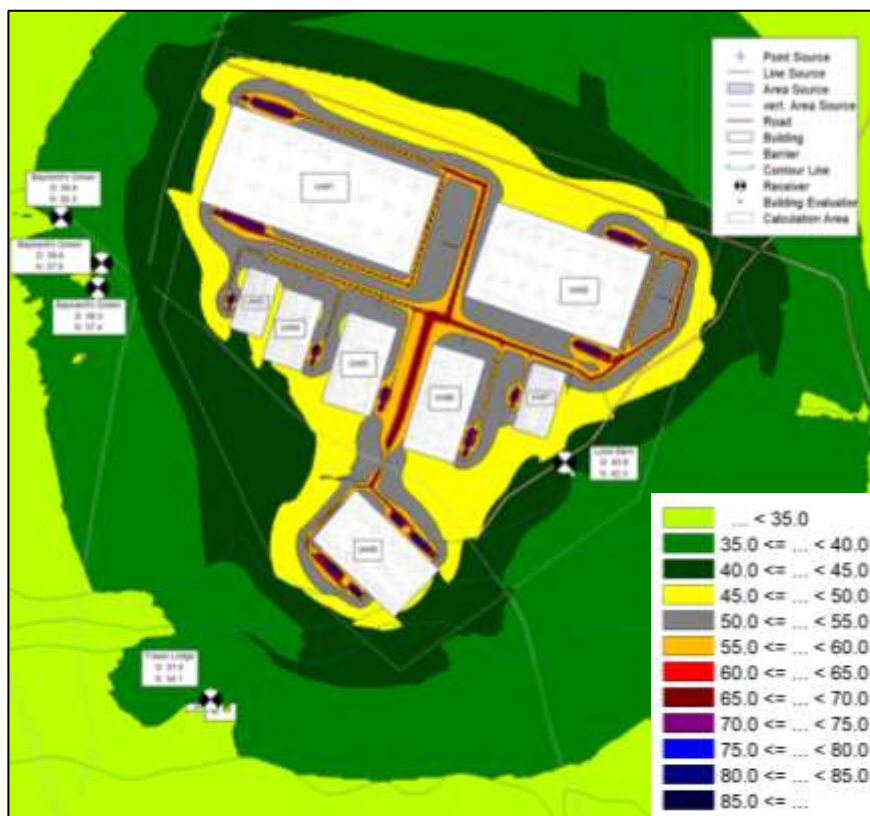


Figure 7.3 Daytime Specific Sound Level at a Grid Height of 1.5m – dB L_{Aeq} , 1 hour

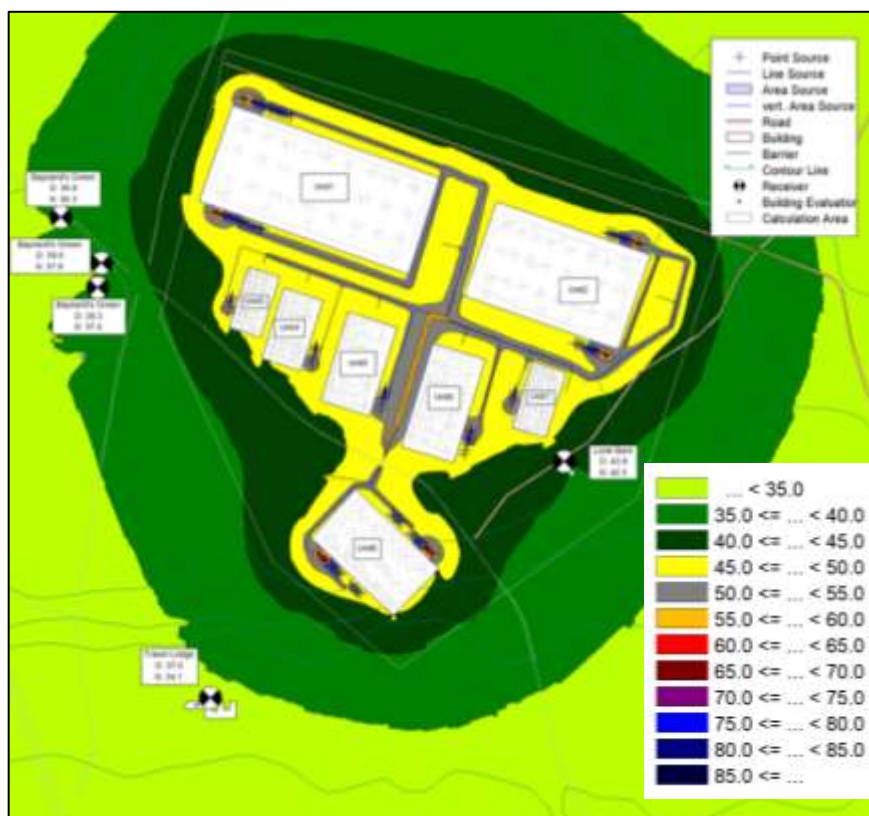


Figure 7.4 Night-Time $L_{Aeq,T}$ Specific Sound Level at a Height of 4 m – dB L_{Aeq} , 15 min

Character Correction

7.6.7 The character of each noise source, and the correction that will be applied in the BS4142:2014+A1:2019 assessment are as follows:

- **Tonality:** The only source of noise associated with the operation of the proposed development that is expected to contain a tone would be vehicle reversing alarms. This source is not a dominant component of the overall predicted specific sound level (Table 7.22), which itself is at least 20 dB below the existing ambient noise. Consequently, it is considered unlikely that such tones would subjectively be perceptible, or even just perceptible. Therefore, no correction for tone has been applied.
- **Impulsivity:** It is not anticipated that any of the noise sources would be impulsive provided it is well maintained.
- **Other sound characteristics:** It is not anticipated that the identified noise sources would have any other identifiable sound characteristics that differ to those associated with the surrounding area, for example vehicle movements.
- **Intermittentness:** Noise sources at the site are expected to be relatively constant.

7.6.8 Based on the above, there will be no acoustic characteristic corrections applied to the specific sound levels.

Assessment

7.6.9 The character corrections described in Section 7.6.7 have been added to the predicted sound levels shown in Table 7.22 to derive the rating levels at each of the nearest noise-sensitive receptors.

7.6.10 The results of the BS4142:2014 +A1:2019 assessment are shown in Table 7.23. In accordance with the standard, the rating levels and the representative background sound levels have been rounded to the nearest decibel.

7.6.11 Based on the accuracy of the prediction methodology, i.e., ISO9613-2, the uncertainty of the CadnaA model accuracy, i.e., barrier corrections for buildings, etc., it is considered that the results of the assessment are as accurate as reasonably practicable and considered to be within +/-3 dB.

Table 7.23 BS4142:2014+A1:2019 Assessment

Receptor	Assessment Period	Predicted Specific Sound Level, $L_{Aeq,T}$	Predicted Rating Level, $L_{A,r,Tr}$	Representative Background Sound Level L_{A90}	Difference between Background Sound Level and Rating Level
Location 1, Baynard's Green	Daytime	39	39	57	-18
	Night-Time	38	38	49	-11
Location 2, Lone Barn	Daytime	44	44	49	-5
	Night-Time	42	42	42	0
Location 3, Travel Lodge	Daytime	37	37	57	-20
	Night-Time	34	34	49	-15

7.6.12 It can be seen from Table 7.23 that:

- During the daytime, the rating level of the proposals would be below the background sound level at all receptors assessed. The impact and associated effect is Negligible, which is not Significant.
- During the night-time the rating level of the proposals would be equal to the background sound level at Lone Barn and below the background sound level at all other receptor positions. The impact and associated effect is Negligible, which is not Significant.

7.6.13 Mitigation of operational noise upon existing receptor locations is therefore not considered necessary.

Assessment Three Development Related Traffic

7.6.14 Changes in road traffic noise levels are presented in Table 7.24, locations of the road links assessed are shown in Figure 7.1.

Table 7.24 Changes in Road Traffic Noise Levels, LA10,18hour

Link ID	Location	Change in Basic Noise Level, dB
1	B4100 north of A34 junction	0.2
2	B4100 north of site access	3.2
3	B4100 south of site access	1.0
4	A4095 east	0.2
5	A4095 west	0.2
6	A43 west of B4100 junction	0.6
7	B430	0.1
8	M40 south	0.2
9	M40 north	0.0
10	A43 east of B4100 junction	0.3
11	A43 north of A421 junction	0.3
12	A421	0.3
13	M40 northbound on slip	1.2
14	M40 southbound off slip	1.1
15	M40 northbound off slip	0.4
16	M40 southbound on slip	0.4
17	A43 bridge	0.3
18	A43 north of services	0.4

7.6.15 It can be seen that:

- a Medium impact of change (3.0 - 4.9 dB) is predicted for the section of the B4100 north of the site access;
- a Low impact of change (1.0 – 2.9 dB) is predicted for the sections of the B4100 south of the site access, and the M40 slip roads in both directions; and

- a Negligible impact of change (0.1 – 0.9 dB) is predicted for the M40 in both directions and the B4100 north of the A34 junction to the northwest of site.

7.6.16 A small section of the B4100 is shown to result in a Medium impact of change; however, there are no noise sensitive receptors present along that section of road.

7.6.17 On this basis, it is considered that all receptors would experience no greater than a Low impact. All the receptors along these roads are assumed to be of High sensitivity (e.g., residential receptors) and therefore a Minor Significance of effect, which is Not Significant.

7.6.18 Mitigation of road traffic noise upon existing receptor locations is not considered necessary.

7.7 Residual effects

7.7.1 The Assessments have concluded Low impacts of noise, which result in a worst case of Minor Significant Effect. Construction good practice measures have been detailed which are expected to control noise during this phase of the development and result in reducing Low impacts to Negligible, yielding Negligible Significant Effect.

7.7.2 It would not be practicable to control changes in road traffic noise brought about by the operation of the proposed development. Therefore, a residual Minor Significant Effect would occur during the operation of the development, which is Not Significant.

7.8 Implications of Climate Change

7.8.1 The implications of climate change have been considered and none have been identified.

7.9 Cumulative effects

7.9.1 Cumulative effects of the following planning applications have been considered:

- 21/03266/F Planning application: 21/03266/F: Site clearance, construction of new site access from the B4100, permanent and temporary internal roads, an internal roundabout and a foul drainage station, diversion of an existing overhead power cable and public right of way, and soft landscaping.
- 21/03267/OUT (Eastern Parcel) Planning application: 21/03267/OUT: Outline planning permission (all matters reserved except for access) for the erection of buildings comprising logistics (Use Class B8) and ancillary Office (Use Class E(g)(i)) floorspace and associated infrastructure; construction of new site access from the B4100; creation of internal roads and access routes; and hard and soft landscaping.
- 21/03268/OUT (Western Parcel) Planning application: 21/03268/OUT: Outline planning permission (all matters reserved except for access) for the erection of buildings comprising logistics (Use Class B8) and ancillary Office (Use Class E(g)(i)) floorspace; construction of new site access from the B4100; creation of internal roads and access routes; hard and soft landscaping including noise attenuation measures; and other associated infrastructure
- Symmetry Park Oxford North (EIA scoping 21/02861/SCOP): Full planning application for research, development and production facility comprising of Class B2 floorspace and ancillary office floorspace with associated infrastructure including formation of signal-controlled vehicular access to the A41.

- 18/00825/Hybrid Heyford Park: Hybrid planning application for development on land at the Former RAF Upper Heyford air base and adjacent land north and south of Camp Road. Mixed use application for up to 1,175 dwellings, 60 close care dwellings, retail employment and community use spaces, school, energy facility and open spaced.
- 20/03199/OUT Axis J9 Phase 1: Erection of up to 53,000 sqm of floor space to be for B8 and B2 ancillary B1 (uses classes) employment provision within two employment zones; a new access off the Middleton Stoney Road (B4030); temporary access of Howes Lane pending the delivery of the realigned Howes Lane; 4.5ha of residential land; internal roads, paths and cycleways; landscaping including strategic green infrastructure (G1); provision of sustainable urban systems (suds) incorporating landscaped areas with balancing ponds and swales. Associated utilities and infrastructure.
- 19/02550/F Great Wolf Leisure: Leisure resort incorporating a waterpark, a family entertainment centre, a hotel, conferencing facilities, restaurants, access, parking and landscaping.

7.9.2 SLR has reviewed each submission, and the combined Environmental Statement for the first three applications listed (Land at J10, M40). Land at J10, M40 is located adjacent to the Proposed Development and has been considered cumulatively with all parts of this assessment. Other developments are more distant and would not contribute to construction or on-site operational noise; therefore, the remaining developments have been considered cumulatively with off-site operational traffic noise changes only.

7.9.3 Chapter 10 of the Land at Junction 10, M40 ES addressed noise which undertook a comparative assessment of: construction noise, on-site operational noise, and changes in road traffic noise brought about by the operation of Land at Junction 10, M40 development. Impacts were considered at six adjacent receptor locations (R1 – R6) as shown in the reproduction of Figure 10.1 below.



Figure 7.5 Land at Junction 10, M40 Site and Receptor Locations

- 7.9.4 The Land at Junction 10, M40 ES concludes no significant residual effects at these receptors for all three areas of the assessment considered. Mitigation has been specified for road traffic noise to protect R1, R2 and R6 to achieve these residual effects.
- 7.9.5 In addition, the Land at Junction 10, M40 application(s) considers wider receptor locations as part of the impact assessment of road traffic noise. It concludes that mitigation is required for dwellings along the B4100, from the site to the northern ring-road around Bicester (B4095). Whilst the mitigation is likely to reduce the impact of the change in road traffic noise for these receptors it is concluded that: *"on a precautionary basis in the absence of any further study, the effects at these receptors are considered 'Significant'"*.
- 7.9.6 Consideration has been given to the predicted noise levels and conclusions of the Land at Junction 10, M40 ES to inform the potential cumulative impact assessment.
- 7.9.7 It is possible that if both developments are consented that the construction phases may overlap.
- 7.9.8 It is noted that the Land at Junction 10, M40 development did not consider the receptor at Lone Barn (approximately 1km from the boundary of the proposed Land at Junction 10, M40 site). Noise levels during construction activities from the Land at Junction 10, M40 site would be expected to be sufficiently below the prevailing ambient noise climate from road traffic noise so as not to increase the overall level. On this basis, this receptor has been omitted from the construction section of the cumulative impact assessment.
- 7.9.9 With regard to Locations 1 and 3, the construction noise thresholds set out within the Land at Junction 10, M40 EIA at these receptors locations are 75 dB, 10 dB above those set out in this chapter. On the basis that the predicted noise levels from the Proposed Development are at least 10 dB below the Land at Junction 10, M40 construction noise thresholds, the construction of the Proposed Development would not cause an exceedance of these thresholds. On this basis, there is a negligible effect at these receptor locations, which is not significant.
- 7.9.10 The combined operational noise from the Land at Junction 10, M40 site with the Proposed Development is set out in Table 7.25. Predictions were not made at Lone Barn as part of the Land at Junction 10, M40 assessment; however, given the relative distances it is considered highly likely that the Land at Junction 10, M40 on-site noise would not cumulatively add to the predictions for this location.

Table 7.25 BS4142:2014+A1:2019 Cumulative Assessment with Land at J10, M40

Receptor	Assessment Period	Predicted Cumulative Rating Level, $L_{A,T}$	Representative Background Sound Level L_{A90}	Difference between Background Sound Level and Rating Level
Location 1, Baynard's Green	Daytime	43	57	-14
	Night-Time	43	49	-6
Location 2, Lone Barn	Daytime	44	49	-5
	Night-Time	42	42	0
Location 3, Travel Lodge	Daytime	42	57	-15
	Night-Time	42	49	-7

7.9.11 It can be seen that the cumulative rating level from on-site noise would be, at all locations, equal to or below the representative background sound level. Therefore, there would be a Negligible Cumulative Effect.

7.9.12 Traffic flow data for the cumulative case of Land at Junction 10, M40, Oxford North, Heyford Park, Axis J9 Phase 1, Great Wolf Leisure Centre and the Proposed development has been provided by Vectos. Following the same method as described above, cumulative road traffic noise impacts have been calculated and summarised in Table 7.26.

Table 7.26 Changes in Cumulative Road Traffic Noise Levels, LA10,18hour

Link ID	Location	Change in Basic Noise Level, dB
1	B4100 north of A34 junction	0.5
2	B4100 north of site access	4.3
3	B4100 south of site access	2.5
4	A4095 east	1.0
5	A4095 west	1.3
6	A43 west of B4100 junction	1.5
7	B430	3.0
8	M40 south	0.8
9	M40 north	0.6
10	A43 east of B4100 junction	1.1
11	A43 north of A421 junction	1.2
12	A421	1.1
13	M40 northbound on slip	2.2
14	M40 southbound off slip	1.6
15	M40 northbound off slip	0.9
16	M40 southbound on slip	1.0
17	A43 bridge	1.5
18	A43 north of services	1.3

7.9.13 It can be seen that:

- a Medium cumulative impact of change (3.0 - 4.9 dB) is predicted for the section of the B4100 north of the site access and the B430;
- a Low impact of change (1.0 – 2.9 dB) is predicted for the 11 further road links; and
- a Negligible impact of change (0.1 – 0.9 dB) is predicted for four road links.

7.9.14 Noise sensitive receptors are located along the B430 and as such would be exposed to a Moderate Cumulative Effect, which is Significant, if Land at Junction 10, M40, Oxford North, Heyford Park, Axis J9 Phase 1, Great Wolf Leisure Centre and the Proposed Development are all operational.

7.10 Summary

7.10.1 A summary of the assessment is set out in Table 7.27.

Table 7.27 Assessment Summary

Effect	Receptor	Residual Effect	Is the Effect Significant
Construction Phase			
Noise arising from construction activities, including construction traffic.	Existing Noise Sensitive Receptors	Negligible	No
Operational Phase			
Noise arising from on-site traffic movements and fixed plant associated with the Proposals	Existing Noise Sensitive Receptors	Negligible	No
The noise impact of increased traffic movements on transport links to and from the Site.	Existing Noise Sensitive Receptors	Minor Adverse	No

7.11 References

BS5228:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*, The British Standards Institution (2014).

BS4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*, The British Standards Institution (2019)

Design Manual for Roads and Bridges Volume (DMRB) LAN 111 *Noise and Vibration*

Calculation of Road Traffic Noise, Department of Transport (1998)

National Planning Policy Framework, Ministry of Housing, Communities & Local Government (2021)

Noise Policy Statement for England, Department for Environment, Food and Rural Affairs (2010)

Planning Practice Guidance, Department for Levelling Up, Housing and Communities (2014)

Cherwell District Council Local Plan *Part 1 Adopted 20 July 2015*, Cherwell District Council (2015)

ISO9613-2 *Acoustics – Attenuation of Sound During Propagation Outdoors Part 2: General Method of Calculation*, International Organisation for Standardization (1996)

Guidelines for Environmental Noise Impact Assessment Version 1.2, Institute of Environmental Management & Assessment (2014)

8 Biodiversity

8.1 Introduction

- 8.1.1 This chapter of the Environmental Statement (ES) has been produced by the Environmental Dimension Partnership Ltd (EDP).
- 8.1.2 This chapter should be read in conjunction with Technical Appendix 8.1 (Ecological Baseline) which sets out full details of the baseline surveys and other work undertaken to identify and evaluate relevant Important Ecological Features within the Proposed Development's zone of influence.

Purpose of Assessment

- 8.1.3 This chapter considers the existing biodiversity and ecological context of the Study Area and the potential effects of the Proposed Development on Important Ecological Features (IEFs).

Legislative Framework

- 8.1.4 The following is a summary of legislation and planning policies relevant to biodiversity and ecological issues both at national and local levels.

Legislative Context

The Conservation of Habitats and Species Regulations 2017 (as amended)

- 8.1.5 The Conservation of Habitats and Species Regulations 2017 (as amended) provide for the designation and protection of statutorily designated wildlife sites of European importance ('European sites'), and the protection of a number of rare and vulnerable species in a European context ('European Protected Species' (EPS)). European sites, including Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar sites are recommended for designation in the UK by the Joint Nature Conservation Committee (JNCC).

The Environment Act 2021

- 8.1.6 The Environment Act 2021 was passed into law in November 2021. Its overall aims are to strengthen environmental protection and deliver the UK Government's 25-year environment plan following the UK's exit from the European Union. Of greatest relevance to ecology and biodiversity are provisions within the Act for biodiversity gain to be a condition of planning permission in England. When these provisions come into force, following secondary legislation expected to be issued by the Secretary of State within approximately two years of the Act passing into law, the delivery of a net gain in biodiversity of 10% (as measured by a standard biodiversity metric) will become a legal requirement of planning permission for development.

The Wildlife and Countryside Act 1981 (as amended)

- 8.1.7 The Wildlife and Countryside Act 1981 (as amended) enshrines the protection of statutory designated wildlife sites of national importance (Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs)) in England and Wales. The Act also sets out varying degrees of protection and offences with regards to native species and their habitats that are rare and vulnerable in a national context. The Act also provides for the control, management and offences in respect of invasive non-native species. Sites of national importance (SSSIs and NNRs) are designated by Natural England under the Act and are protected from any development that may destroy or negatively affect them, either directly or indirectly.

Protection of Badgers Act 1992

- 8.1.8 The Protection of Badgers Act 1992 (as amended) affords protection specifically to badgers (*Meles meles*) and their setts.

Natural Environment and Rural Communities (NERC) Act 2006

- 8.1.9 Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006 places a statutory duty on Local Planning Authorities (LPAs) to consider the effects upon biodiversity when exercising their functions in England and Wales. In addition, Section 41 of the Act makes for the provision of a list of habitats and species of principal importance for the conservation of biodiversity.

Biodiversity 2020

- 8.1.10 In 2013, the UKBAP Priority Habitats and Priority Species, and the Section 41 Species and Habitats of Principal Importance for Conservation under the NERC Act 2006, were rationalised. This rationalisation occurred under the 'Post-2010 Biodiversity Framework'. As a result, a new list of Priority Species and Priority Habitats is now in operation at the UK level. These new lists supersede the former UKBAP; they are the new 'Biodiversity Indicators' that are used to monitor the status of biodiversity at the UK level. Each of the four devolved countries of the UK also has a similar list. Within England, the new rationalised lists of 24 Priority Habitats and 213 Priority Species are provided in Biodiversity 2020 which is the national biodiversity policy for England.

Planning Policy Context

National Planning Policy Framework (NPPF)

- 8.1.11 The Government published a revised version of the National Planning Policy Framework (NPPF) in July 2021. Paragraph 174 of the NPPF states that:

'planning policies and decisions should contribute to and enhance the natural and local environment by:

- a) Protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*
- b) Recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland.'*

- 8.1.12 Paragraph 174 of the NPPF states that planning policies and decisions should contribute to and enhance the natural and local environment by:

- d) Minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.'*

- 8.1.13 With regard to planning applications and biodiversity, Paragraph 180 of the NPPF states that:

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

- a) If significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*
- b) Development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other*

developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the Application Site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;

- c) Development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and*
- d) Development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged especially where this can secure measurable net gains for biodiversity.'*

National Planning Practice Guidance (NPPG)

- 8.1.14 Further guidance on the NPPF with respect to ecology is described within the Planning Practice Guidance on the Natural Environment under 'Biodiversity, geodiversity and ecosystems'.

Local Planning Policy

- 8.1.15 Relevant development management policies within the Cherwell Local Plan 2011 – 2031 are: Policy ESD10, which aims to protect and enhance biodiversity and the natural environment; and Policy ESD17, relating to the maintenance and enhancement of the District's Green Infrastructure.

8.2 Survey

- 8.2.1 All survey methodologies used within the assessment followed the published guidelines as accepted by the statutory and non-statutory agencies, including Natural England (NE) and the Chartered Institute for Ecology and Environmental Management (CIEEM). This EclA follows the standard current guidance in place at the time of writing in 2021, as set out by the CIEEM and recommended by NE.
- 8.2.2 For the purposes of this chapter the term 'Site' refers to all land within the Application Site red line boundary as shown in Figure 2.1. The term 'Study Area' relates to the areas covered by the ecological surveys and desk-based survey which varies as appropriate for the ecological features being considered, due to its sensitivity, size of home range etc., as well as the nature of predicted impacts. The study areas used for the desk study are defined below.

Survey Methodology

Desk Study

- 8.2.3 An ecological desk study was completed to collate current baseline data from statutory and non-statutory sources. The following data were gathered:
- Records of statutorily designated sites of international importance (Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites), national/regional (Sites of Special Scientific Interest (SSSI)), or local importance (Local Nature Reserves (LNR)) within 15km, 5km and 2km of the Site respectively.
 - Records of non-statutorily designated sites for nature conservation (Local Wildlife Sites (LWS) within 2km of the Site
 - Habitats of importance for nature conservation including ancient woodlands and Habitats for Principal Importance (HPI) under the Natural Resources and Environment Act (NERC) Act 2006 within or adjacent to the Site.

- Records of legally protected and notable species (including Species of Principal Importance (SPI)) under the NERC Act within 2km of the Site.

8.2.4 Information was sourced from Thames Valley Environmental Records Centre (TVERC) in May 2014, updated in April 2018 and most recently in December 2021. Online resources, including data available through the Multi-Agency Geographic Information for the Countryside website (www.magic.gov.uk) were used to supplement the baseline data and reviewed in order to gain an overview and identify features of interest in the wider landscape.

Field Survey

8.2.5 An Extended Phase 1 Habitat Survey of the western part of the Site was carried out in accordance with the standard Joint Nature Conservation Committee (JNCC) methodology in April 2018, which was updated in December 2021 along with an Extended Phase 1 Habitat Survey of the additional habitats in the east and south of the Site. Hedgerows were assessed against the Wildlife and Landscape criteria of the Hedgerow Regulations 1997 in May 2018 and the results checked in December 2021. Details of these methodologies are presented within Technical Appendix 8.1.

8.2.6 Detailed faunal surveys were carried out in accordance with the relevant survey methodology for that species as recommended by CIEEM and NE. The faunal surveys undertaken include breeding birds, roosting and foraging/commuting bats, badger, common reptiles and butterflies (brown, black and white-letter hairstreak). Methodologies used are presented within Technical Appendix 8.1.

8.3 Assessment methodology

8.3.1 Assessment and evaluation has been made in accordance with the CIEEM guidance for EcIA, which recognises that evaluation is a complex process and that a range of factors need to be considered in attributing value to ecological features. Various characteristics can be used to identify features that are likely to be important in terms of biodiversity, including:

- Naturalness;
- Animal or plant species that are rare or uncommon, either internationally, nationally or more locally;
- Ecosystems and their component parts which provide the habitats required by the above species, populations and/or assemblages;
- Endemic species or locally distinct sub-populations of a species;
- Habitat diversity, connectivity and/or synergistic associations (e.g., Networks of hedgerows and areas of species-rich pasture that provide important feeding habitat for a rare species, such as greater horseshoe bat);
- Plant communities (and their associated animals) that are considered to be typical valued natural/semi-natural vegetation types – these will include examples of naturally species poor communities;
- Species on the edge of their range, particularly where their distribution is changing as a result of global trends and climate change;
- Species rich assemblages of plants and animals;
- Typical faunal assemblages that are characteristic of homogenous habitats.

8.3.2 The ecological features that may be affected by the Development have been evaluated within a geographical framework based on the ecological status of the features, but which also reflects

a wide range of legislation and governmental guidance as indicated in Table 8.4. The guidance stresses there are many geographic contexts in which the importance of 'Important Ecological Features' (IEFs) can be assessed and the importance is in how these are defined. The significance of impacts is also then subsequently assessed based on this frame of reference.

8.3.3 Features with a value of Local or above were considered to represent IEFs. Those features not meeting the criteria for IEFs were classified as having below local (that is, not considered to appreciably enrich the habitat resource at the local level, although they may provide some habitat diversity within the immediate context of the Site itself), or Negligible ecological importance. These features are excluded from further assessment given that impacts on such features are considered insignificant regardless of the nature or magnitude of the potential impact, the exception to this being where a feature (typically individuals or populations of a species) is legally protected.

8.3.4 The likelihood that a change/activity will occur as predicted has a degree of confidence assigned. The categories of confidence used are provided in Table 8.1.

Table 8.1 Level of Confidence in Predictions

Level of Confidence	Estimated Probability
Certain/Near Certain	Probability estimated at 95% chance or higher
Probable	Probability estimated below 95% but above 50%
Unlikely	Probability estimated below 50% but above 5%
Extremely Unlikely	Probability estimated at less than 5%

8.3.5 The impacts of the Development have been predicted, taking into account different stages and activities within the development process. Impacts have been considered both individually and cumulatively. When describing impacts on an ecosystem, structure or function, reference is made to the terms as described in Table 8.2.

Table 8.2 Terms used to Describe Impacts

Parameter	Definition of parameter
Positive or Negative	Whether the impact has a positive or negative effect
Extent	The area of which the impact occurs
Magnitude	The size or amount of an impact
Duration	The time for which the impact is predicted to last prior to recovery or replacement of the resource or feature
Reversibility	Whether the impact is permanent (i.e., irreversible) or temporary (i.e., reversible)
Timing and Frequency	How often the impact occurs (e.g., repeated noise from piling work) and when it occurs (e.g., vegetation clearance undertaken outside of the bird breeding season).

8.3.6 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended) require that attention be paid to all likely forms of effects. These may be:

- Direct or indirect;
- Short or long-term;
- Intermittent, periodic or permanent; and
- Cumulative.

8.3.7 Potential effects prior to mitigation include:

- Direct loss of habitats and associated flora and fauna within the Site boundary, interruption of wildlife corridors, decrease in value to wildlife through reduction in species and/or habitats;
- Indirect effects on retained vegetation within and bordering the Site, through increased disturbance and through local changes in soils, drainage and hydrology;
- Potential effects upon protected and scarce species through disturbance;
- Operational effects such as pollution incidents from chemical spills, pollution of streams and fragile habitats from runoff and incorrect storage of materials; and
- Long-term effects arising as a result of the favourable restoration of the Site to beneficial after-use.

Magnitude

8.3.8 Magnitude of effects has been determined based on the scales described in Table 8.3:

Table 8.3 Methodology for Assessing Magnitude

Parameter	Definition of parameter
Major	Total loss or major/substantial alteration to key elements/features of the baseline (pre-Development) conditions such that the post Development character/composition/attributes will be fundamentally changed.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post Development character/composition/attributes of the baseline will be materially changed.
Minor	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-Development circumstances/situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation

Significance

8.3.9 The ecological significance of any impact has been assessed, based upon the likely effect on the structure, function or conservation status of the feature. The assessment of impact significance is undertaken both to identify the need for mitigation and also to assess residual effects.

8.3.10 The significance of likely effects was determined by identifying those ecological features likely to be affected. The features were evaluated to identify the important ones, i.e., those which, if their level of importance reduced, national or local policies (or in some cases legislation) would be triggered. The nature of the individual and combined impacts (positive or negative) were characterised on each important feature, to determine the longevity, reversibility and consequences for the feature in terms of ecological structure and function and/or the conservation status of a habitat or species. As part of the process of determining whether there is likely to be an effect on the integrity of a site or ecosystem, the following questions are considered:

- Will any site/ecosystem processes be removed or changed?
- What will be the effect on the nature, extent, structure and function of component habitats?
- What will be the effect on the average population size and viability of the component species?

- 8.3.11 Once an impact is considered to be significant then the scale of impact is assessed on a geographical scale (i.e., international, national, regional, county etc.) as above. For example, the impact may not be significant at a county scale but is significant at a more local scale. For the purposes of this Chapter, likely significant effects on IEFs are those identified as being of significance at a local scale or above.

Mitigation, Compensation or Enhancement

- 8.3.12 For the purposes of the EclA, impacts on IEFs are assessed without mitigation in place. Mitigation or compensation is identified for significant impacts on features of nature conservation importance. In line with current CIEEM guidelines, the mitigation proposals for the Development should aim to:
- Avoid negative ecological impacts – especially those that could be significant;
 - Reduce negative impacts that cannot be avoided; and
 - Compensate for any remaining significant ecological impacts.
- 8.3.13 Priority is given to avoidance of impacts, where possible, through design and/or regulation of the Development through aspects such as timing, storage of materials etc. Where this is not possible opportunities are sought to reduce the impacts as much as is feasible. If significant impacts cannot be avoided through mitigation, then compensation that is considered appropriate to offset the negative impacts of the Development should be outlined. Where it is known to exist, evidence is supplied for the effectiveness of proposed mitigation or compensation.
- 8.3.14 Development should be sustainable, and projects should seek to provide a net gain for biodiversity, as promoted through national and local policies. Enhancement should therefore be an objective of all projects, and refers to gains, such as from improved management or habitat creation, which are unrelated to an identified negative impact or, are over and above that required for mitigation or compensation of an identified effect, and will therefore deliver a net biodiversity gain or benefit.

Assumptions and Limitations

- 8.3.15 Limitations relating to field surveys are generally limited or absent, as described in further detail with Technical Appendix 8.1.

Consultation

- 8.3.16 Unfortunately, it has not been possible to arrange consultation on the development proposals prior to submission of the application in this instance. However, the scope has been informed by previous scoping opinions on similar assessments in Cherwell District, in addition to consultation responses to the application on the adjoining site.
- 8.3.17 As set out above, a BIA has been undertaken, which is provided in Technical Appendix 8.2. The methodology and results of the suite of surveys undertaken, as well as an assessment of impacts and mitigation, are set out in this ES chapter and accompanying Technical Appendix 8.1.

8.4 Baseline conditions

Current Baseline

- 8.4.1 The baseline conditions within the Site and surrounding Study Area (where relevant), which have informed the subsequent evaluation and ecological assessment, are detailed in full within Technical Appendix 8.1 and are summarised below.

Designated Sites

- 8.4.2 The Application Site is not covered by any statutory designations, nor are there any international designations (European Sites) within 15km. No European Sites are judged to be at risk of adverse impacts resulting from the Proposed Development and therefore an Appropriate Assessment of the proposals, in line with The Conservation of Habitats and Species Regulations 2017, is not required.
- 8.4.3 Initial review and impact screening with regard to designated sites, as described within Technical Appendix 8.1, ruled out adverse impacts on all but one designated site, namely Stoke Bushes Local Wildlife Site (LWS). This designation measures 19.7 ha. and is designated on account of its lowland mixed deciduous woodland (also designated as Ancient Semi-natural and Ancient Replanted Woodland) and the many birds of conservation concern recorded there. It is located approximately 50m to the north east of the Site (Figure 8.3). This designation, of District-level ecological importance, has been scoped into the assessment because of its geographical proximity to the north eastern extent of the Site.

Habitats and Vegetation

- 8.4.4 The current distribution of habitats within the Site and surrounding Study Area is illustrated on Figure 8.1 and further details/evaluation of habitats are provided in Technical Appendix 8.1. Those habitats and flora of sufficient value for inclusion as IEFs in the assessment are summarised in Table 8.4 below.

Table 8.4 Important Habitats and Flora

IEF	Summary	Level of Ecological Importance
Species-poor and species rich hedgerow and scattered mature broadleaved trees	Low distinctiveness although forms part of notable habitat corridor throughout the site and with offsite habitats.	Local

Fauna

- 8.4.5 A detailed account of the protected and notable species present within and around the Site is provided in Technical Appendix 8.1. Those species or species assemblages of sufficient value for inclusion as IEFs in the assessment are summarised in Table 8.5 below.

Table 8.5 Important Species/Species Assemblages

IEF	Summary	Level of Ecological Importance
Birds	No significant breeding or wintering populations on Site, although the hedgerows and trees offer suitable nesting habitat. Barn owl recorded foraging but no breeding confirmed.	Local
Bats	Potential roosting in several mature trees. Foraging and commuting by mostly common and widespread bat species with low numbers of uncommon species including barbastelle.	Local

IEF	Summary	Level of Ecological Importance
Badger	Evidence recorded within the site was limited to feeding remains, and although the site provides suitable foraging for badger, there is limited sett building opportunities present. However, records indicate badger is present within the wider area such that future presence in the Site cannot be ruled out.	Site
Butterflies	Non-significant breeding population of brown hairstreak butterfly on site.	Local

Future Baseline

- 8.4.6 In the absence of development it is predicted that the existing agricultural use of the land would continue, as would the management of existing habitats such as hedgerows and trees. The current management is not undertaken with the objective of maintaining or enhancing the ecological and biodiversity value of the Site and does not, for example, include repairing or replanting of trees to replace those which have died. Therefore, in the long-term, it is predicted that the ecological and biodiversity value would gradually decline below existing levels, in the absence of any significant intervention or farming subsidies which would incentivise habitat enhancement and restoration.

8.5 Potential Effects

- 8.5.1 An assessment of likely significant effects of the Proposed Development on those IEFs identified above has been undertaken based on the EIA Parameter Plan (Figure 3.1) and description of development (Chapter 3). The quantum and layout of the Proposed Development incorporates inherent or embedded ecological mitigation as a result of an iterative assessment and design process. In particular, green corridors have been incorporated into the design along the eastern site boundary, in which existing hedgerows can be retained and new habitat created, and this corridor feature of the Site (the primary objective of which is landscape mitigation) also provides opportunities for new habitat creation.
- 8.5.2 The likely effects are assessed with the inherent mitigation included, but in the absence of the additional mitigation measures required to address potentially significant effects. Anticipated effects during the construction and operation/post-completion stage of the Proposed Development are discussed in turn below.

Construction Phase

- 8.5.3 Generalised effects which could arise as a result of the construction of the Proposed Development in the absence of mitigation include the following:
- Effects of direct habitat loss, damage and degradation due to land take upon habitats and species;
 - Effects of dust deposition due to vehicle movements and construction activities on habitats within and adjacent to the Site;
 - Impacts of noise, light and human disturbance to species; and
 - Pollution of groundwater and surface water flows, as described further in Chapter 11 of the ES (Hydrology, flood risk and drainage).

Designated Sites

- 8.5.4 Given the proximity of Stoke Bushes LWS to the north-eastern extent of the Site boundary, the

woodland habitats within Stoke Bushes LWS could be subject to dust deposition caused by construction work in the Site, particularly construction plant movement and enabling ground works.

- 8.5.5 However due to a distance of at least 30m between the development footprint and potentially sensitive habitats, potential effects caused by dust deposition are therefore judged to be minor adverse, temporary, reversible, not certain, and significant at a Local level.

Habitats and Vegetation

Species-poor and species-rich hedgerows and trees

- 8.5.6 Approximately 2,475 m (39%) of the existing hedgerow with trees will be lost either to make way for built development or as part of the main access creation off the B4100 through the centre of the Site. This direct loss is judged to be major adverse, permanent, partially reversible, certain and significant at a Local level.
- 8.5.7 Where retained hedgerow is present in close proximity to the construction zone, it is at risk of damage or deterioration, including physical damage from machinery or personnel, pollution from dust, fuels/chemicals and waste materials. Such effects would be moderate adverse, temporary, reversible, not certain, and significant at a Local level.

Fauna

Birds

- 8.5.8 Land take associated with the built development and other groundworks will result in the reduction in habitat available for breeding, overwintering and foraging by a range of bird species, albeit the majority of habitats affected are of limited importance. This direct habitat loss is judged to be moderate adverse, permanent, partially reversible, certain and significant at a Local level.
- 8.5.9 Removal of breeding habitat at inappropriate times of year could result in the injuring or killing of individual birds, their eggs or young. However, such actions would also be an offence under the Wildlife and Countryside Act 1981 (as amended), compliance with which is assumed as being inherent to the Proposed Development. Therefore, no significant effect is anticipated.
- 8.5.10 Birds using retained habitats in close proximity to the construction zone are likely to be disturbed temporarily during construction by noise and movement from machinery and personnel. This disturbance could affect breeding success, albeit it is likely only a small proportion of the population would be affected. Such effects would be minor adverse, temporary, reversible, not certain, and significant at a Local level.

Bats

- 8.5.11 Out of thirteen trees with bat roost potential identified within the Site (as shown on Figure 8.2), four require removal to facilitate the construction of the Proposed Development, including three trees with moderate potential (T10, T11 and T12) and one with low potential (T13). The loss of potential roosting opportunities is judged to be major adverse, permanent, irreversible, uncertain and significant at a Local level.
- 8.5.12 Removal of a confirmed bat roost could result in the injuring or killing of individual bats and such actions would also be an offence under the Conservation of Habitats and Species Regulations 2017 (as amended), compliance with which is assumed as being inherent to the Proposed Development. Therefore, no significant effect is anticipated.
- 8.5.13 The remaining nine trees within the Site with bat roost potential are sufficiently close to the

development footprint to be at risk of disturbance from construction noise and lighting (T1 – T9). Given that this effect applies to potential, rather than actual, bat roosting and affects a small number of trees, it is judged to be minor adverse, temporary, reversible, uncertain and significant at a Local level.

- 8.5.14 With respect to effects on bat foraging and commuting habitats, the highest quality bat habitats within the Site are the hedgerows, with the off-site woodland boundary forming a commuting and foraging corridor along the southern boundary and the continuous scrub forming a commuting and foraging corridor along the western boundary. Given the relatively low numbers of common and widespread species using the internal hedgerows, the area of direct habitat loss represents a small proportion of the total resource is judged to be insignificant.
- 8.5.15 Potential disturbance of retained bat foraging habitats by artificial lighting during construction has been ruled out on the basis that standard hours of operation will be imposed, thereby avoiding works after dark during the main bat activity season.

Badger

- 8.5.16 No badger setts have been recorded within the Site. However, evidence of badgers was recorded in the site and badger are known to be present in the wider area. Furthermore, scrub and hedgerow habitats offer some suitable locations for badgers to potentially establish new (likely outlier) setts in future and the arable fields provide some foraging habitat. Direct loss or disturbance of such habitats during construction will affect the majority of the habitats within the site, apart from those retained habitats located along the Site boundaries. However, due to the active and mobile nature of badgers and the presence of extensive habitat in the wider landscape, the effect on any badger population (if present) is judged as being insignificant.
- 8.5.17 Removal of vegetation and groundworks within and around an active badger sett could result in the disturbance of the sett or the injuring or killing of individual badgers. Such actions would be an offence under the Protection of Badgers Act 1992 (as amended), although compliance with which is assumed as being inherent to the Proposed Development. Therefore, no significant effect is anticipated.

Butterflies

- 8.5.18 Only a minority of the hedgerows within the Site were found to support, or have potential to support, brown hairstreak butterflies. These were located at the northern and western extent of the Site. This is due to the frequency with which the hedgerows are flailed, thereby, periodically destroying the vast majority of the egg-laying habitat and eggs themselves (the species lay its eggs on blackthorn). The hedgerows within the centre of the Site are to be lost to facilitate the development, although the hedgerows forming the site boundary and those either side of the access road in the centre of the Site are to be retained. The area of direct habitat loss represents a reasonable proportion of the total resource within the Site, although the hedgerows within the Site are sub-optimal habitat for the species). The loss of the hedgerows is therefore judged to be insignificant.

Operational Phase

- 8.5.19 Generalised effects which could arise as a result of the operation of the Proposed Development, in the absence of mitigation, include the following:
- Effects of light and noise/visual/human disturbance to habitats and species;
 - Increased risk of collision to species arising from increased traffic movements;

- Alteration of surface water and groundwater flow quality and quantity (see Chapter 11 -Hydrology, flood risk and drainage).

Designated Sites

- 8.5.20 Stoke Bushes LWS is located near the north-eastern extent of the Site boundary. However, despite its proximity the LWS is not predicted to be affected by air pollutants. In accordance with EPUK-IAQM guidance, the overall effect of the development on NO_x for ecological receptors is considered to be 'not significant' (6.6.3). On this basis the effects are judged to be negligible.

Habitats and Vegetation

- 8.5.21 Negative effects on retained habitats during operation of the Proposed Development (beyond the habitat losses experienced during construction) are predicted to be limited. However, there is potential for some deterioration of features to occur as a result of poor management/neglect. Such effects are not predicted to be significant in EIA terms, however this will be addressed as part of the mitigation strategy to meet planning policy requirements in respect of biodiversity net gain and to maintain locally important species populations.

Fauna

- 8.5.22 Negative effects on fauna during operation of the Proposed Development (beyond the habitat losses experienced during construction) are predicted to be limited. However, certain species could suffer from the habitat deterioration/neglect described above. As above, such effects are not predicted to be significant in EIA terms, although this will be addressed as part of the mitigation strategy to meet planning policy requirements in respect of biodiversity net gain and to maintain locally important species populations.
- 8.5.23 In addition to the above, nocturnal fauna, in particular barn owl, bats and badger could be deterred from using, or accessing, their breeding or foraging habitats by light spill from the Proposed Development. This is only likely to affect species using habitats in close proximity to the development and associated highways infrastructure, such that this effect is judged to be a minor-moderate adverse, permanent, irreversible, uncertain and significant at a Local level.

8.6 Mitigation

Introduction

- 8.6.1 Wherever possible, negative effects have been avoided or reduced through inherent mitigation. However, not all potential negative effects can be avoided or reduced in severity through inherent mitigation alone. This section identifies any additional mitigation measures required to avoid, reduce, or offset the potential for such significant negative impacts. The key mechanisms described include measures to:
- Conform with relevant and pertinent legislative requirements, particularly those associated with legally protected species; and
 - Deliver and, where possible, maximise opportunities for biodiversity enhancement and gain through the Proposed Development.

- 8.6.2 The key mitigation delivery mechanisms to be implemented are summarised below.

Detailed Design Measures

- 8.6.3 Aspects of the detailed design which are especially relevant are as follows:
- Lighting – to be designed to avoid impacts on nocturnal wildlife where in close

proximity to retained habitats. This detail is included in ES Appendix 9.5. and

- Detailed soft landscape scheme – designed to include new habitats of ecological value within the public open space and other green and blue infrastructure, including SuDS. An illustrative landscape design is provided as part of the planning application.

Construction Environmental Management Plan

8.6.4 A framework Construction Environmental Management Plan (CEMP) has been submitted with the planning application. Further detail will be included and the CEMP will be implemented during the entirety of the construction stage to ensure appropriate management and operational systems are in place to avoid or minimise adverse pollution effects. Further details on the measures to be included in the CEMP are provided within Chapters 6, 7 and 11 of the ES (covering Air Quality, Noise and Hydrology respectively).

8.6.5 The CEMP can be secured by way of a suitably worded pre-commencement planning condition attached to the planning permission.

Ecological Construction Method Statement

8.6.6 An Ecological Construction Method Statement (ECMS) will be prepared which will set out in detail the measures to be implemented to protect IEFs during the construction phase of the Proposed Development. It is proposed that the implementation of the ECMS will be overseen by an appointed Ecological Clerk of Works (ECoW), whose scope and remit will be set out within the ECMS. This document will cross reference with the CEMP, where relevant, and a detailed Arboricultural Method Statement (AMS) which will set out measures to protect trees and hedgerows during the construction phase.

8.6.7 The ECMS (and AMS) and appointment of the ECoW can be secured by way of a suitably worded pre-commencement planning condition attached to the planning permission.

Landscape and Ecological Management Plan

8.6.8 A Landscape and Ecological Management Plan (LEMP) will be prepared. This will set out in detail the measures to be implemented to ensure the successful establishment/installation of new habitats/features and the long-term maintenance and management of both existing and new habitats/features proposed as part of the soft landscape scheme.

8.6.9 The LEMP can be secured by way of a suitably worded pre-commencement planning condition attached to the planning permission.

Construction Phase

8.6.10 As set out above, detailed Phase 1 surveys of the Site were carried out in April 2018 on the western part of the Site, which were updated in December 2021 along with detailed Phase 1 surveys of the additional habitats within the red line boundary of the Site. In addition, all trees within the Site were surveyed for their potential to support roosting bats during the survey in December 2021. Further Phase 2 surveys for bats, badgers, breeding birds, reptiles and butterflies were carried out in the western part of the Site in 2018, and although these surveys require updating in 2022 in order to conform to best practice guidelines, given that the additional habitats present within the eastern and southern parts of the Site are very similar to those assessed during the 2018 surveys, and that there has been no material change in the habitats present within the Site from the 2018 surveys, the likelihood of the baseline results having changed materially is very low. As such, it is considered that the conclusions reached in this ES chapter are based on sufficient evidence and can be relied upon to inform any proposed mitigation measures set out below. However, where relevant and depending on development

timescales, certain detailed species surveys may require updating prior to commencement of development. The findings will be used to inform the measures set out below.

Designated Sites

- 8.6.11 Potential adverse effects resulting from deposition of dust on Stoke Bushes LWS during construction will be avoided or reduced to insignificant levels by a range of measures, as set out in Appendix 6.3 – Air Quality.

Habitats and Vegetation

- 8.6.12 The effects of habitat loss during construction will be mitigated or compensated through new habitat creation post-construction. This is described further under the Operational Phase mitigation section below.
- 8.6.13 Potential adverse effects on retained habitats relating to damage, deterioration or disturbance, will be avoided or reduced to insignificant levels by the following:
- CEMP – including pollution prevention and control of hours of operation; and
 - ECMS and AMS – including establishment of Ecological Protection Zones (EPZs) around retained habitats, clearly delineated by protective fencing (or other barriers) and signage, where construction activities (including incursion by vehicles or personnel, fires and stockpiling of materials) are excluded.

Fauna

- 8.6.14 Protection of species during construction will be ensured through the provisions of the ECMS. As a general measure aimed at protecting species, “toolbox talks” will be provided by a suitably qualified ecologist to the principal contractor appointed by the Developer, for distribution to all employees involved in any enabling works/vegetation clearance, to ensure that identification and protection of the relevant species, their habitats is understood.
- 8.6.15 In addition to the habitat protection measures described above, which will deliver much of the necessary species protection, further measures to be included in the ECMS for each relevant species group are summarised below.

Birds

- Retained nesting and foraging habitats will be included within EPZs;
- Removal of potential nesting habitat will be undertaken outside the bird breeding season (namely March-August) unless a detailed survey by a suitably experienced ecologist has confirmed that no active nests are present in the affected area immediately prior to works commencing; and
- Pre-commencement check of any mature trees for nesting barn owls prior to felling and appropriate mitigation (timing of works and provision of nest box) if any barn owl nests are found.

Bats

- Retained trees with bat roost potential will be included within EPZs;
- Construction activities will be restricted to daylight hours as far as possible to mitigate effects of increased visual and noise disturbance, with the use of temporary, artificial lighting avoided during the hours between dusk and dawn, with directional and low-level lighting used away from sensitive habitat corridors to mitigate effects relating to increased use of artificial lighting;

- Update survey of trees with confirmed bat roosting or bat roost potential prior to felling or pruning of trees;
- Works to trees containing bat roost(s) will require a Natural England (NE) EPS licence to derogate from the legal protection afforded to bats. In order to obtain a licence it must be demonstrated that there will be no detriment to the maintenance of the favourable conservation status of the local bat population; and
- Provision of replacement roosting habitat to mitigate losses of confirmed roosts.

Badger

- Update check of development footprint and 30m buffer for badger setts prior to works commencing;
- In the unlikely event that setts are recorded, aim to avoid impacts by micro-siting of development or, if impacts cannot be avoided, exclusion of animals from the affected area (under NE licence and potentially requiring provision of alternative setts) prior to works; and
- Use of ramps or sloping sides in open excavations to allow for wildlife to escape.

Butterflies

- Retained hedgerows and woodland/scrub edge left uncut during the year of vegetation clearance and construction, to minimise brown hairstreak egg mortality rates in these habitats.

Operational Phase

Designated Sites

- 8.6.16 Potential adverse effects from pollutants on Stoke Bushes LWS and sensitive habitats within the 'Ardley Cutting and Quarry' SSSI during operation of the Proposed Development are not predicted (see Chapter 6 Air Quality).

Habitats and Vegetation

- 8.6.17 The LEMP will include measures to restore and enhance the ecological value of existing hedgerows through a combination of initial interventions (e.g., gap planting) and sensitive long-term management (e.g., less frequent flailing of hedgerows).
- 8.6.18 The effects of habitat loss during construction will be mitigated or compensated through new habitat creation post-construction. New habitats to be delivered as part of the Soft Landscape Scheme (SLS) include the following:
- New native trees and shrubs;
 - New native hedgerow planting;
 - New native woodland planting;
 - New species-rich meadow grassland; and
 - New wetland habitat.
- 8.6.19 The planting of new native trees, shrubs, woodland and hedgerows along the eastern boundary of the Site will also serve to connect the Biodiversity Opportunity Areas that border the southeastern boundary and north eastern tip of the Site, by connecting these offsite habitats via new foraging and commuting routes for a range of wildlife. The establishment and long-term management of these habitats, as secured through the LEMP, will offset the losses to development and seek to result in an overall net gain in habitat of biodiversity value. Details of

the biodiversity metric can be seen at Technical Appendix 8.2. Furthermore, the proposed new planting will enhance the connectivity between existing important habitats, in particular between Stoke Bushes LWS to the northeast and the woodland adjacent to the south of the Site through new tree, scrub, hedgerow and woodland habitats, thereby strengthening the integrity of the local ecological network.

Fauna

8.6.20 The habitat enhancement and creation measures described above (delivered via the LEMP and SLS) will offset any impacts of habitat loss and fragmentation on the important species and species groups present within the Site.

8.6.21 Additional species-specific measures proposed to minimise post-development effects, and provide enhanced opportunities for species breeding, forage and refuge, are detailed below.

Birds

- Landscape planting to include a range of fruit and seed-bearing plants to enhance foraging resource for birds; and
- Bird nesting features (bird boxes or bricks) to be installed on retained trees and/or incorporated into selected new buildings in the development;

Bats

- Bat roosting features (bat boxes or bricks) to be installed on retained trees and/or incorporated into selected new buildings in the development; and
- Sensitive design of lighting on buildings and roads to avoid impacts on bats where in close proximity to retained habitats.

Badger

- Landscape planting to include a range of fruit bearing shrubs and trees to enhance foraging resource for badgers; and
- Sensitive design of lighting to avoid impacts on badgers where in close proximity to retained habitats.

Butterflies

- Landscape planting to include a high proportion of blackthorn to provide additional breeding habitat for brown hairstreak.

8.7 Residual effects

Construction Phase

8.7.1 Subject to the mitigation measures outlined above, residual effects anticipated upon IEFs during the construction phase have been reduced to levels that are not considered to be significant.

Operational Phase

8.7.2 In light of the mitigation proposed, all potential effects upon those IEFs identified within the assessment are not considered to be significant. Furthermore, habitat creation, restoration and long-term management to be delivered via the LEMP and SLS will result in minor beneficial (Local level) effects on hedgerow and scrub habitats.

8.8 Implications of Climate Change

- 8.8.1 Changes to future climate including higher winter and summer temperatures and a decrease in summer rainfall could negatively affect habitats and species on site, and/or result in a shift in the geographical range of plants and animals (generally northward or towards higher altitudes).
- 8.8.2 The proposed protection and enhancement of existing habitats, and creation of new habitats composed of native climate tolerant species, will increase the resilience of the Site's ecological features to the future effects of climate change. In addition, the increased habitat connectivity that would be achieved by the landscaping proposals would facilitate the long-term migration/shift in geographical range by plants and animals in response to the changing climate.

8.9 Cumulative effects

- 8.9.1 The assessment of cumulative effects repeats the assessment process set out above, but considers the potential change caused by all schemes identified for cumulative assessment.
- 8.9.2 The schemes listed below have been included within the assessment of cumulative effects.
- Heyford Park (18/00825/HYBRID);
 - Great Wolf Leisure Resort (APP/C3105/W/20/3259189);
 - Oxfordshire RFI (21/02008/SCOP);
 - J10 M40 (21/03267/OUT and 21/03268/OUT);
 - Axis J9 Phase 1 (20/03199/OUT); and
 - Symmetry Park Oxford North (21/02861/SCOP).
- 8.9.3 Subject to the implementation of the proposed ecological avoidance, mitigation and enhancement measures, the residual effects of the Proposed Development alone will be either negligible or beneficial. Thus, the likelihood of cumulative effects on ecological features arising in combination with the schemes listed above is judged to be negligible.

8.10 Summary

- 8.10.1 This chapter assesses the impacts and consequential ecological effects that may occur to Important Ecological Features from the Proposed Development. Important Ecological Features includes designations, habitats, protected and Priority Species of plants and animals (terrestrial and aquatic).
- 8.10.2 The assessment includes a summary of the current baseline and predicted future ecological conditions and identifies measures to avoid, mitigate and/or compensate, where appropriate, for significant effects that may arise as part of the Proposed Development.
- 8.10.3 The assessment has been informed by baseline investigations (desk studies and a series of detailed ecological surveys) by EDP. The assessment has been undertaken using professional judgement and experience, and in accordance with industry standard guidance.
- 8.10.4 The majority of the Site comprises arable fields, with smaller areas of poor semi-improved grassland and scrub that are of negligible – site level intrinsic ecological importance. However, the Site also includes species-poor and species-rich hedgerows and trees that are of Local ecological importance.
- 8.10.5 The Important Ecological Features taken forward for detailed assessment are set out below:

- Stoke Bushes LWS (District-level);
- Species-poor and species-rich hedgerow and trees (Local-level);
- Birds (Local-level);
- Bats (Local-level);
- Badger (Site-level);
- Butterflies (Local-level).

- 8.10.6 A range of industry standard measures describing key working methods and timings to avoid/minimise ecological effects during construction will be delivered through an Ecological Construction Method Statement (ECMS), and protected species licenses where required, overseen by an ECoW. These licenses would be obtained in advance of construction, and mitigation measures would be further refined and agreed during the licensing process.
- 8.10.7 The design and layout of the Proposed Development has been refined through various iterations to ensure that potentially significant ecological effects are avoided or minimised, and to deliver biodiversity gains in accordance with local and national planning policy. To achieve this, the Parameters Plan ensures that a minimum of 17.24ha, 20.70% of the site area, will be devoted to open space and managed for biodiversity purposes. Additional landscaping and open space will also be provided within the Developable Area once final site layouts are fixed at Reserved Matters Stage, further increasing the biodiversity potential of the proposals. The establishment, maintenance and long-term management of the retained and created habitats will be delivered via a Landscape and Ecological Management Plan (LEMP).
- 8.10.8 Overall, it is predicted that a net biodiversity gain can be delivered either onsite or offsite by the development proposals, thereby meeting both local and national policy requirements regarding biodiversity.
- 8.10.9 In summary, with appropriate mitigation and design built into the Proposed Development, **no significant**, adverse construction nor operational effects are predicted to the Important Ecological Features assessed. Furthermore, the Proposed Development can potentially deliver a long-term **beneficial** effect at a **Local level** with respect to hedgerow, scrub and tree habitats.
- 8.10.10 A summary of the assessment is set out in Table 8.6 overleaf.

8.11 References

- Department for Communities and Local Government, 2021, “*National Policy Planning Framework*”
- www.gov.uk/guidance/natural-environment
- Cherwell Local Plan 2011–2031 Part 1 (adopted July 2015)
- Chartered Institute of Ecology and Environmental Management (September 2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (2nd Edition)

Table 8.6 Summary of effects

Feature(s)	Potential effect	Nature of effect	Significance (pre-mitigation)	Mitigation measure	Significance of residual effect
Construction Phase					
<i>Designated sites</i>					
Stoke Bushes LWS	Degradation of habitats caused by deposition of dust	Minor adverse, temporary, reversible, not certain.	Significant (Local level)	CEMP (sensitive construction methods)	Negligible
<i>Habitats and Vegetation</i>					
Species-rich and species-poor hedgerows and trees	Direct loss (38.9%)	Major adverse, permanent, irreversible, certain.	Significant (Local level)	LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible
	Damage or deterioration	Moderate adverse, temporary, reversible, not certain.	Significant (Local level)	CEMP, ECMS and AMS (protection of retained habitats); LEMP (enhancement of retained habitat); and SLS (new habitat creation)	Negligible
<i>Fauna</i>					
Birds	Loss of nesting and foraging habitat	Moderate adverse, permanent, partially reversible, certain	Significant (Local level)	LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible
	Direct killing and injuring of nesting birds, young and eggs	Not significant (based on inherent mitigation – legal compliance)		ECMS (sensitive timing and method of vegetation clearance)	Negligible
	Disturbance	Minor adverse, temporary, reversible, not certain.	Significant (Local level)	CEMP and ECMS (protection of retained habitats)	Negligible
Bats	Loss of potential roosting habitat in trees	Major adverse, permanent, irreversible, uncertain.	Significant (Local level)	LEMP (bat boxes)	Negligible
	Direct killing and injuring of roosting bats	Not significant (based on inherent mitigation – legal compliance)		ECMS and EPS Licence (sensitive timing and method of tree removal, provision of replacement roost habitat)	Negligible
	Disturbance of potential roosting habitat	Minor adverse, temporary, reversible, uncertain.	Significant (Local level)	CEMP and ECMS (protection of retained habitats)	Negligible
	Loss of foraging/commuting habitat (small proportion)	Insignificant		LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible
Badger	Loss of foraging habitat (small proportion)	Insignificant		LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible
	Direct killing and injuring of badgers in setts	Not significant (based on inherent mitigation – legal compliance)		ECMS and NE Licence (sensitive timing and method of works)	Negligible
Brown hairstreak butterfly	Loss of breeding habitat (small proportion)	Insignificant		LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible

Feature(s)	Potential effect	Nature of effect	Significance (pre-mitigation)	Mitigation measure	Significance of residual effect
Operational Phase					
<i>Designated sites</i>					
Stoke Bushes LWS	Changes in air quality	Negligible		None required	Negligible
<i>Habitats and Vegetation</i>					
Retained habitats	Poor management/neglect	Insignificant		LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible
<i>Fauna</i>					
All species	Poor management/neglect of retained habitats	Insignificant		LEMP (enhancement of retained habitat); and SLS (new habitat creation/planting)	Negligible
Nocturnal species (barn owl, bats, and badger)	Disturbance of habitat by lighting	Minor-moderate adverse, permanent, irreversible, not certain	Significant (Local level)	Sensitive lighting design	Negligible

9 Landscape and visual effects

9.1 Introduction

9.1.1 This chapter of the ES has been produced by the Environmental Dimension Partnership Ltd (EDP). This chapter has been prepared with reference to the Technical Appendices and contributors, as set out below:

- Technical Appendix 9.1: Landscape and Visual Impact Assessment (LVIA) baseline assessment - EDP;
- Technical Appendix 9.2: Table of Effects: Visual Amenity;
- Technical Appendix 9.3: Cumulative Assessment;
- Technical Appendix 9.4: Arboricultural Impact Assessment;
- Technical Appendix 9.5: Dunwoody Lighting Assessment;
- Technical Appendix 9.6: Landscape Strategy;
- Technical Appendix 9.7: Photomontages; and
- Technical Appendix 9.8: Landscape Sections

9.1.2 This chapter considers the existing landscape and visual context of the Study Area and the potential effects of the Proposed Development on landscape and visual receptors.

Legislative Framework

9.1.3 The following is a summary of planning policies relevant to landscape and visual issues both at national and local levels.

Legislative Context

9.1.4 With regard to Landscape and Visual matters the European Landscape Convention (ELC), to which the UK is a signatory, defines landscape thus:

“Landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.”

9.1.5 The Guidelines for Landscape and Visual Impact Assessment Third Edition (LI/IEMA, 2013) (GLVIA), para 2.4, reminds us that the importance of the ELC definition is that it “...moves beyond the idea that landscape is only a matter of aesthetics and visual amenity”. Landscape assessment requires that proposed changes are assessed holistically in terms of all dimensions of the landscape resource. Those other dimensions include whether the Site has historical or cultural relevance, its habitats, its landscape fabric and its long-term management. Frequently we find that loss of openness and change to visual character are counterbalanced by neutral or even positive impacts on other dimensions of the landscape resource.

9.1.6 The GLVIA also states, in reference to the European Union Directive 2011/92/EU:

“The Directive is clear that the emphasis is on the identification of likely significant environmental effects. This should embrace all types of effect and includes, for example, those that are positive/beneficial and negative/adverse, direct and indirect, and long and short term, as well as cumulative effects. Identifying significant effects stresses the need for an approach that is in proportion to the scale of the project that is being assessed and the nature of its likely effects. Judgement needs to be exercised at all stages in terms of the scale of investigation that is appropriate and proportional. This does not mean that effects should be ignored, or their importance minimised but that the assessment should be tailored to the particular

circumstances in each case.”

- 9.1.7 This landscape and visual assessment has been prepared in accordance with best practice guidance, as set out in the GLVIA which “*takes into account recognition of the European Landscape Convention by the United Kingdom government*” including with regard to: definition of landscape; value of landscape; and the assessment of the effects of the development on landscape, as set out above. This assessment has, therefore, been prepared with regard to the European Landscape Convention in these regards.

National Planning Policy Framework (NPPF)

- 9.1.8 At the heart of the National Planning Policy Framework (NPPF, Updated July 2021) is a presumption in favour of sustainable development. For landscape, this means recognising the intrinsic character and beauty of the countryside (paragraph 174 (b)) and balancing any harm to the landscape resource with the benefits of the scheme in other respects. This balancing exercise is to be undertaken by the decision taker (in this case the Local Planning Authority (LPA)) and falls outside the remit of this report. The benefits of the scheme are to be weighed against the effects on the landscape character and visual amenity as set out in this report, as detailed in the Planning Statement accompanying this application. The policy framework is supported by the National Planning Practice Guidance (NPPG) where relevant.

National Planning Practice Guidance (NPPG)

- 9.1.9 Those categories within the NPPG that are of relevance to landscape and visual matters in relation to this site are set out below.
- 9.1.10 The NPPG states that well-designed places can be achieved by taking a pro-active and collaborative approach at all stages of the planning process. The guidance sets out processes and tools that can be used through the planning system. The guidance is to be read alongside the National Design Guide.

National Design Guide

- 9.1.11 The importance of design is a key focus within the guide as is the local and wider context and character of the Site.

Green Infrastructure

- 9.1.12 The NPPG highlights the multifaceted benefits delivered through Green Infrastructure and recognises how it can be used to reinforce and enhance local landscape character and contribute to a sense of place.

Landscape

- 9.1.13 Finally, the NPPG refers to the NPPF and the recognition of the intrinsic character and beauty of the countryside and the provision of strategic policies to provide the conservation and enhancement of landscapes. Adverse landscape impacts are to be avoided and mitigation measures employed where necessary.

Local Planning Policy

- 9.1.14 The statutory development plans which are relevant to the Site comprise:
- Cherwell Local Plan 2011–2031 Part 1 (adopted July 2015); and
 - Saved Policies of the Adopted Cherwell Local Plan 1996.

- 9.1.15 Part 2 of the Local Plan 2011–2031 is under preparation, which will contain detailed development management policies and non-strategic site allocations. While this is under preparation the saved policies of the Cherwell Local Plan 1996 remain part of the current development plan.

Cherwell Local Plan 1996 Saved Policies

- 9.1.16 The Local Plan Proposals Map shows no specific policies applying to the Site.
- 9.1.17 The following saved policies to be retained under the new 2011–2031 Local Plan are considered relevant in the context of this assessment:
- Saved policy C7 Landscape conservation, requires development to take into account the surrounding topography and landscape character so as not to detract from important views; and
 - Saved Policy C28 Layout, design and external appearance of new development, which relates to the design of development (including siting, layout, size, scale, architectural style, building materials, means of enclosure and landscaping), and which should be sympathetic to the character of its landscape context.

Cherwell Local Plan 2011–2031: Part 1 (Adopted July 2015)

- 9.1.18 The over-arching policies contained within the Cherwell Local Plan 2011–2031 that are considered relevant are described in detail within **Technical Appendix 9.1** and listed below:
- Policy SLE 1: Employment Development;
 - 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;
 - Policy ESD 17 Green Infrastructure.

Other Documents of Relevance to Landscape Matters

- 9.1.19 The following evidence base documents have been considered as part of this appraisal:

Supplementary Planning Documents

- 9.1.20 Although this is now considered very dated, the Countryside Design Summary (June 1998) is Supplementary Planning Guidance (SPG) adopted in 1998. This document was informed by the older Cherwell District Landscape Assessment by Cobham Resource Consultants (November 1995), which describes the landscape character of the district. Development proposals should reference the information and advice contained in this SPG, as well as the more recent landscape assessment within the Oxfordshire Wildlife and Landscape Study. The intention of the SPG document is that it will “*encourage creative and imaginative approaches to new development, which reflects the existing distinctive character of the villages and countryside of Cherwell District*” rather than being prescriptive.

9.2 Assessment methodology

- 9.2.1 Provided within this section is an abridged methodology for the LVIA. An unabridged version can be found at Annex EDP 2 of **Technical Appendix 9.1**, with terms clearly defined within the Glossary at Annex EDP 3.
- 9.2.2 A three-stage assessment process will be adopted for the LVIA in accordance with best practice as set out in the GLVIA as relevant to EIA schemes, comprising: 1) Description of the proposed

development and the existing landscape and visual context in which it will be assessed (set out at, **Technical Appendix 9.1**, with reference to ES Chapter 3, and summarised in this Chapter); 2) Prediction of the likely changes to the landscape and visual context resulting from the proposed development; and 3) Assessment of the significance and nature (positive or negative/adverse) of the effects resulting from the likely changes.

9.2.3 The likely effects of the proposed development on the landscape resource and visual amenity will be assessed through the combination of an assessment of a number of representative viewpoints and desk research and fieldwork, through which a more precise understanding of the study area can be gained.

9.2.4 In order to assess the likely effects, the assessment will draw on the baseline to identify receptors, which, for the Proposed Development may include, but not be limited to, those listed below.

9.2.5 Landscape receptors may include:

- Landscape designations on a national, regional or local level (where relevant);
- The landscape fabric of the development Site;
- The 'host' landscape character area which contains the proposed development;
- 'Non-host' landscape character areas surrounding the host character area which have the potential to be affected by the Application Proposals (where relevant); and
- Specific landscape features of value as identified through the ecology and arboriculture surveys.

9.2.6 Visual receptors may include:

- Users of National Cycle Routes and National Trails;
- Users of local/regional cycle and walking routes;
- Those using local rights of way – walkers, horse riders, cyclists;
- Users of open spaces with public access;
- Settlements and private residences;
- People using major (A and B) roads;
- People using minor roads; and
- People using local railways.

9.2.7 The tables within **Technical Appendix 9.1** Annex EDP 1 - Methodology, reproduced below for ease of reference, offer templates for assessing overall sensitivity of any landscape or visual receptor, and magnitude of change.

9.2.8 Assessment of the overall sensitivity of any landscape or visual receptor is determined by combining judgements of their susceptibility to the type of change or development proposed and the value attached to the landscape or view as set out at paragraph 5.38 of GLVIA. However, the narrative in this report may demonstrate that assessment of overall sensitivity can change on a case-by-case basis. For example, a high susceptibility to change and a low value may result in a medium overall sensitivity, unless it can be demonstrated that the receptor is unusually susceptible or is in some particular way more valuable. A degree of professional judgement is applied in arriving at the overall sensitivity for both landscape and visual receptors.

9.2.9 Table 9.1 below provides an indication of the criteria by which the overall sensitivity of a landscape receptor is judged within this assessment and considers both value and susceptibility independently.

Table 9.1 Landscape Sensitivity Criteria

Category	Landscape Receptor Value Criteria	Landscape Susceptibility to Change Criteria
Very High	Nationally/internationally designated/valued countryside and landscape features; strong/distinctive landscape characteristics; absence of landscape detractors.	Strong/distinctive landscape elements/-aesthetic/perceptual aspects; absence of landscape detractors; landscape receptors in excellent condition. Landscapes with clear and widely recognised cultural value. Landscapes with a high level of tranquillity.
High	Locally designated/valued countryside (e.g., Areas of High Landscape Value, Regional Scenic Areas) and landscape features; many distinctive landscape characteristics; very few landscape detractors.	Many distinctive landscape elements/-aesthetic/perceptual aspects; very few landscape detractors; landscape receptors in good condition. The landscape has a low capacity for change as a result of potential changes to defining character.
Medium	Undesignated countryside and landscape features; some distinctive landscape characteristics; few landscape detractors.	Some distinctive landscape elements/-aesthetic/perceptual aspects; few landscape detractors; landscape receptors in fair condition. Landscape is able to accommodate some change as a result.
Low	Undesignated countryside and landscape features; few distinctive landscape characteristics; presence of landscape detractors.	Few distinctive landscape elements/-aesthetic/perceptual aspects; presence of landscape detractors; landscape receptors in poor condition. Landscape is able to accommodate large amounts of change without changing these characteristics fundamentally.
Very Low	Undesignated countryside and landscape features; absence of distinctive landscape characteristics; despoiled/- degraded by the presence of many landscape detractors.	Absence of distinctive landscape elements/-aesthetic/perceptual aspects; presence of many landscape detractors; landscape receptors in very poor condition. As such landscape is able to accommodate considerable change.

9.2.10 For visual receptors, judgements of susceptibility and value are closely interlinked considerations. For example, the most valued views are those which people go and visit because of the available view – and it is at those viewpoints that their expectations will be highest and thus most susceptible to change.

9.2.11 Table 9.2 below provides an indication of the criteria by which the overall sensitivity of a visual receptor is judged within this assessment and considers both value and susceptibility together.

Table 9.2 Visual Receptor Sensitivity Criteria

Category	Visual Receptor Criteria
Very High	<p>Designed view (which may be to or from a recognised heritage asset or other important viewpoint), or where views of the surroundings are an important contributor to the experience. Key promoted viewpoint e.g., interpretative signs. References in literature and art and/or guidebooks tourist maps. Protected view recognised in planning policy designation.</p> <p>Examples may include views from residential properties, especially from rooms normally occupied in waking or daylight hours; national Public Rights of Way (PRoW) e.g., National Trails and nationally designated countryside/landscape features with public access which people might visit purely to experience the view; and visitors to heritage assets of national importance.</p>
High	<p>View of clear value but may not be formally recognised e.g., framed view of high scenic value, or destination hill summits. It may also be inferred that the view is likely to have value e.g., to local residents.</p> <p>Examples may include views from recreational receptors where there is some appreciation of the landscape e.g., golf and fishing; local PRoW, access land and National Trust land, also panoramic viewpoints marked on maps; road routes promoted in tourist guides for their scenic value.</p>
Medium	<p>View is not promoted or recorded in any published sources and may be typical of the views experienced from a given receptor.</p> <p>Examples may include people engaged in outdoor sport other than appreciation of the landscape e.g., football and rugby or road users on minor routes passing through rural or scenic areas.</p>
Low	<p>View of clearly lesser value than similar views experienced from nearby visual receptors that may be more accessible.</p> <p>Examples may include road users on main road routes (motorways/A roads) and users of rail routes or people at their place of work (where the place of work may be in a sensitive location). Also views from commercial buildings where views of the surrounding landscape may have some limited importance.</p>
Very Low	<p>View affected by many landscape detractors and unlikely to be valued.</p> <p>Examples may include people at their place of work, indoor recreational or leisure facilities or other locations where views of the wider landscape have little or no importance.</p>


9.2.12 Table 9.3 below provides an indication of the criteria by which the size/scale of change at a landscape or visual receptor is judged within this assessment (Note that the assessment of visual effects has considered seasonality, with professional judgement considering the likely worst-case scenario of effects).

Table 9.3 Scale of Change Criteria

Category	Landscape Receptor Criteria	Visual Receptor Criteria
Very High	Total loss of or major alteration to key elements/features/characteristics of the baseline condition. Addition of elements which strongly conflict with the key characteristics of the existing landscape.	There would be a substantial change to the baseline, with the proposed development creating a new focus and having a defining influence on the view.
High	Notable loss or alteration to one or more key elements/features/characteristics of the baseline condition. Addition of elements that are prominent and may conflict with the key characteristics of the existing landscape.	The proposed development will be clearly noticeable, and the view would be fundamentally altered by its presence.
Medium	Partial loss or alteration to one or more key elements/features/characteristics of the baseline condition. Addition of elements that may be evident but do not necessarily conflict with the key characteristics of the existing landscape.	The proposed development will form a new and recognisable element within the view which is likely to be recognised by the receptor.
Low	Minor loss or alteration to one or more key elements/features/characteristics of the baseline landscape. Addition of elements that may not be uncharacteristic within the existing landscape.	The proposed development will form a minor constituent of the view being partially visible or at sufficient distance to be a small component.
Very Low	Barely discernible loss or alteration to key elements/features/characteristics of the baseline landscape. Addition of elements not uncharacteristic within the existing landscape.	The proposed development will form a barely noticeable component of the view, and the view whilst slightly altered would be similar to the baseline situation.
Negligible	No appreciable change	No appreciable change

9.2.13 Table 9.4 below provides an indication of the criteria by which the geographical extent of the area affected is judged within this assessment.

Table 9.4 Geographical Extent Criteria

	Landscape Receptors	Visual Receptor Criteria
<div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 10px;"> Largest  Smallest </div> </div>	Large scale effects influencing several landscape types or character areas.	Direct views at close range with changes over a wide horizontal and vertical extent.
	Effects at the scale of the landscape type or character areas within which the proposal lies.	Direct or oblique views at close range with changes over a notable horizontal and/or vertical extent.
	Effects within the immediate landscape setting of the Application Site.	Direct or oblique views at medium range with a moderate horizontal and/or vertical extent of the view affected.
	Effects at the Site level (within the Application Site itself).	Oblique views at medium or long range with a small horizontal/vertical extent of the view affected.
	Effects only experienced on parts of the Application Site at a very localised level.	Long range views with a negligible part of the view affected.

Significance of Effect

9.2.14 The purpose of the EIA process is to identify the likely significant environmental effects (both beneficial and adverse) arising from Application Proposals.

9.2.15 In order to consider the likely level of any effect, the sensitivity of each receptor is combined with the predicted magnitude of change (as set out above), with reference also made to the geographical extent, duration and reversibility of the effect within the assessment. The level of effect can be derived by combining the sensitivity and magnitude in accordance with the matrix in Table 9.5.

Table 9.5 Level of Effects Matrix

Overall Sensitivity	Overall Magnitude of Change				
	Very High	High	Medium	Low	Very Low
Very High	Substantial	Major	Major/ Moderate	Moderate	Moderate/ Minor
High	Major	Major/ Moderate	Moderate	Moderate/ Minor	Minor
Medium	Major/ Moderate	Moderate	Moderate/ Minor	Minor	Minor/ Negligible
Low	Moderate	Moderate/ Minor	Minor	Minor/ Negligible	Negligible
Very Low	Moderate/ Minor	Minor	Minor/ Negligible	Negligible	Negligible/ None

9.2.16 Each effect is described and evaluated individually through the integration of all of the relevant factors and assessed as either significant or not significant. For landscape and visual effects, those effects identified at a substantial, major, major/ moderate or moderate level (emboldened

in the table above) are generally considered to be significant and those effects assessed at a moderate/minor, minor, minor/ negligible or negligible level are considered to be not significant.

- 9.2.17 In certain cases, where additional factors may arise, a further degree of professional judgement may be applied when determining the level of overall change. For example, in cases where a moderate/minor effect is experienced by a high or very high sensitivity receptor, this may be considered to be significant. Where this occurs, further explanation is given.
- 9.2.18 Effects will be described and evaluated during construction, at Year 1 (completion of construction activities) and Year 15 (following maturation of the landscape proposals).

Study Area

- 9.2.19 In order to establish the baseline and the potential limit of notable effects, a broad study area was adopted as the initial search area. This enabled the geographical scope of the assessment to be defined and provided the wider geographical context of the study. Within this area, the search focused on identifying the local planning policy context, national and local landscape designations and other relevant designations, and providing a general geographical understanding of the Site and its broader context (for example, in relation to landform, transport routes and the distribution and nature of settlement).
- 9.2.20 Following this initial analysis and subsequent field work, and having an appreciation of the development proposed, the study area has been refined to focus on those areas and features that are assessed to be likely to be affected by the proposals. The extent of this study area is 3km from the Site boundary, largely due to local topography being relatively flat. Occasional reference may be made to features beyond this 3km area where appropriate. The study area is illustrated on **Figure 9.1**.

Surveys

- 9.2.21 A number of field assessments of local Site circumstances, including photographic survey of the character and visual context of the Site and its surroundings were undertaken in during August 2021, and again in November 2021 in order to gather robust baseline information. Field assessments were undertaken in clear, dry weather and have, therefore, been undertaken, as far as is practicable, in accordance with best practice guidance which states that such assessments should be undertaken across the seasons when the leaves are absent from the majority of trees/vegetation and visibility is at its greatest.
- 9.2.22 These field-based assessments were undertaken by a Chartered Landscape Architect, with appropriate experience of the relevant guidance.

Arboricultural Matters

- 9.2.23 There are no known TPO trees within or adjacent the Site.
- 9.2.24 As illustrated at **Technical Appendix 9.1: Figure 9.2**, Stoke Bushes Ancient Woodland is situated to the east of the Site, with the extent of the ancient woodland designation being approximately 100m from the Site boundary; and Stoke Wood is an area of Ancient Woodland which is situated approximately 200m to the south of the Site, this is physically separated from the Site by Cherwell Valley services and road infrastructure.

Public Rights of Way

- 9.2.25 The locations of Public Rights of Way (PRoW) within the Zone of Theoretical Visibility of the Proposed Development are discussed in detail in **Technical Appendix 9.1**. They have been

taken from Ordnance Survey Explorer Mapping (at a scale of 1:25,000) and PRow route codes from the online Oxfordshire Countryside Access Map.

- 9.2.26 There are no PRow within the Site, Stoke Lyne PRow (367/24/10) passes adjacent to the Site's northern boundary. Potential views of the Site from this route and others within the local context are considered in **Technical Appendix 9.1**.

Assumption and Limitations

- 9.2.27 Baseline conditions have been established using published documents and field assessment; it is important to note that this information may change before, or during, the construction and operation of the Application Proposals.
- 9.2.28 The assessment is undertaken in consideration of the 'worst case' scenario for the Application Proposals, i.e., those potential outcomes, situations or locations which would result in the most profound effect on landscape and visual receptors, unless stated to the contrary. It therefore identifies the greatest degree of change likely to accrue and may be subject to mitigating factors or alternative conditions which might reduce those effects.
- 9.2.29 As defined above, the assessment of likely significant effects applies a pre-determined methodology to arrive at its conclusions. This procedure brings a degree of objective, procedural rigour into what otherwise might be judged to be 'personal opinion'. Certainly, professional judgement still plays its part, but the purpose of adopting a methodology is to make the process as clear and logical as possible.

9.3 Baseline conditions

Current Baseline

- 9.3.1 Landscape and visual assessment is comprised of a study of two separate but inter-linked issues; landscape character and visual amenity. A detailed description of the landscape and visual baseline at and around the Site is set out in **Technical Appendix 9.1**, with a summary provided below.

Landscape Character

National Landscape Character

- 9.3.2 The landscape of England has been subject to a nationwide Landscape Character Assessment, The Character of England: Landscape, Wildlife and Natural Features (Natural England). The Site falls within National Character Area (NCA) Profile 107 Cotswolds.
- 9.3.3 While the descriptions of NCA 107 are useful in that it provides a context for the Site, and a broad framework for more detailed landscape character assessments, it is too generic to provide specific Site level characterisation. For the scale of the development proposed, it is considered that the description of landscape character undertaken at the sub-regional level is more relevant in establishing the landscape resource baseline.

Local Landscape Character

- 9.3.4 Of more relevance, is the landscape character outlined within local publication, namely the Oxfordshire Wildlife and Landscape Study (2004)

Oxfordshire Wildlife and Landscape Study

- 9.3.5 The Site lies within 'Wooded Estatelands' Landscape Character Type (LCT).

- 9.3.6 As defined by the Oxfordshire wildlife and landscape study (OWLS), the 'Wooded Estatelands' LCT is described as "a wooded estate landscape characterised by arable farming and small villages with a strong vernacular character."
- 9.3.7 Key characteristics of the Clay Vale LCT relevant to the Site and its context include:
- *"Rolling topography with localised steep slopes;*
 - *Large blocks of ancient woodland and mixed plantations of variable sizes; and*
 - *Large parklands and mansion houses; and*
 - *A regularly shaped field pattern dominated by arable fields; and*
 - *Small villages with strong vernacular character"*
- 9.3.8 The 'Forces for Change' for this LCT highlights "some *large scale business parks using inappropriate building materials are visually intrusive.*"
- 9.3.9 The landscape strategy for the LCT is to "*safeguard and enhance the characteristic landscape of parklands, estates, woodlands, hedgerows and unspoilt villages.*"
- 9.3.10 While the Site sits wholly within the Wooded estatelands LCT, it is bordered to the north west by the Farmland Plateau LCT. This landscape character is characterised by '*a distinctive elevated and exposed character, broad skies and long distance views*' and a landscape dominated by large scale arable fields, '*with some medium sized plantations partially obscuring the otherwise open views.*'
- 9.3.11 The strategy for the Plateau Farmland LCT is to "*Conserve the open and remote character of the landscape, and maintain the large-scale field pattern*", with key recommendations including to "*Safeguard and enhance the open, sparsely settled character of the landscape whilst maintaining and strengthening its pattern of hedgerows, stone walls, small woodlands and tree belts*", and to "*Ensure that all priority habitats are in favourable condition and management.*"

EDP's Site Specific Landscape Character Assessment

- 9.3.12 EDP conducted a desk based and field assessment of the Site's characteristics during which the individual elements of the Site were noted, as were the differences in the composition and the character of the Site's physical components to the published assessment, and their value and ability to accommodate change.
- 9.3.13 The landscape within the context of the Site includes a mix of rural features with major vehicular corridors to the north-west and south-west. The Site itself is generally flat with levels falling gently to the east and is typical of the surrounding areas of the Wooded Estatelands LCT. Within the local context the Site sits on a broad plateau, with land to the south-east being gently undulating and land to the north generally being level. Far reaching views are limited owing to surrounding mature vegetation and blocks of woodland. These very minor localised changes in level, combined with mature tree cover, largely determines visual and perceptual characteristics across the Site. From the wider context, as illustrated in Photoviewpoints EDP 1 to 11, there is very little, intervisibility between the Site and the wider context.
- 9.3.14 The Site is located in close proximity to major vehicular routes namely the M40 to the southwest and A43 to the west. The A43 runs parallel to the Sites north-western boundary which is screened from views by dense boundary vegetation. The B4100 separates the Site's two land parcels, which then gently rises to the south enabling views looking north from a slightly elevated position.

- 9.3.15 The location of the Site, within a gently undulating landscape to the east and flat topography to the north, results in limited visibility from the surrounding context, with most ground level views being filtered by intervening hedgerows and other vegetation. Views back to the Site from publicly accessible locations are generally limited by mature field boundary vegetation within the Site's local context, characteristic of the surrounding LCA. With the more open views being experienced from sections of the B4100.
- 9.3.16 The Site's general character is illustrated at Technical Appendix 9.1: Figure 9.4. The character of the Site is influenced by the road infrastructure of the A43, B4100 as well as the M40 corridor further afield which all exert an audible influence on local tranquillity. In views from the west however, major road infrastructure is generally well screened by mature vegetation, including views from the Ardley Conservation Area.
- 9.3.17 The landscape fabric of the Site comprises a series of agricultural fields of varying sizes. The key characteristics of the Site are consistent with the current agricultural land use prevalent in the wider area. Mature trees are found along some of the field boundaries and are generally in good condition. Internally the fields are separated with hedgerows.
- 9.3.18 With regard to landscape character, there are no heritage assets within the Site. The closest assets to the Site are largely physically and visually separated from the Site by intervening vegetation and road infrastructure.
- 9.3.19 While there are a number of heritage assets present within the local context, in relation to landscape matters, there is no reason to believe that heritage issues should influence the character of the landscape and therefore constrain development of the Site.

Value of the Landscape Receptors

- 9.3.20 The following paragraphs describe the value of the landscape receptors as assessed by EDP and within published documents. Value and susceptibility to change are considered independently in the assessment of overall 'sensitivity' of landscape receptors, with susceptibility being in accordance with best practice guidance.

Value: Landscape Character of the Site and Context

- 9.3.21 Published landscape character assessments provide some contextual understanding of the defining characteristics of the wider landscape and, in some respects, the Site itself. As set out above, the Site and its surrounding context correlates with many of the key rural characteristics of the Wooded Estate Lands LCT. Junction 10 of the M40 is located at the boundary of two LCTs and, as such, the key characteristics of the area do not wholly represent one or the other of the LCTs. Although the descriptions provided within the published landscape character assessments are broadly applicable to Junction 10 and its context, those of relevance include: *"Level or gently rolling open ridges"; "Sparsely settled landscape with a few nucleated settlements"; and "Long, straight roads running along the ridge summits."*
- 9.3.22 The descriptions of the Wooded Estate Lands LCT include a number of forces for change, including that *"some large-scale business parks using inappropriate building materials are visually intrusive."* However, it is noteworthy that this assessment is now almost 20 years old and that the local context, particularly around the junction itself, is evolving. Therefore, on balance, the value and susceptibility of the local landscape character is considered to be medium, leading to an overall medium sensitivity.
- 9.3.23 The Site and its context is not considered to be particularly representative of the wider Plateau Farmland LCT, however, the forces for change set out within LCT do acknowledge that "The

exposed character of the plateau is particularly sensitive to visually intrusive development, large buildings and communication masts". As such, the susceptibility to the change proposed would be high to this non-host landscape type. In combination with a medium value, the overall sensitivity to the proposed development would be medium.

Value: On Site Landscape Features

- 9.3.24 The landscape elements with the potential to be adversely impacted by the development of the Site would include hedgerow boundaries and mature trees which define the existing agricultural field parcels. These landscape elements have been shown to be characteristic of published character assessments and are present within the Site or local context. However, the Site is adversely affected, in a sensory manner, by its proximity to the surrounding road infrastructure of the M40, A43 and the B4100, which is partially visible in short-distance views. Furthermore, the Site does not lie within, or contain, any nationally or locally designated landscapes and it does not represent, in a perceptual or physical sense, a landscape of any great importance or distinct character. Furthermore, there is no evidence to suggest that the local community place special weight on the Site, meaning overall the Site is considered to be of no more than local landscape value. However, it is acknowledged that the susceptibility to change of land to the east of the Site would be high, with a lower susceptibility to change for land in close proximity to the motorway junction. Therefore, on balance, the value and susceptibility of the Site and the local context is considered to be medium, leading to an overall medium sensitivity.

Visual Context

- 9.3.25 EDP has conducted the assessment of the views available to and from the Site by walking and driving (as appropriate) local roads and rights of way. Before doing so, a broad area of search was defined using a Geographical Information System (GIS) based computer programme that predicts the Zone of Theoretical Visibility (ZTV), as detailed below.

Visibility to the Site

- 9.3.26 Using landform data within a Geographical Information System (GIS), EDP has prepared a broad Zone of Theoretical Visibility (ZTV) using digital surface modelling (DSM) data. This data includes height data on landform and surface features and therefore accounts for the screening effects of intervening landform, buildings, structures and vegetation. The ZTV was then visited by walking and driving (as appropriate) local roads, rights of way and other publicly accessible viewpoints. Through this exercise the main visual receptors predicted to have actual visibility to the Proposal, and constituent areas, were identified and the Zone of Primary Visibility (ZPV) of the Site was established (refer to **Technical Appendix 9.1**: Figure 9.5).
- 9.3.27 As set out at **Technical Appendix 9.1**, the ZPV is based on professional judgement and is considered to be where the proposed development would be visible to the casual observer on foot, cycling, driving or travelling by train where the views would normally be close-ranging and open; the proposal would be an obvious element of the view. Beyond this area, there is a zone of visibility that is less open, being either partly screened or filtered. Views from within this wider zone may include the proposal, it may not be immediately noticeable, but once recognised any new development may be a perceptible addition to the view. The extent of the proposal within such views would vary and, in some cases, it would be almost indistinguishable as a consequence of both increasing distance and intervening visual screening.
- 9.3.28 The visual appraisal identified that the relatively flat landform of the study area means that landform, settlement, structures and vegetation provide effective screening for the Site. It shows that visual containment is provided by:

- To the north – Agricultural land extends to the north either side of the A43 corridor. Due to the well-treed context of the wider landscape views of the Site are likely to be glimpsed. A PRoW and track extend along the northern boundary with boundary vegetation limiting views to the immediate context. (Refer to **Technical Appendix 9.1** (Photoviewpoints EDP 1 and 2);
- To the east- a country lane passes adjacent to the Site where glimpsed views can be obtained across a portion of the Site. Beyond is the village of Stoke Lyne where views are frequently contained to the immediate setting due to a combination of mature landscape features and undulating topography. (Refer to **Technical Appendix 9.1**: Photoviewpoints EDP 2,4 and 5);
- To the south- mature vegetation and tree cover limits views from the wider landscape. However, for receptors travelling north along the B4100 medium distance views are possible of the southern areas of the Site owing to the gently undulating topography. (Refer to **Technical Appendix 9.1**: Photoviewpoint EDP 6);
- To the west- owing to the slightly elevated topography and limited tree cover within the wider context longer distance views are possible. Views towards the Site however are filtered by mature vegetation and tree cover (refer to **Technical Appendix 9.1**: Photoviewpoints EDP 10 and 11)

Extent of Visibility

- 9.3.29 As set out in paragraph 9.2.26, based on fieldwork observations, and the findings of the data trawl and consultation, a number of representative viewpoints, or Photoviewpoints (PVPs), have been selected to be assessed. The locations are shown at **Technical Appendix 9.1**: Figure 9.5 and the views themselves are shown on **Technical Appendix 9.1**: Figure 9.7.
- 9.3.30 Within the zone of primary visibility, there are different groups of ‘receptors’, i.e., people in cars, walking, at work, or with views from their homes. The following paragraphs summarise the main ‘receptor groups’ which do obtain views towards or into the Site:
- Road Users: There are close-distance views (i.e., less than 500m from the Site boundary) towards the Site from sections of the local road network including the B4100. Minor roads are considered to have medium sensitivity:
 - Road Users: There are limited close-distance views (i.e., less than 500m from the Site boundary) towards the Site from sections of the main road network, including the M40 and A43. Major roads are considered to have low sensitivity:
 - PRoW Users: Aside from PRoW running immediately adjacent to the Site, there are few PRoW within the Study Area that afford clear views of the Site. Views from PRoW are limited to a few PRoW within close proximity, or immediately adjacent to the Site, largely where breaks in tree cover occur. PRoW users are considered to have a high sensitivity.
 - Users of the wider Public Rights of Way (PRoW) Network: There are a number of PRoWs within 3km of the Site. PRoWs receptors are considered to have a high sensitivity;
- 9.3.31 This assessment has focused on the assessment of views from publicly accessible locations. Views from private residential properties are not protected by national planning guidance or local planning policy. Due to the distribution and orientation of residential properties and intervening vegetation within the landscape immediately surrounding the Site, the number of private residential properties with potential views of the proposed development is limited. A residential property does lie adjacent to the Site’s eastern boundary and although separated by a boundary hedgerow would be afforded views across a portion of the Site from elevated

storeys.

9.3.32 Residents within the wider Study Area are generally less susceptible to the proposed development due to their views being contained to the 'settlement setting' and immediate surrounding fields and vegetation. This is particularly the case for residents within Stoke Lyne. The sensitivity of residential receptors is dependent, to some extent, on the room(s), and the activities of people in those rooms, from which the Site is visible. Residents with visibility from rooms normally occupied in waking hours will generally have a very high sensitivity with a lower sensitivity from bedrooms and rooms from which there may be no expected view, for example bathrooms. In some instances, the purpose of rooms with potential views towards the Site cannot be ascertained from public vantage points, and thus in those circumstances a cautionary approach is adopted where the receptor is accorded a high to very high sensitivity.

9.3.33 Details of each view, and the reason for its selection as a 'representative viewpoint', are provided in **Table 9.6** below.

Table 9.6 Representative Viewpoints, or PVP

No.	Viewpoint Location	Grid Ref	Distance and Direction from Site	Receptor Sensitivity
PVP 1	View from PRow 367/15/20 looking south	455244, 230547	1km north of the Site boundary	Represents views experiences by PRow users (high sensitivity)
PVP 2	View from PRow 367/19/10 looking South-West	456441, 229477	500m northeast of the Site boundary	Represents views experiences by PRow users (high sensitivity)
PVP 3	View from a minor road adjacent to the Site boundary looking west	456271, 229192	On the eastern Site boundary	Representative of views for vehicle users and pedestrians on a minor road (medium sensitivity)
PVP 4	View from a B-road to the east of the Site	456475, 229109	300m to the east of the Site boundary.	Representative of views for vehicle users and pedestrians on a minor road (medium sensitivity) and PRow users (high sensitivity)
PVP 5	View from a B-road (The Green) to the east of the Site	456533, 228302	750m to the south-east of the Site boundary	Representative of views for vehicle users on a minor road (medium sensitivity)
PVP 6	View from a minor road and its junction with the B4100	455850, 228136	300m to the south of the Site boundary	Representative of views for vehicle users on a minor road (medium sensitivity)

No.	Viewpoint Location	Grid Ref	Distance and Direction from Site	Receptor Sensitivity
PVP 7	View from PRow 367/21/10, looking north-east	454832, 228351	400m to the south-west of the Site boundary	Represents views experiences by PRow users (high sensitivity)
PVP 8	View from PRow 109/7/10 looking north-east	454246, 227942	1.2km to the south-west of the Site boundary	Represents views experiences by PRow users (high sensitivity)
PVP 9	View from minor road (Fritwell Road) looking east	253595, 228247	1.7km to the west of the Site boundary	Representative of views for vehicle users on a minor road (medium sensitivity)
PVP 10	View from PRow 109/2/40 looking south-east	454177, 229546	800m to the west of the Site boundary	Represents views experiences by PRow users (high sensitivity)
PVP 11	View from PRow 367/13/10 looking north-east	454208, 229565	775m to the west of the Site boundary	Represents views experiences by PRow users (high sensitivity)

Visual Receptors

9.3.34 Users of the following locations and routes, and residents of the following properties, have been identified as potentially able to perceive a change because of the Application Proposals that could result in a notable effect:

- PRow
 - PRow 367/15/20;
 - PRow 404/15/10
 - PRow 367/21/10;
 - PRow 109/7/10;
 - PRow 109/2/40; and
 - PRow 367/13/10
- Transport Routes – Roads
 - M40;
 - A43;
 - B4100;
 - Minor roads around the Site, including those within Stoke Lyne;
- Single residential property near to the Site's eastern boundary and, potentially, those on the north-western fringe of Stoke Lyne.

Site Context After Dark

9.3.35 A total of eight locations were visited between the hours of 18:00 and 20:00 on the 24th of November 2021, with photography being recorded in line with best practice guidance published by the Landscape Institute (refer to **Technical Appendix 9.1: Figure 9.7**).

9.3.36 It was found that lighting sources immediately around the Site are limited due to its largely

agricultural context. However, as shown within **Night View EDP 3, 5 and 10** the main lighting sources are predominantly found within the wider landscape and are associated the A43 and M40 junction, including a petrol station and fast-food outlet. The B4100 is unlit, however it is affected by vehicular traffic as shown in **Night View EDP 6**.

- 9.3.37 From the north the view is rural across agricultural fields yet is affected by vehicular movement along the A43. Beyond this lighting associated with the M40 junction and Viridor Ardley ERF are visible, which can be seen in **Night View EDP 1**. Looking east, as illustrated **Night View EDP 11**, lighting associated with small industrial units adjacent to the A43 are visible, these are partially screened by boundary vegetation which reduces light spill to the wider field parcels meaning that to the northeast views are generally unaffected by light pollution.
- 9.3.38 . Lighting sources associated with the M40 and A43 are defining features of the character within the landscape after dark along with the lit tower associated with Viridor Ardley ERF which provide a backdrop to views across the Site.
- 9.3.39 Receptors that would be likely to experience a change to character after dark in the Site's immediate context would largely be limited to those within the village of Stoke Lyne, and those travelling along the B4100. Overall, it is considered that the sensitivity of landscape character after dark would be medium due to there being some elements of lighting infrastructure along vehicular highways that adversely affect tranquillity after dark.

Summary of Visual Amenity Matters

- 9.3.40 As a complement to the appreciation of the character and evolution of the landscape EDP has assessed the nature and distribution of views within, from and towards the Site.
- 9.3.41 EDP's analysis focuses on the assessment of visual impacts of the development of the Site from the surrounding landscape, concentrating on the views towards the Site from surrounding public locations. Such analysis provides an understanding of the location and sensitivity of surrounding areas with views towards the Site and therefore forms the basis of an assessment of the significance of any visual impacts arising from the Site proposals.
- 9.3.42 It is clear from EDP's field appraisal and a review of the visual context that:
- Views from close quarters are generally only available from very small sections of busy road corridors, and from very short sections of the local PRow network immediately surrounding the Site;
 - From most roads and footpaths beyond the immediate context of the Site, views towards the Site are filtered by intervening vegetation within a gently undulating landscape;
 - Views from residential properties are generally limited to a single property immediately adjacent to the Site's eastern boundary, although with some potential views also being obtained from properties within Stoke Lyne. Beyond this, any middle distance to distant views of the Site are gained across gently undulating agricultural landscape and tend to be heavily filtered or fragmented by intervening vegetation; and
 - Much of the wider study lies outside the visual envelope from where no views of the entire Site are possible.

9.4 Potential Effects

9.4.1 With reference to the contents of the previous sections, this section provides EDP's assessment of the potential landscape and visual effects arising from the proposed development.

9.4.2 For convenience, the assessment can be considered under three different categories.

1. The potential effects on the character of the landscape (including the character of the Site itself and the surrounding area), including:

- The character of the Site; and
- The Wooded Estate lands LCT.

2. The potential effects at the selected viewpoint locations, which examines the effects on the visual receptors at each location and enables a 'calibration' of the general assessment. The viewpoint assessment is provided in **Technical Appendix 9.2**.

3. The potential effects on visual amenity (having regard to the conclusions of the representative viewpoints), including assessments of the following receptors:

- Close Proximity Views from Roads and PRow; and
- Distant Views towards the Site.

Construction Phase

9.4.3 The construction activities that can potentially cause landscape and visual impacts include:

- Demolition and clearance of vegetation within the construction zone, where appropriate;
- Earthworks and temporary storage of topsoil;
- Removal of unwanted waste from the Site;
- Erection of Site hoarding and fencing around vegetation (tree protection scheme);
- Erection of temporary structures within the main contractor's construction compound, plus materials stockpiling and lay-down areas;
- Potential lighting of the works (during winter);
- Erection of scaffold structures;
- Movement of construction vehicles;
- Partially completed built form;
- Works associated with the implementation of the landscape scheme; and
- Removal of temporary construction facilities.

Operational Phase

9.4.4 This section describes the likely effects of the proposed development on the landscape and visual resource following overall completion at operation year 1 and without landscape mitigation measures having matured. The main potential landscape and visual impacts of the proposed development once completed, irrespective of any mitigation measures, are summarised below:

- Potential adverse landscape impacts caused by the operational development would be localised in scale and restricted to the Site itself and immediate environs, including the A43, due to the relatively enclosed nature of the Site in the wider landscape and its immediate surroundings. There will be some internal hedgerow loss resulting from the proposed development, however the proposals have been designed to incorporate generous landscape buffers at the Site boundary, particularly at the eastern boundary where views from Stoke Lyne may be possible;

- Change to the character of the landscape of the Site, through alteration of land use and introduction of new temporary and permanent features, the latter including beneficial effects such as the creation of new habitats within the Site boundary;
- A permanent, long-term adverse impact on landscape character would occur due to physical impact on landscape within the Site, introduction of new built form and ground remodelling within existing agricultural land, movement of vehicles and people within the Site, and increase in the volume of light pollution from both street lighting and internal lighting of built form.
- There would be adverse physical impact on landscape elements and features within the Site caused by the localised removal of existing landscape features; and
- There would be adverse visual impacts on nearby visual receptors, such as users of public footpaths and bridleways, road users and visitors to local facilities, due to visibility of the completed scheme (including built development, traffic and lighting).

9.4.5 Alteration to existing night-time views, from additional lighting that would form part of the proposed development, is considered within the Dunwoody Lighting Assessment (refer to **Technical Appendix 9.5**). Importantly, as set out within the Dunwoody Assessment, *“All luminaires will be selected to have a zero upward light output ratio with shielding to limit light spill to surrounding areas and have a photometric distribution to control illumination of vertical surfaces and secondary reflected lighting pollution.”* As such, the conclusion of the lighting assessment found that *“there is no significant environmental spillage or impact to residential amenity or other environmental concerns as a result of the lighting installation either during construction or in operational phases.”*

9.5 Mitigation

- 9.5.1 An understanding of the mitigation measures embedded in the proposal is fundamental to an assessment of the potential landscape and visual effects. The design in terms of layout, built form height, orientation, Green Infrastructure strategy and biodiversity enhancements has been informed by the LVIA in order to mitigate potential impacts. A key principle of landscape assessment is that the assessment should take account of the effect of any proposed mitigation (GLVIA3, para 6.45).
- 9.5.2 The hierarchical approach toward mitigation (prevent, reduce, offset) has been (1) first to avoid where possible, any effects through the overall design and layout of the Proposed Development and disposition of its elements; this constitutes primary mitigation by preventing effects occurring through sensitive design and layout; (2) subsequently reducing effects arising through the careful siting of strategic landscape mitigation measures and careful consideration of the siting of each of the different elements of the Proposed Development; (3) Tertiary mitigation is achieved through the compensation of potential losses.
- 9.5.3 Embedded mitigation provides a form of preventative mitigation and, as discussed above, is that which been considered as an integral part of the overall design and locational strategy for the Proposed Development. This is not an ‘add-on’ measure to ameliorate significant environmental effects, but part of the positive and pro-active approach whereby mitigation has been assessed and considered at all stages of the project to prevent or reduce the occurrence of environmental effects.

The parameters of the Proposed Development have evolved over time, with input from EDP’s consultant team. Consistent with the landscape led approach, EDP’s landscape team has

provided continuing feedback from the early stages of this LVIA process. EDP's role was to recommend masterplan responses to avoid or minimise potential landscape and visual effects in light of the more detailed findings of our field assessments. The design of the Proposed Development has evolved as follows:

- The initial parameters of the proposed development were based on a single plateau. However, the landscape circumstances of the Site and its context resulted in the final design being amended to adopt a two-plateau approach, reducing the height of the finished floor level at the eastern edge of the Site and, in turn, reduced the overall height of built form at the eastern edge of the Site. This has been done in response to the more sensitive receptors to the east of the Site, in and around Stoke Lyne;
- The width of a landscape buffer on the eastern edge of the Site was increased from a minimum of 30m wide to a minimum of approximately 45m wide. This would enable the delivery of a generous landscape corridor at the eastern edge of the Site and would contribute to providing mitigation to local views, including in views from Stoke Lyne; and
- The ground levels within the eastern buffer have been designed such that a landscaped bund would be delivered in order to screen any views of lower-level activity, including the movement of pedestrians and cars within the Site. This would simplify the outlook in views from Stoke Lyne, with built form within the Proposed Development being in the context of a well-treed landscape corridor at the eastern edge of the Site.

9.5.4 Those mitigation measures pertinent to landscape and visual matters are detailed with reference to the different stages of the Proposed Development below and are illustrated on **Technical Appendix 9.6: Illustrative Landscape Strategy Plan**.

9.5.5 In order to aid the consideration of landscape and visual effects, five of the Photoviewpoint locations provided within Technical Appendix 9.1 have been used for the production of visualisations. This includes views to AVR Level 1 (wirelines) which have informed the assessment of effects discussed below, being based on the development parameters, and also views to AVR Level 3 (Photomontages)), which are illustrative views and demonstrate how proposed built form in the context of the landscape strategy may come forward. This imagery is contained at **Technical Appendix 9.7**. Further details of the Site's eastern boundary, and the function of landscape strategy scheme, is provided at **Technical Appendix 9.8**.

Construction Phase

9.5.6 This assessment has assumed a scenario based on conventional best practice approaches. The following construction control measures should be implemented and adhered to, secured by a suitably worded planning condition, during the temporary construction phase:

- The adoption of an approved Construction Environmental Management Plan (CEMP) including an Ecological Construction Method Statement designed to avoid significant ecological effects, including those on key landscape features, and incorporating the measures listed below as appropriate;
- The adoption of an approved Arboricultural Method Statement (AMS) incorporating best practice guidance set out in British Standard 5837: '2012 Trees in Relation to Design, Demolition and Construction' which would ensure retained trees and other vegetation are not adversely affected during the construction process;
- The adoption of an approved topsoil and earthworks management plan (Soil Management

Plan) including dust control measures;

- The use of visual screening, such as hoardings for more sensitive visual receptors in proximity to the Site, including residential receptors that have the greatest potential to be affected by the Proposed Development;
- Existing residents that live adjacent to the Site would be more sensitive to construction lighting due to the proximity, direction and type of receptor. Mitigation measures for construction lighting are likely to include directional fittings and restricted hours of operation; and
- Construction works which create dust should be kept to a minimum within proximity to existing pedestrian routes and residential properties and use dust prevention measures. For reasons of public safety, any informal use of the Site for dog walking, etc. would need to be prevented during the construction phase of the Proposed Development. This would be achieved using protective fencing.

Operational Phase

9.5.7 The landscape and visual mitigation strategy is a key, and fully integrated, component of the Application Proposals which has been informed by the LVIA process and is illustrated on the Illustrative Landscape Strategy Plan (**Technical Appendix 9.6**). A number of general landscape design principles have been developed as part of the landscape strategy in order to reduce or offset the effects of the proposed development that is described within the Design and Access Statement accompanying this application. These principles, which are summarised below, would guide the implementation of a suitable landscape scheme for the proposed development.

9.5.8 At a broad scale, the landscape strategy for the Site (refer to **Technical Appendix 9.6**) aims to strengthen key strategic landscape corridors around the Site, which also contribute to the well treed character of the local landscape and serve to reduce adverse effects arising from the proposed development. At a more detailed Site level, the design of external spaces, particularly species selection within the planting palette, has drawn on the local landscape character of the Oxfordshire countryside.

9.5.9 The landscape design principles include:

- Existing boundary hedgerows and trees would be retained where possible (with buffers to the proposed development), reinforced and brought into regular, long-term management. This would protect visual amenity and landscape character as well as continuing to offer commuting and foraging opportunities for protected species;
- Creation of a landscaped buffer from proposed development zones to protect and enhance retained boundary features of landscape and ecological interest;
- Provision of structural landscaping, native trees and shrubs that reflect the local context throughout the scheme to maintain a buffer to the wider setting. Particularly within the eastern areas of the Site, existing landscape features would be reinforced with additional planting measures in order to maintain the 'green' setting to the wider rural setting (refer to **Technical Appendix 9.7**);
- Provision of landscape screening, in the form of landscaped bunds and native tree planting, to properties and PRow in close proximity to the Site;
- Native heavy standard tree planting is proposed within landscape buffers to fragment views of the proposed development, particularly for receptors in relatively close proximity to the east of the Site;
- Additional structural landscaping proposed to the eastern boundary would provide a new

landscape corridor that would provide a connection between existing woodland blocks within the local landscape context;

- Species-rich wildflower grassland to be created within areas of green open space to provide nectar-rich habitats for pollinating insects such as bees, butterflies and moths;
- The proposals should complement the existing landscape features of the Site and character of adjacent uses and rural areas; and
- The landscape strategy should take into consideration the long-term vision for the Site, using tree planting to filter into the proposed development from adjacent green corridors and to frame and buffer the proposed built form.

Proposed Tree Planting

- 9.5.10 Structural tree planting and earth bunding within the Site boundaries would buffer the proposed development and assimilate it into the existing landscape and should include a suitable palette of locally native trees that are found across the surrounding landscape, giving rise to beneficial effects.
- 9.5.11 Proposed tree planting, in line with local guidance and policy, should seek to reinforce the existing trees on the Site and around the perimeter of the Site, and would be strategically placed to enhance views into and out from the Site, and define proposed public routes.

9.6 Residual effects

- 9.6.1 This section describes the residual landscape and visual effects (following implementation of the design mitigation measures). The assessment of magnitude of effect and the overall significance of effect is provided for the relevant landscape and visual receptors.

Construction

- 9.6.2 This section describes the likely significant effects of the proposed development on landscape and visual receptors during the construction phase, and would involve Site clearance, groundworks, and construction of buildings, vehicle and pedestrian accesses, tree and shrub planting and grass seeding. The effects described take account of both embedded mitigation and additional measures.

Landscape Character of the Site and its Context

- 9.6.3 Clearly, in terms of the Site itself, the construction of industrial built form would constitute a notable alteration to the existing agricultural character of the Site. The existing mature landscape framework on the boundaries of the Site would be retained, including existing trees and hedgerow trees and enhanced as part of the new landscape strategy.
- 9.6.4 The proposed development construction activity would result in a very high magnitude of change on the immediate rural character of the Site and its surrounding context, including the village of Stoke Lyne, extending only a short distance due to the containment of the undulating landscape in combination with mature woodland cover. The overall medium sensitivity of the character of the Site and its context would therefore yield a **major/moderate**, short-term, adverse and temporary level of effect, which is significant.

On-Site Landscape Features

- 9.6.5 During construction, trees and hedgerows to be retained would be protected in accordance with those measures outlined in the Arboricultural Impact Assessment (Report Reference edp_2425_r012). However, as set out in the Arboricultural Impact Assessment, as a result of

the proposed development and Site access, there would be some tree and hedgerow removal required.

- 9.6.6 EDP's Arboricultural Impact Assessment (included at **Technical Appendix 9.4**) identified 28 individual trees and 3 groups of trees, 24 hedgerows and 1 woodland, totalling 56 items. Of these 56 items, 1 has been categorised as A, of High value; 40 have been categorised as B, of moderate quality; and 15 have been categorised as C and are of low quality. Overall, the items identified across the Site are primarily of moderate value, with the exception of 1 category A item. The category A and B items are located either off-Site or around the periphery and therefore do not adversely constrain the main body of the Site; however, many of the hedgerows dissect the Site and this should be considered when designing any forthcoming proposals. There are no known Tree Preservation Orders (TPOs) on or immediately adjacent to the Site boundary.
- 9.6.7 The magnitude of change to the landscape fabric of the Site would be very high, giving rise to a **major/moderate**, short-term, adverse and temporary effect, which is significant.

Local Landscape Character

- 9.6.8 It is inevitable that there would be some temporary effects during the short-term temporary construction period upon the landscape character of the Wooded Estatelands LCT. However, in local transient views, it is considered that construction activities would be in the context of existing urbanising elements associated with both the M40 junction and the services at Baynards Green. There would be localised excavation of land, ground remodelling and the storage of topsoil, and partial loss to local features of the Site, largely through the removal of gappy hedgerows within the main body of the Site. Additionally, movement and machinery associated with Site operations would introduce additional localised activity. In the wider context, higher-level construction activities may be visible in medium distance in views from the surrounding context, although mature woodland cover generally limits any viewing opportunities to within 1km. Together, these operations would lead to an incremental increase in effects on the Wooded Estatelands LCT as construction draws to completion. Geographically, these changes would be experienced at the Site level and the construction period would be short-term and temporary.
- 9.6.9 It is considered that during the construction phase, there would be high, adverse, short-term and temporary magnitude of change on the Wooded Estatelands LCT, giving rise to a **moderate**, short-term, adverse and temporary level of effect, which is significant.
- 9.6.10 In relation to the Plateau Farmland LCT, which is located to the north of the A43, construction activity within the Site would conflict with the "*sparsely settled rural character of the landscape*", although would be seen in the context of vehicle movements and infrastructure located at the boundary, and outside, of the LCT. Temporary construction activity would result in a low magnitude of change on the Plateau Farmland LCT, giving rise to a **minor**, short-term, adverse and temporary level of effect, which is not significant.
- 9.6.11 There may be some elements of security lighting present around construction compounds and, therefore, the proposed development would result in additional lighting within the local context. New lighting would be considered an addition of elements that would be evident but not necessarily conflicting with the characteristics of the existing landscape. The magnitude of change to character after dark would be medium which, when compared with a medium sensitivity, would give rise to a **moderate/minor** adverse and temporary level of effect which is not significant.

Close Proximity Views from Roads and PRow

- 9.6.12 All construction effects would be adverse in nature, direct and temporary. The majority of receptors would only experience localised views of the Site and the vast majority of construction effects on individual receptor groups would be short-term.
- 9.6.13 Although not represented by a Photoviewpoint, visual receptors travelling directly past the Site on the A43, as well as roads approaching Baynards Green from the north-west, would experience medium distance views of all high-level construction activities within the Site, although generally only experienced in close proximity to the roundabout at the junction with the A43. These visual receptors (road users) would be subject to a medium magnitude of change, giving rise to a **minor** adverse overall effect which is not significant.
- 9.6.14 Owing to mature field boundaries within the surrounding context, views of low-level construction activities would largely be screened from surrounding PRow. However, higher level activities would be visible, albeit seen in the context of existing lighting columns and road signs on the A43 in views from the north and west. Visual receptors in and around Stoke Lyne, shown on **Figure 9.6: Photoviewpoints EDP 4**, in relatively close proximity to the Site would experience medium-distance views of higher-level construction activities and glimpsed views of low-level activities where breaks in vegetation occur during winter months. It is considered that PRow receptors in relatively close proximity to the Site would be subject to a high magnitude of change, giving rise to a **major/moderate** short-term, adverse and temporary level of effect, which is significant.
- 9.6.15 Within the immediate landscape to the north of the Site, illustrated in **Figure 9.6: Photoviewpoints EDP 2**, during construction there is unlikely to be any appreciation of low-level construction activities for PRow users, although high-level activities would be visible with adverse effects. Owing to the lack of built form seen within the baseline view, it is predicted that receptors here would be subject to a high magnitude of change, giving rise to a **major/moderate**, short-term and temporary adverse effect which is significant. As receptors move along this route to the north, views become contained by mature woodland cover such that views beyond 1km, including any views from Tusmore Park, are not possible and there would be no effect.
- 9.6.16 For PRow users to the northwest, illustrated in **Figure 9.6: Photoviewpoints EDP 10 and 11**, again, all low-level activities within the Site would be screened from view. However, it is possible that construction activities within the Site requiring taller machinery, largely relating to cranes, could be seen in views beyond the built elements of the services at Baynards Green. Receptors on PRow to the northwest of the Site would be subject to a worst-case low magnitude of change, giving rise to a **moderate/minor** adverse and temporary level of effect which is not significant.

Private Viewpoint Receptors

- 9.6.17 During construction, private viewpoint receptors would be limited to those in close proximity to the Site, largely limited to those within Stoke Lyne. Here, views of all construction activity at the eastern side of the Site would be possible, although partly screened by mature landscape features within the intervening landscape. Although not illustrated by a supporting Photoviewpoint, it is predicted that receptors here would be subject to high magnitude of change, giving rise to a **major/moderate**, short-term and temporary adverse effect which is significant.
- 9.6.18 In the wider context, beyond 1km, views become heavily filtered by mature vegetation and woodland cover, such that all low-level activities will be entirely screened with any taller

construction activities being barely perceptible, if seen at all from private property. The magnitude of change in private views beyond Stoke Lyne is considered to be very low which, when combined with an assumed very high sensitivity given the wider rural context to the west, gives rise to a **moderate/minor**, short-term and temporary adverse effect which is not significant due to distance.

Distant Views towards the Site

- 9.6.19 In the wider context, for road users, including pedestrians, views of the Site are largely screened by mature vegetation. There would be limited visibility of the construction works throughout the study area comprising of taller machinery, largely relating to cranes. Views from roads are predominantly contained by existing mature field boundary or roadside vegetation, as shown in **Figure 9.7: Photoviewpoint EDP 1, 8, and 9**. High level construction activity would be barely visible in medium distance views, and receptors would be subject to a worst-case low magnitude of change, giving rise to a **minor** overall effect which is not significant.
- 9.6.20 **Figure 9.7: Photoviewpoint EDP 1 and 8** are also representative of views experienced by PRoW users, with the more open views being experienced from the north. A low magnitude of change, owing to the possibility of some high-level construction activities being visible, would give rise to a **moderate/minor**, short-term and temporary adverse effect which is not significant due to distance.

Operational Phase Year 1

Landscape Character of the Site and its Context

- 9.6.21 The proposed development would result in a permanent change of use within the Site from agricultural land to built form. The localised landscape character of the Site and its immediate surroundings would be altered by the proposed development, retaining existing landscape features where possible and appropriate, and enhancing existing landscape corridors. The integration of a well-designed landscape scheme with the built form would assimilate the proposals into the immediate setting. The proposed development would introduce a variety of native, valuable soft landscape elements and features which would positively contribute to the new character of the area, although without the maturation of the landscape proposals effects on local character would remain adverse. As such, at year 1, it is unlikely that the landscape scheme would provide a notable addition to the character of the Site or provide sufficient visual screening to proposed built form. However, although the proposed development would generally be seen in the context of the existing infrastructure on the A43 and M40 in views from the west, the Site and its immediate context to the east would result in the overall magnitude of change, on balance, being high. As such, the proposed development would result in a high magnitude of change at operation year 1, giving rise to a **moderate**, medium-term, adverse and temporary effect, which is significant.

On-site Landscape Features

- 9.6.22 The Arboricultural Impact Assessment confirms that the proposed development would result in some tree and hedgerow loss in order to facilitate the proposed development and access road. The Landscape Strategy Plan (refer to **Technical Appendix 9.6**) shows how boundary trees and hedgerows would be retained across the Site and the overall tree cover would be increased significantly through buffer planting at the Site boundaries and the proposed landscaped bund, particularly at the eastern boundary in addressing local character to the east and the village of Stoke Lyne. This would give rise to some beneficial effects.

- 9.6.23 New tree and scrub planting would improve the species and age diversity of the tree stock, whilst also enhancing the setting of the new development within the landscape. The magnitude of change to the landscape fabric of the Site would be high, giving rise to a **moderate** adverse and temporary effect, which is significant.

Local Landscape Character

- 9.6.24 The proposed development would result in the introduction of commercial built form into the Wooded Estatelands LCT. Although many of the characteristics of the LCT relate to agricultural uses, including many mature trees, the rural character of the Site and its surrounding context is degraded in part by the visual intrusion of urbanising elements including the M40 and A43. The proposed development would retain existing landscape features at the Site boundary which would assist in reducing the visual impact of the proposals on the local landscape character. Due to mature woodland cover within the local context, the effects of the proposed development upon the Wooded Estatelands LCT would be very localised. At operation year 1, it is considered that the proposed development would result in a low magnitude of change upon the Clay Vale LCT, giving rise to a **minor**, medium-term, adverse and temporary effect, which is not significant.
- 9.6.25 In relation to the Plateau Farmland LCT, completed built form may be visible in some local views, but would not be considered to detract from the 'sparse' character of the neighbouring landscape type, largely due to the Site's location to the south of the A43. The proposed development would only be visible from a discrete geographical area, which is already considered to be influenced by existing urbanising features within major highway corridors. At operation year 1, it is considered that the proposed development would result in a low magnitude of change upon the Plateau Farmland LCT, giving rise to a **minor**, medium-term, adverse and temporary effect, which is not significant.
- 9.6.26 On completion, as set out within the Dunwoody Lighting assessment, all luminaires will be selected to have a zero upward light output ratio with shielding to limit light spill to surrounding areas and have a photometric distribution to control illumination of vertical surfaces and secondary reflected lighting pollution. However, in local views, any new lighting sources would generally be seen in the context of lighting associated with the M40 and A43, including the services at Baynards Green. The proposed development, and any new lighting associated within it, would be considered an addition of elements that would be evident but not necessarily conflicting with the characteristics of the existing landscape after dark, although with some conflict with the more rural landscape to the east. On balance, the magnitude of change to character after dark would be medium which, when compared with a medium sensitivity, would give rise to a **moderate/minor** adverse and temporary level of effect which is not significant.

Close Proximity Views from Roads and PRow

- 9.6.27 Visual receptors travelling directly past the Site on the A43 following completion of the proposed development would have close ranging direct views of proposed built form. Existing mature landscape features, being a mature roadside hedgerow, would provide little to no visual screening due to the proximity of the receptor and the height of low field boundary hedgerows. Planting within the proposed development would not have established to increase the filtering of views at this stage. At operation year 1, excluding the consideration of mitigation measures, with consideration of the character of views at Baynards Green, these receptors would be subject to a medium magnitude of change to this low sensitivity receptor, giving rise to a **minor**, medium-term, adverse and temporary effect, which is not significant.

- 9.6.28 For road users and pedestrians in the wider context, the existing landscape framework is useful in limiting adverse effects. Views from roads are predominantly contained by mature roadside vegetation as shown in **Figure 9.7: Photoviewpoint EDP 4**. However, where roadside vegetation has been maintained to a low-level medium distance views of the proposed built form would be possible, including in views from Stoke Lyne. At year 1, the proposed development is likely to be partially visible, with new landscape features and bunding at the eastern boundary of the Site which would serve to reduce the amount of built form seen within the view. The outlook would remain relatively simple due to any active frontages of new built form being orientated away from the eastern side of the Site. However, the proposed development would remain clearly noticeable and would be considered as the addition of elements that may conflict with the key characteristics of the existing landscape. The magnitude of change is considered to be high, giving rise to a **moderate**, medium-term, adverse and temporary effect, which is significant.
- 9.6.29 Where PRow are in close proximity to the Site (such as route 161/14/20), or there are views across existing agricultural in winter months, filtered views of the upper sections of the proposed development will be seen (refer to **Figure 9.7: Photoviewpoint EDP 4, 5 and 6**). Receptors using PRow, in close proximity to the Site would be subject to a worst-case high magnitude of change at operation year 1, giving rise to a **major/moderate**, medium-term, adverse and temporary effect, which is significant.
- 9.6.30 Within the immediate landscape to the north of the Site, illustrated in **Figure 9.6: Photoviewpoints EDP 2**, owing to the mature landscape framework within the surrounding context, the proposed development would be partially screened in views from surrounding PRow. However, particularly where PRow are in close proximity to the Site, or there are views across existing agricultural land over clipped field hedgerows, direct views of taller elements of built form would be possible. Although generally only limited to within around 500m, less in some cases, it is considered that the proposals would form a recognisable element within the view, differing from the character of existing rural context. Therefore, the residual magnitude of change resulting from the proposed development is considered to remain high, giving rise to a **major/moderate**, medium-term, adverse and temporary effect, which is significant.
- 9.6.31 To the north-west, as illustrated in **Figure 9.6: Photoviewpoints EDP 10 and 11**, although the immediate foreground is rural, views are characterised by highways infrastructure and built form at Baynards Green. It is considered that the magnitude of change would be low as the proposed developments roof structure would only be partially visible, screened by mature vegetation, and seen beyond existing major road infrastructure which is a large visual detractor. This low magnitude of change gives rise to a **moderate/minor** adverse effect which is not significant.

Distant Views towards the Site

- 9.6.32 Owing to the mature landscape framework within the surrounding context, the proposed development would be partially screened in views from PRow in the wider context (**Figure 9.7: Photoviewpoint EDP 1, 8 and 9**). Receptors using PRow in the wider context, or where views are restricted by mature landscape features, would be subject to a very low magnitude of change at operation year 1, giving rise to a **minor**, medium-term, adverse and temporary effect on PRow users, which is not significant. The proposed development would form a minor constituent of the view being partially visible or at sufficient distance to be a small component. For road users, a very low magnitude of change gives rise to a **minor/negligible** effect which is not significant.

Private Viewpoint Receptors

- 9.6.33 On completion, private viewpoint receptors would largely be limited to those in close proximity to the Site, generally limited to those within Stoke Lyne and where their view is not constrained by existing built form and mature tree cover. Here, although partly screened by mature landscape features, it is unlikely that the landscape scheme would have matured sufficiently to provide some visual screening over and above the existing context. Although contrasting with the character of the core of Stoke Lyne, the addition of the Proposed Development would not necessarily conflict with the character of the immediate context given the elements of Baynards Green and busy road corridors that are likely to be seen in some views. However, due to the horizontal scale of the proposals, it is possible that the proposed development would form a new and recognisable element within some private view, albeit limited in summer months. The magnitude of change to residential visual amenity is considered to be medium, giving rise to a **moderate** medium-term and temporary adverse effect which is significant.
- 9.6.34 In the wider context, beyond 1km, views become heavily filtered by mature vegetation and woodland cover, such that views of the proposed development are unlikely. The magnitude of change in private views beyond Stoke Lyne is considered to be very low/none which, when combined with an assumed very high sensitivity given the wider rural context to the west, gives rise to a **moderate/minor** or non-effect (due to the proposed development not being visible), medium-term and temporary adverse effect which is significant.

Operational Phase Year 15

Landscape Character of the Site and its Context

- 9.6.35 At year 15, proposed landscape measures within the Site, including tree planting, landscaped bunds and a range of proposed new habitat types, would have matured, assimilating the proposals into the wider landscape context and reducing the level of effect on the immediate environs, including the village of Stoke Lyne. Despite the introduction of commercial built form, the maturation of the proposed landscape framework would give rise to some beneficial effects as set out within the Landscape Strategy. The integration, and maturation, of a well-designed landscape scheme, aided by landscaped bunds, with built form would assimilate the proposals into the immediate setting such that it would not necessarily conflict with the characteristics of the Site's immediate context when considered with regard to the character of Baynards Green. New tree and woodland planting would provide a new landscape corridor between existing woodland block, divorcing the Site and built form within it from the village of Stoke Lyne. It is considered that, at year 15, the magnitude of change would reduce to medium, giving rise to a **moderate/minor**, long-term, both adverse and beneficial and permanent residual effect, which is not significant.
- 9.6.36 Importantly the landscape of the Site and its near surroundings are not designated at either a national or local level, which confirms the general reduced value and sensitivity in landscape terms, as described in detail above. This does not in turn indicate that development is acceptable in landscape terms, but that subject to addressing the appropriate detail of the scheme, there are no 'in principle' landscape constraints to development at the Site.

On-site Landscape Features

- 9.6.37 At year 15, proposed landscape measures within the Site, including tree planting and a range of habitat types, would have matured, assimilating the proposals into the wider landscape context. Despite the introduction of commercial built form, the maturation of the proposed landscape framework would give rise to beneficial effects as set out within the Landscape

Strategy.

- 9.6.38 The integration, and maturation, of a well-designed landscape scheme, aided by landscaped bunds, with commercial built form would assimilate the proposals into the immediate setting such that it would not necessarily conflict with the characteristics of the Site's immediate context, particularly in local views from the west, albeit likely to be of greater horizontal massing to built form within the current baseline. It is considered that, at year 15, the magnitude of change would remain high, although reducing to a neutral effect as proposed planting would offset the loss of existing tree and hedgerow stock within the main body of the Site. This gives rise to a **moderate**, permanent and neutral effect which is significant.

Local Landscape Character

- 9.6.39 Design mitigation proposals on the Site boundaries, including landscaped bunds adjacent to the Site boundaries in key locations, would assimilate the proposed development into the surrounding landscape context and minimise the effect on the wider landscape setting. Glimpsed views of the proposed built form within the Site may remain, particularly during winter months however, the proposed development would be seen in the context of existing infrastructure and major transport route M40/A41. It is considered that, with the maturation of the proposed landscape framework, the key characteristics of Wooded Estate lands LCT would be subject to a low magnitude of change, giving rise to a **minor**, long-term, adverse and temporary effect, which is not significant.
- 9.6.40 In relation to the Plateau Farmland LCT, despite the maturation of the landscape proposals, completed built form may be visible in some local views, but would not be considered to detract from the 'sparse' character of the neighbouring landscape type. The proposed development would only be visible from a discrete geographical area, which is already considered to be influenced by existing urbanising features within major highway corridors. At operation year 15, it is considered that the proposed development would result in a low magnitude of change upon the Plateau Farmland LCT, giving rise to a **minor**, long-term, adverse and permanent effect, which is not significant.
- 9.6.41 In the longer term, new lighting associated with the proposed development would be mitigated in part by the maturation of the landscape scheme. However, light sources would be likely to remain an identifiable component of local views. Beneficial effects would be evident in some views as the landscape strategy proposed within the Site would provide some visual screening to lighting and vehicular movements associated with major vehicular corridors. However, overall, due to the proximity of new light sources to Stoke Lyne, it would be considered that the overall effect would be adverse. In the long term, with consideration of the maturation of the landscape strategy, lighting within the proposed development would be considered to be the addition of elements that are not uncharacteristic of the existing landscape. The magnitude of change to character after dark would be low which, when compared with a medium sensitivity, would give rise to a **minor** adverse and permanent level of effect which is not significant.

Close Proximity Views from Roads and PRow

- 9.6.42 In the long-term, mitigation proposals would reduce the magnitude of change resulting from the proposed development, particularly for receptors in close proximity to the Site, including in views from Stoke Lyne as shown on **Figure 9.6: Photoviewpoints EDP 4**. Mitigation proposals on the eastern boundary of the Site would partly screen new built form, which would also provide a new woodland connection to woodland blocks to the north and south of the Site; this would divorce Stoke Lyne from the new character of the Site and the environs to the west at Baynards

Green. It is considered that the residual magnitude of change resulting from the proposed development would be **medium**, giving rise to a **moderate/minor** adverse effect on vehicle users, which is **not significant**, and a **moderate** adverse and permanent level of effect on PRow users, which is **significant**.

- 9.6.43 From the north, as illustrated at **Figure 9.6: Photoviewpoints EDP 2**, owing to the mature landscape framework within the surrounding context, the proposed development would be partially screened in views from surrounding PRow. Additional mitigation measures, including landscaped bunds, would further screen views of the proposed development, albeit with some winter visibility remaining when vegetation is not in leaf. Furthermore, the further growth of a tree belt that sits adjacent to, but outside, the northern boundary of the Site would further contribute to visual screening. However, the proposed development is likely to remain a new and recognisable element of local views and, therefore, with the maturation of the landscape scheme, it is considered that the residual magnitude of change resulting from the proposed development would reduce to medium, giving rise to a **moderate** adverse and permanent level of effect which is not significant.
- 9.6.44 In views from the A43, and roads extending to the west, views from roads are predominantly contained by mature roadside vegetation such that, beyond road section immediately adjacent to the Site, there is little perception of land beyond the immediate highway. The addition of the maturation of the proposed landscape framework would further mitigate views however, views of the rooftops of the proposed development, particularly where built form lies in close proximity to the western boundary, would be seen in short-distance views. As views would remain in winter months, the magnitude of change to vehicle users immediately adjacent to the Site would remain medium, giving rise to a **minor**, medium-term, adverse and permanent level of effect, which is not significant.
- 9.6.45 For pedestrians to the west of the Site, illustrated by **Figure 9.6: Photoviewpoints EDP 10 and 11**, although further mitigation planting would reduce some views of the proposed development, views of the roof structure would remain. However, these views would be seen in the context of Baynards Green and infrastructure associated with the A43 and M40 and, therefore, it is considered that the residual magnitude of change would be low, giving rise to a **moderate/minor** adverse effect which is not significant.

Distant Views towards the Site

- 9.6.46 Distant views of the Site, as shown in **Figure 9.7: Photoviewpoint EDP 1, 8 and 9**, at operation year 15 would largely be limited by mature landscape features within a flat and undulating landscape. The proposed mitigation measures and landscaped bund would contribute to further screening views from PRow within the surrounding open agricultural landscape to the east. To the north and west, the layering effect of existing landscape features would be such that the proposed development would form a minor constituent of the view, although in some cases would be barely perceptible with any views being limited to the immediate agricultural setting. It is considered that receptors experiencing distant views towards the Site would be subject to a very low magnitude of change, giving rise to a worst-case **minor**, long-term, adverse and permanent effect, which is not significant. For road users with a medium sensitivity, a very low magnitude of change gives rise to a **minor/negligible**, long-term, adverse and permanent effect, which is not significant.

Private Viewpoint Receptors

- 9.6.47 For residential receptors in close proximity to the Site, on completion, the Proposed

Development would introduce views of commercial built form, although partly screened by mature landscape features aligning the eastern boundary. New landscape proposals at the eastern boundary, aided by landscaped bunds, would give rise to beneficial effects in contributing to the well-treed character of the local context. However, in local views from publicly accessible areas, there would likely be some adverse effects arising from the proposed development. In views from private properties, it is unlikely that the proposed development would form a material component in primary views from properties within Stoke Lyne. However, if views are possible, with the consideration of some beneficial effects within the view, on balance, the magnitude of change to the residential amenity of properties in close proximity to the Site would be low, giving rise to a **moderate** and permanent adverse effect, which is significant.

- 9.6.48 In the wider context, beyond 1km, views become heavily filtered by mature vegetation and woodland cover, such that views of the proposed development are unlikely. The magnitude of change in private views beyond Stoke Lyne is considered to be very low/none which, when combined with an assumed very high sensitivity given the wider rural context to the west, gives rise to a **moderate/minor** or non-effect which is not significant.

9.7 Implications of Climate Change

- 9.7.1 The impact of climate change might include certain tree species or grasslands becoming more dominant/prevalent, but given the character of the surrounding landscape, which includes agricultural land with mature trees and hedgerow boundaries, these changes would not have a prominent impact. Changes to the landscape effects predicted is considered appropriate.
- 9.7.2 For visual effects, the future baseline under a climate change scenario would not lead to any greater, or different, effects to those predicted. Due to the Proposed Development being set within a mature landscape, particularly with regard to mature woodland cover on the eastern side of the A43, any perception of it with consideration of climate change would remain limited to few locations.

9.8 Cumulative effects

- 9.8.1 GLVIA3 defines 'cumulative effects' as "the additional changes caused by a development in conjunction with other similar developments or as the combined effect of a set of developments taken together":
- Cumulative landscape effects are defined as effects that "*can impact on either the physical fabric or character of the landscape, or any special values attached to it*" and;
 - Cumulative visual effects are effects caused by:
 - Combined visibility, which "*occurs where the observer is able to see two or more developments from one viewpoint*"; and/or
 - Sequential effects, which "*occur when the observer has to move to another viewpoint to see different developments.*"
- 9.8.2 The separate effect of individual changes may not be significant, but together they may create a significant adverse effect on the landscape resource or visual receptors within their combined envelopes. In this cumulative assessment, the focus is on the additional effects of the proposed development over and above the effects that would arise from the other developments.
- 9.8.3 The cumulative landscape and visual impact assessment uses the same assessment

methodology as that presented for the main LVIA above and considers impacts on the same receptor groups. The cumulative assessment considers construction phase impacts, as well as operational phase impacts at year 1 post completion and 15 years after completion. The assumptions with regard to mitigation set out in the main LVIA also apply to the cumulative assessment. Impacts reported below include consideration of residual impacts with the implementation of the mitigation proposed.

- 9.8.4 The sites to which the Proposed Development may result in a cumulative effect differ for each technical discipline. In the case of landscape and visual matters, of the 6 cumulative development sites, only 1 is physically and visually proximate to the Site. However, there may also be transient views of development sites slightly further afield, particularly on the western edge of Bicester. Those considered in the assessment of cumulative landscape and visual effects are listed below in Table 9.7. Due to a combination of distance, intervening built form and tree and woodland cover within the local context, Site 2 is unlikely to result in either sequential or in-combination views with the Proposed Development and, as such, has been scoped out of further consideration of cumulative landscape and visual effects.

Table 9.7: Cumulative Sites

Development approved	Map Ref.	Description.
CDC Planning Ref 19/02550/F Great Wolf Leisure Resort	1	Leisure resort incorporating a waterpark, a family entertainment centre, a hotel, conferencing facilities, restaurants, access, parking and landscaping.
CDC Planning Ref 20/03199/OUT Axis J9 Phase 1	2	Erection of up to 53,000 sqm of floor space to be for B8 and B2 with ancillary B1 (use classes) employment provision within two employment zones covering an area of 9.45ha; parking and service areas to serve the employment zones; a new access off the Middleton Stoney Road (B4030); temporary access of Howes Lane pending the delivery of the realigned Howes Lane; 4.5ha of residential land; internal roads, paths and cycleways; landscaping including strategic green infrastructure (G1); provision of sustainable urban systems (suds) incorporating landscaped areas with balancing ponds and swales. Associated utilities and infrastructure.
Planning application		Description.
CDC Planning Ref 18/00825/HYBRID Heyford Park	3	Hybrid planning application for development on land at the Former RAF Upper Heyford air base and adjacent land north and south of Camp Road. Mixed use application for up to 1,175 dwellings, 60 close care dwellings, retail employment and community use spaces, school, energy facility and open space.
CDC Planning Refs 21/03267/OUT & 21/03268/OUT J10 M40	4	Buildings comprising logistics (Use Class B8) and ancillary Office (Use Class E(g)(i)) floorspace and associated infrastructure; access from the B4100.

21/02861/SCOP Symmetry Park, Oxford North	5	Full planning application for research, development and production facility comprising of Class B2 floorspace and ancillary office floorspace with associated infrastructure including formation of signal-controlled vehicular access to the A41.
EIA Scoping		Description.
National Infrastructure Planning Scoping Opinion 15 th July 2021	6	Oxfordshire Strategic Rail Freight Interchange. A new rail terminal and associated infrastructure, warehouses up to 675,000 sq.m and highways works

Landscape Character

- 9.8.5 The Proposed Development is assessed above as having a moderate/minor adverse effect on the character of the Site context and a minor adverse effect on the landscape of both the Wooded Estatelands LCT and the Plateau Farmland LCT. The Proposed Development adopts the landscape strategy for Wooded Estatelands LCT by strengthening existing field boundaries, which includes planting of native deciduous woodland blocks to minimise the visual impact of both the proposed development and existing commercial uses to the west.
- 9.8.6 Views of the Proposed Development, including the cumulative sites listed above would be possible from within the host LCT, and the neighbouring Plateau Farmland LCT. However, it is not the view that defines the landscape effect, rather it is changes to the physical and wider perceptual qualities (including visual) that lead to the level of effect. Large areas of built development, such as the Sites listed above, would clearly have a notable effect on landscape character. However, assuming the development of all strategic sites, the urban context that surrounds Junction 10 of the M40 would extend east and, as a whole, the cumulative sites listed above would result in further urbanisation of the north-eastern extents of the Wooded Estatelands LCT. The proposed development enhances key landscape features at the boundary of the Site which provide clear value to the local landscape context, including mature boundary vegetation and new woodland planting however, there would be an adverse alteration to a number of key characteristics within the Site's immediate context. The Proposed Development would increase the quantity of land developed on the eastern side of the M40 but have a limited cumulative effect with regards to the future urban developed context, largely owing to its location on the A43 and with consideration of generous landscape planting at the eastern boundary of the Site. It is therefore considered that, while the Proposed Development would form a notable addition to the local context, the Proposed Development would not lead to a significant cumulative landscape effect, especially given the size of the overall strategic developments named above.

Visual Amenity

- 9.8.7 It is pertinent to note that the cumulative baseline consists of a number of areas of development. Taking into account the size and distribution of cumulative developments as a whole, it is possible that there would be locations within the landscape from which views of more than one development site may be gained either in combination or sequentially, particularly in views from vehicular corridors including the A43 and B4100. A detailed assessment of the cumulative impact on each Photoviewpoint is provided in **Technical Appendix 9.3**.

- 9.8.8 The cumulative assessment (See **Technical Appendix 9.3**) has identified that some cumulative effects are predicted, although these cumulative effects are predominantly in views from the immediate context of the Site. Overall, on completion at year 15, cumulative effects were not considered to give rise to additional significant effects to those outlined within the main assessment above.
- 9.8.9 In consideration of the cumulative developments, it is assessed that there would be a proportional increase of 'in combination' effects as a result of a change to views to currently undeveloped land. In summary:
- The area to the east of Junction 10 of the M40 would be more urbanised in transient views and therefore less susceptible to change and less sensitive to the introduction of built components within the landscape; and
 - Generally, as a result of intervening landscape features, combined with undulating topography, although there are predicted to be some in-combination views of taller elements of construction activity, on completion there are likely to be few locations where views of the Site would be seen in combination with the cumulative sites named above. Where in-combination views are possible, due to the distribution of the cumulative sites named above, these views are often heavily filtered or informed by existing urbanising features within the local context.
- 9.8.10 The cumulative assessment found that:
- For residential receptors at Stoke Lyne, the submitted LVIA for Cumulative Site 4 identified that there would be an "Introduction of large commercial buildings to views in an otherwise rural landscape. Proposals will be partially screened by hedgerows, hedgerow trees and linear woodlands in the intervening landscape. During the winter months the reduced leaf cover will increase slightly the available views of the Development." Despite this conclusion, the submitted LVIA for Cumulative Site 4 identified a minor adverse effect on visual receptors, although the calculation of this effect is unclear. Within the proposed development, the landscape strategy delivers a generous treed boundary between built form and views from Stoke Lyne, more so than any planting proposed within Cumulative Site 4 in isolation, giving rise to some beneficial effect on the well-treed character of the local context. In the long-term, the Proposed Development within the Site would not increase the horizontal scale of built areas within the local context;
 - For PRoW users in and around Stoke Lyne, similar to the above, although there may be some views of the proposed development remaining, there would be very limited perception of any other cumulative site on the eastern side of the M40. There may be some perception of an increase in built form throughout the local context however, it is not considered that this effect would increase the magnitude of change from that arising from the proposed development;
 - For receptors travelling on the B4100, sequential views of the proposed development with Cumulative Site 4 would result in a perceived increase in built form throughout the local context. The magnitude of change in the short term is considered to increase to moderate, which is significant, while the effect in the long-term would increase from that assessed above to moderate/minor, which is not significant;
 - For receptors travelling on the A43, while there would remain some in combination views of the proposed development and Cumulative Site 4, the combination of built form would not be considered to fundamentally alter the character of local views beyond that stated within the main assessment above;

- For receptors on the M40, development within Cumulative Site 4 would entirely screen views of the proposed development and there would be no cumulative effect.

9.8.11 While the effect of the Proposed Development at the Site would not differ, the magnitude of change experienced across the wider area will clearly be greater when taking the combined effect of the other schemes into consideration. By the same token, it may be considered that the proportion of the total visual change attributable to the Site would be proportionately less because i) the wider area will be more urbanised and therefore potentially less sensitive to the introduction of urban components within the landscape; and ii) viewpoints that are likely to experience change as a result of the Site may have views blocked or altered by other developments. In this case, with the exception of Cumulative Site 4, due to the physical and visual separation of the Site and each of the other cumulative development sites, being aided by intervening built form and tree and woodland cover within the local context, the assessment of sensitivity and susceptibility to change is considered to remain as set out within the main assessment. Overall, as a result of the implementation of the Proposed Development and the cumulative developments listed above, there would be an increase in massing of built development within the wider context as a whole. However, significant effects would remain as identified within the main assessment above and at no locations would the cumulative level of effect be made significant by the addition of the Proposed Development.

9.9 Summary

- 9.9.1 An assessment of landscape and visual components of the Site and the wider area where there is the potential for likely significant environmental effects was undertaken through desktop and field study and in accordance with accepted guidance. This identified the main landscape and visual receptors likely to be affected by the proposed development and resulted in a baseline appraisal (contained at **Technical Appendix 9.1**) in the context of which landscape and visual effects could be assessed. The main landscape and visual implications of the proposed development and the potential impacts were identified, and mitigation developed in order to minimise these impacts.
- 9.9.2 The Landscape and Visual Impact Assessment considered the effects of the proposed development on the Wooded Estatelands Landscape Character Type and the Plateau Farmland Landscape Character Type and finds that the proposed development results in limited impacts. The proposed development would not cause any significant residual effects on the overall character of this area.
- 9.9.3 The Site forms part of a transitional landscape between the major road corridors of the M40 and A43, and a more rural landscape to the east, including the village of Stoke Lyne.
- 9.9.4 The landscape within the study area is predominantly flat to the north and gently undulating to the east, containing a mix of rural features and peri-urban uses, resulting in limited opportunities for views of the Site. In consideration of the impacts on the visual amenity of people, views towards the Site are often obscured by mature landscape features within a flat and gently undulating landscape. The assessment finds that, due to this visual screening, there would be limited long-term impacts on publicly accessible areas, including highways and PRoW.
- 9.9.5 Significant residual impacts are predicted for receptors using PRoW in close proximity to the Site, as well as residents in close proximity to it; and where the property may afford a view

looking west as many are well contained by mature landscape features.

- 9.9.6 In the wider context, the low number of significant landscape and visual effects confirm the extent to which strategic planting incorporated into the proposed development would mitigate views, retaining and reinforcing the characteristic landscape fabric and pattern of the Site and assimilating the proposed development, as far as possible, into the peri-urban and rural landscape context.
- 9.9.7 The cumulative assessment identified that some in-combination views of the proposed development and named Cumulative Sites are predicted, predominantly where receptors are in close proximity to both the proposed development and Cumulative Site 4. However, where the cumulative assessment identified effects that differ from that set out within the main Landscape and Visual Assessment, in all cases, these effects were found to be not significant in the long-term.

9.10 References

- Department for Communities and Local Government, 2021, “*National Policy Planning Framework*”.
- Landscape Institute / Institute of Environmental Management and Assessment, 2013, “Guidelines for Landscape and Visual Impact Assessment, Third Edition”
- Natural England website
<http://publications.naturalengland.org.uk/publication/12332031> ‘The Character of England: Landscape, Wildlife and Natural Features’
- Cherwell Local Plan 2011–2031 Part 1 (adopted July 2015) and Saved Policies of the Adopted Cherwell Local Plan 1996
- Countryside Design Summary (June 1998)
- Cherwell District Landscape Assessment by Cobham Resource Consultants (November 1995)
- Oxfordshire Wildlife and Landscape Study (2004)
- Natural England, 2015, National Character Area (NCA) Profile 107

Glossary

A glossary of clearly defined terms can be found at Annex EDP 3 of **Technical Appendix 9.1**.

Table 9.7 Summary of effects

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction phase					
Landscape Character of the Site and Context	Medium	Adverse. Refer to Para 9.4.3	Mitigation considered in all effects at Construction Stage.	Major/Moderate Short-term, Adverse and Temporary	Significant
On-site Landscape Features	Medium	Adverse. Refer to Para 9.4.3	Mitigation considered in all effects at Construction Stage.	Major/Moderate Short-term, Adverse and Temporary	Significant
Wooded Estatelands LCT	Medium	Adverse. Refer to Para 9.4.3	Mitigation considered in all effects at Construction Stage.	Moderate Short-term, Adverse and Temporary	Significant
Plateau Farmland LCT	Medium	Adverse. Refer to Para 9.4.3	Mitigation considered in all effects at Construction Stage.	Minor Short-term, Adverse and Temporary	Not Significant
Landscape Character after Dark	Medium	Adverse. Refer to Para 9.4.3	Mitigation considered in all effects at Construction Stage.	Moderate/Minor Short-term, Adverse and Temporary	Not Significant
Visual receptors travelling directly past the Site on the A43	Low	Adverse. Refer to Para 9.4.3	Mitigation considered in all effects at Construction Stage.	Minor Short-term, Adverse and Temporary	Not Significant
Visual receptors (PRoW and minor road users) in close proximity to the Site	Medium-High	Adverse. Refer to Para 9.4.3	Mitigation considered in all effects at Construction Stage.	Major/Moderate Short-term, Adverse and Temporary	Significant
Road users and pedestrians in the wider context only	Low-medium	Adverse. Refer to Para 9.4.3	Mitigation considered in all effects at Construction Stage.	Minor Short-term, Adverse and Temporary	Not Significant
PRoW users in the wider context only	High	Adverse. Refer to Para 9.4.3	Mitigation considered in all effects at Construction Stage.	Moderate/Minor Short-term, Adverse and Temporary	Not Significant
Residential receptors in Stoke Lyne	Very High	Adverse. Refer to Para 9.4.3	Mitigation considered in all effects at Construction Stage.	Major/Moderate Short-term, Adverse and Temporary	Significant
Residential receptors in the wider context	Very High	Adverse. Refer to Para 9.4.3	Mitigation considered in all effects at Construction Stage.	Moderate/Minor Short-term, Adverse and Temporary	Not Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Operational phase (Year 1)					
Receptor					
Landscape Character of the Site and Context	Medium	Adverse. Refer to Para 9.4.4	Refer to Para 9.5.5 to 9.5.9	Moderate Medium-term, Adverse and Temporary	Significant
On-site Landscape Features	Medium	Adverse. Refer to Para 9.4.4	Refer to Para 9.5.5 to 9.5.9	Moderate Medium-term, Adverse and Temporary	Significant
Wooded Estatelands LCT	Medium	Adverse. Refer to Para 9.4.4	Refer to Para 9.5.5 to 9.5.9	Minor Medium-term, Adverse and Temporary	Not Significant
Plateau Farmland LCT	Medium	Adverse. Refer to Para 9.4.4	Refer to Para 9.5.5 to 9.5.9	Minor Medium-term, Adverse and Temporary	Not Significant
Landscape Character after Dark	Medium	Adverse. Refer to Para 9.4.4	Refer to Para 9.5.5 to 9.5.9 and Dunwoody Lighting Assessment	Moderate/Minor Medium-term, Adverse and Temporary	Not Significant
Visual receptors travelling directly past the Site on the A43	Low	Adverse. Refer to Para 9.4.4	Refer to Para 9.5.5 to 9.5.9	Minor Medium-term, Adverse and Temporary	Not Significant
Visual receptors (PRoW and minor road users) in close proximity to the Site	Medium-High	Adverse. Refer to Para 9.4.4	Refer to Para 9.5.5 to 9.5.9	Major/Moderate Short-term, Adverse and Temporary	Significant
Road users and pedestrians in the wider context only	Low-medium	Adverse. Refer to Para 9.4.4	Refer to Para 9.5.5 to 9.5.9	Minor/Negligible Medium-term, Adverse and Temporary	Not Significant
PRoW users in the wider context only	High	Adverse. Refer to Para 9.4.4	Refer to Para 9.5.5 to 9.5.9	Minor Medium-term,	Not Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
				Adverse and Temporary	
Residential receptors in Stoke Lyne	Very High	Adverse. Refer to Para 9.4.4	Refer to Para 9.5.5 to 9.5.9	Moderate Medium-term, Adverse and Temporary	Significant
Residential receptors in the wider context	Very High	Adverse. Refer to Para 9.4.4	Refer to Para 9.5.5 to 9.5.9	Moderate/Minor Medium-term, Adverse and Temporary	Not Significant
Operational phase (Year 15)					
Landscape Character of the Site and Context	Medium	Both Adverse and Beneficial. Refer to Para 9.4.4	The landscape and GI framework will have established, assimilating the proposed development into the landscape and lessening the magnitude of change.	Moderate/Minor Long term, Adverse and Beneficial and Permanent	Not Significant
On-site Landscape Features	Medium	Beneficial. Refer to Para 9.4.4	The landscape and GI framework will have established, assimilating the proposed development into the landscape. The magnitude of change would remain, although reducing to a beneficial effect as proposed planting would offset the loss of existing arable land.	Moderate Long term, Beneficial and Permanent	Significant
Wooded Estate/lands LCT	Medium	Adverse. Refer to Para 9.4.4	The landscape and GI framework will have established, assimilating the proposed development into the landscape. However, the magnitude of change would remain.	Minor Long term, Adverse and Permanent	Not Significant
Plateau Farmland LCT	Medium	Adverse. Refer to Para	The landscape and GI	Minor	Not Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		9.4.4	framework will have established, assimilating the proposed development into the landscape. However, the magnitude of change would remain.	Long term, Adverse and Permanent	
Landscape Character after Dark	Medium	Adverse. Refer to Para 9.4.4	The landscape and GI framework would have established, assimilating the proposed development into the landscape. Lighting would be considered to be characteristic of the baseline context around Baynards Green.	Minor Long term, Adverse and Permanent	Not Significant
Visual receptors travelling directly past the Site on the A43	Low	Adverse. Refer to Para 9.4.4	The landscape and GI framework, and planting measures close to the viewpoint, will have established, lessening the magnitude of change	Minor Long term, Adverse and Permanent	Not Significant
Visual receptors (PRoW and minor road users) in close proximity to the Site	Medium-High	Adverse. Refer to Para 9.4.4	The landscape and GI framework will have established, assimilating the proposed development into the landscape. However, the magnitude of change would remain due to the proximity of the view.	Moderate Long term, Adverse and Permanent	Significant
Road users and pedestrians in the wider context only	Low-medium	Adverse. Refer to Para 9.4.4	The landscape and GI framework will have established, assimilating the proposed development into the landscape. However, the magnitude of change would remain due distance.	Minor/Negligible Long term, Adverse and Permanent	Not Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
PRoW users in the wider context only	High	Adverse. Refer to Para 9.4.4	The landscape and GI framework will have established, assimilating the proposed development into the landscape. However, the magnitude of change would remain due distance	Minor Long term, Adverse and Permanent	Not Significant
Residential receptors in close proximity to the Site	Very High	Adverse. Refer to Para 9.4.4	The landscape and GI framework will have established, assimilating the proposed development into the landscape. However, the magnitude of change would remain due to the proximity of the view.	Moderate Long term, Adverse and Permanent	Significant
Residential receptors in the wider context	Very High	Neutral. Refer to Para 9.4.4	The landscape and GI framework, and planting measures close to the viewpoint, will have established, lessening the effect to neutral.	Moderate/Minor Long term, Neutral and Permanent	Not Significant

10 Heritage

10.1 Introduction

- 10.1.1 This chapter of the Environmental Statement (ES) has been prepared by The Environmental Dimension Partnership Ltd (EDP) and assesses the potential effects of the Proposed Development in terms of archaeology and cultural heritage resources (the historic environment). EDP is a Registered Organisation with the Chartered Institute for Archaeologists (CIfA).
- 10.1.2 This chapter describes the assessment methodology, the baseline conditions currently existing within the Site and surroundings, the likely significant environmental effects during the construction and operational phases of the proposed development, the mitigation measures required to prevent, reduce or offset significant adverse effects and likely residual effects after these measures have been employed. The chapter assesses the site and development as described in Chapters 2 and 3 of this ES (referenced as the Site and Proposed Development).
- 10.1.3 This chapter is informed by desk-based assessment and site survey work carried out in 2021. The results of these surveys are summarised in this chapter, with more detailed information included in Appendix 10.1, which comprises an Archaeological and Heritage Desk-Based Assessment (EDP, 2021b) and Appendix 10.2 which comprises two geophysical survey reports (ASWYAS, 2015 and 2021b). Pre-application consultation responses and WSIs in relation to the Assessment (EDP, 2021a) and 2021 geophysical survey (ASWYAS, 2021a) are reproduced in Appendix 10.3.

10.2 Assessment methodology

Archaeological and Heritage Desk-Based Assessment

- 10.2.1 The chapter has been informed by an Archaeological and Heritage Assessment (Appendix 10.1) carried out in line with the Standard and Guidance for Historic Environment Desk-Based Assessment issued by the Chartered Institute for Archaeologists (CIfA, 2020).
- 10.2.2 The assessment methodology was developed in consultation with Oxfordshire County Council's Lead Archaeologist in November 2021. The methodology was set out in a Written Scheme of Investigation (WSI) (EDP, 2021a) that was approved in advance by the Lead Archaeologist (see Appendix 10.3).
- 10.2.3 The Archaeological and Heritage Assessment forms the basis of the assessment within the ES. It utilised baseline information derived from the following sources:
- Citations and supporting documentation acquired from Historic England for archaeological and/or heritage designations within the site, or located within the Site's wider zone of influence;
 - Information held by the Oxfordshire Historic Environment Record (HER) on known archaeological sites, monuments and findspots within the Site and within a wider study area that was defined around it;
 - Information from the Oxfordshire Historic Landscape Character study;
 - Information from the Portable Antiquities Scheme (PAS);
 - Information describing the site's archaeological and historical background, including published and unpublished maps, books and periodicals, drawn from a wide variety of sources including the Oxfordshire History Centre;
 - Aerial photographs depicting the Site and its environs, which are held by the Historic

England Archive in Swindon;

- LiDAR data acquired from the Environment Agency; and
- Observations regarding the presence or absence of above ground archaeological sites, features and/or remains within the Site, as well as the likely survival and condition of below ground features in light of past and present land use, made during a site walkover survey carried out in November 2021.

10.2.4 In accordance with the National Planning Policy Framework 2021 (NPPF), the following designated and non-designated heritage assets have been considered:

- Registered Parks and Gardens;
- Listed Buildings;
- Scheduled Monuments;
- Conservation Areas;
- Previously recorded or hitherto unknown non-designated archaeological remains; and
- Non-designated standing buildings or other extant heritage assets.

10.2.5 The baseline archaeological assessment focused on a study area extending for 1km from the boundary of the Site, as that was considered appropriate to understand the historic environment context for a proposed development of this size/scale and in this topographical location.

10.2.6 The available baseline information was checked and augmented through the completion of site walkover/field surveys. In addition, these also aimed to determine the contribution made by the settings of designated heritage assets to their significance, in addition to determining their relationship(s) (if any) to the Site.

10.2.7 This aspect of the assessment was carried out in accordance with the Historic England guidance set out in *Historic Environment Good Practice Advice in Planning, Note 3 (Second Edition), The Setting of Heritage Assets* (HE 2017) and adopted an initial 2km radius study area for detailed assessment, albeit also considering the potential for effects on designated heritage asset located beyond 2km.

10.2.8 This study area was considered appropriate on account of the site being situated on broadly level ground within a landscape characterised by gently sloping or level land. Thus, the land is not prominent in long distance views nor is it overlooked by high ground. Furthermore, views to or from the site are curtailed by the proliferation of mature hedgerows and trees in the landscape surrounding the site, including numerous small pockets of woodland and wooded belts.

10.2.9 In each case, the significance of heritage assets has been defined in accordance with the categories of heritage interest set out in Annex 2 of the NPPF (2021).

Legislation Planning and Guidance

10.2.10 In terms of effects on the historic environment, the principal legislative instruments and planning policy framework is described in full in Section 2 of the Archaeological and Heritage Assessment at Appendix 10.1.

Guidance

10.2.11 The baseline assessment and this ES chapter follow, where it is relevant, the heritage-specific guidance documents listed below:

- The baseline review of archaeological and heritage issues has been completed with recourse to the ClfA *Standard and Guidance for Historic Environment Desk-based*

Assessment (CIfA 2020);

- The identification and assessment of potential 'setting' effects on heritage assets has been undertaken using Historic England's *Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets (Second Edition)* (HE 2017); and
- The assessment of the significance of heritage assets references Historic England's *Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision-Taking in the Historic Environment* (HE 2015).

Geophysical Survey

10.2.12 Parts of the Site were subject to a geophysical survey carried out in 2015 (ASWYAS, 2015). Following further consultation with Oxfordshire County Council's Lead Archaeologist, the parts of the Site that were not previously surveyed in 2015 were subject to a geophysical survey undertaken in 2021.

10.2.13 Both surveys entailed magnetometer survey of all available and suitable areas within the Site. The 2021 survey was carried out in line with a methodology set out in a Written Scheme of Investigation (WSI) (ASWYAS, 2021a) which was approved in advance by the Council's Lead Archaeologist (See Appendix 10.3).

10.2.14 The work was undertaken in accordance with the relevant best practice guidance, in this case the main documents being the *Geophysical Survey in Archaeological Field Evaluation: Research and Professional Services Guidelines* issued by English Heritage (EH 2008) and the *Standard and Guidance for archaeological geophysical survey issued by the Chartered Institute for Archaeologists* (CIfA 2016).

10.2.15 The aims of the geophysical survey were (1) to provide sufficient information to enable an assessment to be made of the impact of any proposed development on any potential sub-surface archaeological remains and (2) for details of further evaluation or mitigation proposals, if appropriate, to be recommended and then defined. The general archaeological objectives of the geophysical survey were:

- To provide information about the nature and possible interpretation of any magnetic anomalies identified;
- To therefore model the possible presence/absence and extent of any buried archaeological features; and
- To prepare a report summarising the results of the survey.

ES Assessment Methodology

10.2.16 The evaluation of potentially significant effects on a heritage asset depends on a combination of its designation, the heritage significance or sensitivity of the asset and the magnitude of change that is predicted to result from the development. The assessment of likely significant effects as a result of the development takes into account both the construction phase and the completed occupation phase.

10.2.17 The assessment attributes 'sensitivity' to archaeological and cultural heritage assets, as shown in Table 10.1.

Table 10.1 Sensitivity of Receptor

Receptor	Sensitivity of receptor				
	Very High	High	Medium	Low	Negligible
World Heritage Site					
Scheduled Monument					
Grade I or II* listed building					
Grade I or II* registered park or garden					
Other nationally important archaeological asset					
Grade II listed building					
Grade II registered park or garden					
Conservation Area					
Other asset of regional or county importance					
Locally important asset with cultural or educational value					
Heritage site or feature with very limited values or interests					

10.2.18 The classification of the magnitude of change to heritage assets is based on consistent criteria and take account of such factors as the physical scale and type of disturbance and whether features or evidence would be lost that are fundamental to their historic character, integrity and therefore, significance.

10.2.19 Both physical and non-physical (e.g., visual) changes to heritage assets are considered. The magnitude of impact is assessed using the criteria in Table 10.2.

Table 10.2 Magnitude of Change

Magnitude of Change	Description
Large	Change to the significance of a heritage asset so that it is completely altered or destroyed.
Medium	Change to the significance of a heritage asset so that it is significantly modified.
Small	Change to the significance of a heritage asset so that it is noticeably different.
Negligible	Change to the significance of a heritage asset that hardly affects it.
None	No change to the significance of an asset.

10.2.20 Following the evaluation of the sensitivity of specific cultural heritage receptors, and the magnitude of the impact upon them, the significance of the effect will be assessed using the criteria outlined in Table 10.3 below.

10.2.21 It should be noted that there are no receptors of 'Very High' sensitivity within the scope of the assessment and therefore, this is not included in the matrix in Table 10.3.

Table 10.3 Significance of Effect

Magnitude of Change	Sensitivity of Receptor			
	High	Medium	Low	Negligible
Large	Severe	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Small	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

10.2.22 The assessment matrix defined in Table 10.3 is not intended to be 'prescriptive', but rather it allows for the employment of professional judgement to determine the most appropriate level of effect for each heritage asset that is identified.

10.2.23 Effects are categorised with regard to their nature (adverse, beneficial or neutral) and their permanence (permanent, temporary or reversible). For all forms of heritage asset (receptor); including archaeological sites and remains; historic buildings, places and areas; and historic landscapes; the sensitivity of the receptor is combined with the predicted magnitude of change to arrive at the significance of effect.

10.2.24 The combination of sensitivity and magnitude of change is undertaken with reference to the matrix in Table 10.3, with those effects defined as severe, major or moderate being deemed significant. All other effects are determined to be not significant in EIA terms.

Consultation

10.2.25 Pre-application consultation responses are reproduced in Appendix 10.3. Pre-submission consultation was carried out informally with Cherwell District Council's Conservation Officer, Oxfordshire County Council's Lead Archaeologist and Historic England's Inspector of Ancient Monuments, Berkshire, Buckinghamshire, Oxfordshire.

10.2.26 The Cherwell Conservation Officer was contacted on 26th November 2021 for comment on the scope of the assessment. A response was received on 10th December 2021 which describes the scope of the assessment as 'sensible' but states that this is not a formal response i.e., to a Scoping Opinion submitted to CDC.

- 10.2.27 Historic England were also consulted for an opinion on the scope of the assessment. An email was sent on the 26th November 2021 with further information on the Proposed Development supplied on 1st December 2021. An email response was received on 14th December 2021 stating that the approach taken for the assessment is supported but that the potential for impacts on the settings of heritage assets located beyond the 2km study area should also be considered. This response has been taken into consideration in the assessment set out in the report at Appendix 10.1.
- 10.2.28 As noted above, regarding the archaeological approach, consultation took place with Oxfordshire County Council's Lead Archaeologist during November and December 2021. Initially a WSI (EDP, 2021a), in relation to the Archaeological and Heritage Assessment report, was issued to define the scope of that study and then subsequently agreed with the Lead Archaeologist on the 24th November 2021.
- 10.2.29 Secondly, a WSI (ASWYAS, 2021a) was issued in relation to the Geophysical Survey which defined the survey's scope and methodology and was agreed with the Lead Archaeologist on the 3rd December 2021.
- 10.2.30 An email was subsequently issued by the Lead Archaeologist on the 9th December 2021 stating the following: 'We will be requiring an archaeological evaluation on this site prior to the determination of any planning application'.
- 10.2.31 Following the completion of the survey the geophysical survey report was issued as a draft to the Lead Archaeologist for comment on the 16th December 2021.
- 10.2.32 Accordingly, it is intended to submit a WSI for trial trenching for comment and agreement with the Lead Archaeologist in due course.
- 10.2.33 This will comprise the excavation of a series of evaluative trenches to determine the presence and significance of any assets of archaeological interest within the Site.
- 10.2.34 Based on the results of this initial trial trenching, the requirement and scope of any further archaeological mitigation will be determined through further consultation with the Lead Archaeologist, to be carried out after the submission of a report detailing the results of the trenching and, implemented either in advance of, or during, construction works.

Assumption and Limitations

- 10.2.35 The Archaeological and Heritage Assessment was made with the following assumptions in place, and limitations to the data.
- 10.2.36 It is assumed that the HER data, as curated by Oxfordshire County Council, and the Historic England data, is up-to-date and robust.
- 10.2.37 In terms of limitations, the value of archaeological anomalies, identified in the geophysics data, has not been confirmed through archaeological evaluation. As such, the assessment of their value within the ES Chapter is based on professional judgement. The value of any archaeological remains present within the site will be confirmed thorough archaeological evaluation following a scope and methodology to be agreed in advance with Oxfordshire County Council's Lead Archaeologist. The results of this evaluation, where relevant to the assessment in the ES Chapter, will be presented prior to the determination of the planning application. Once the results of this exercise are known, further consultation with the Lead Archaeologist will take place regarding archaeological mitigation.

10.3 Baseline conditions

Current Baseline

- 10.3.1 This section of the ES chapter identifies the relevant archaeological and cultural heritage receptors (heritage assets) within the extents of the Site and its wider zone of influence. It draws upon the results of the supporting baseline assessment and further geophysical surveys (Appendices 10.1 and 10.2).
- 10.3.2 A detailed description of the baseline situation at and around the Site is set out in the reports at Appendices 10.1 and 10.2. Provided below is a summary of the baseline assessment with regard to archaeology and cultural heritage, with the relevant receptors identified on supporting figures within the assessment reports.

Designated Heritage Assets

- 10.3.3 No designated heritage assets (world heritage sites, scheduled monuments, listed buildings, conservation areas, registered parks and gardens or registered battlefields) are located within the Site.
- 10.3.4 Whilst all designated heritage assets were considered in the wider landscape (see report at Appendix 10.1), all designated heritage assets located up to 2km from the Site boundary have been assessed in detail in order to understand to what degree their setting contributes to their heritage value, whether the site forms part of that setting and whether the site makes a contribution to their heritage value.
- 10.3.5 As stated previously, this study area was considered appropriate on account of the site's broadly level topography, the similar topography of the surrounding area and the proliferation of mature hedgerows and trees in the landscape surrounding the site, including numerous small pockets of woodland and wooded belts which curtail views.
- 10.3.6 The assessment concludes that the Site forms part of the setting of a single designated heritage asset, the Grade II* listed building Church of St Peter (1193248) which is located within the hamlet of Stoke Lyne, c. 860m to the south-east of the site but does not make any contribution to its significance as a heritage asset.
- 10.3.7 The Site does not form a part of the setting of any other designated heritage assets and does not make any contribution to the heritage significance of any other designated heritage asset.

Non-Designated Heritage Assets

- 10.3.8 The Archaeological and Heritage Assessment and two geophysical surveys identified the following non-designated heritage assets within the Site:

Geophysical anomalies suggesting prehistoric or Roman period settlement

- 10.3.9 The 2021 geophysical survey has identified a cluster of anomalies that appear to comprise a series of overlaid enclosures with various related features such as pits and linear anomalies (A1 – A7 in the 2021 geophysics report at Appendix 10.2, with other references below also from that report). A possible boundary ditch arcs around the group on its western and southern sides which may have enclosed it (A8). Several distinct rectilinear features can be identified within the group. The anomalies are equivalent to the 'banjo enclosure' and possible trackway recorded by the HER from cropmarks in the same location. The distinct form of a banjo enclosure is not clearly identifiable in the group, although an enclosure with a funnel-like possible entrance (A1) is discernible which has some characteristics suggestive of this type of feature.
- 10.3.10 The group probably comprises the buried remains of a farmstead or small rural settlement of

the later prehistoric (probably Iron Age) or possibly Roman period. It is anticipated that these features will be targeted by trial trenching and a more precise interpretation and characterisation can be presented prior to the determination of the planning application.

- 10.3.11 With reference to Table 10.1, well-preserved buried remains related to a prehistoric or Roman settlement are considered to represent an '*asset of regional or county importance*', and thus a heritage asset of **Medium** sensitivity.

Anomalies indicating possible buried linear features within the site

- 10.3.12 The two geophysical surveys also identified several linear anomalies that appear to adjoin the boundaries associated with the probable settlement to the south, south-east and east (P1 and P2). These may represent field boundary ditches associated with the settlement remains. It is anticipated that these features will be targeted by trial trenching and a more precise interpretation and characterisation can be presented prior to the determination of the planning application.

- 10.3.13 With reference to Table 10.1, linear ditches within the Site that are demonstrably of archaeological origin and likely associated with the settlement archaeology, would be considered to represent '*Locally important assets with cultural or educational value*' and comprise heritage assets of **Low** sensitivity.

Anomalies indicating possible buried ditches associated with a trackway of unknown date within the southern part of the site

- 10.3.14 The 2021 geophysical survey also identified linear anomalies in the southern part of the site (A9 and A10) that possess the characteristics of trackway drainage ditches, running from south-east to north-west up to the modern road which bisects the two parts of the site. Given that the possible buried ditches appear to spread apart to the north-west to form a funnel shape, they may represent the buried remains of a drove way of undetermined date. It is anticipated that these features will be targeted by trial trenching and a more precise interpretation and characterisation can be presented prior to the determination of the planning application.

- 10.3.15 With reference to Table 10.1, linear roadside ditches within the Site that are demonstrably of archaeological origin would be considered to represent '*Locally important assets with cultural or educational value*' and comprise heritage assets of **Low** sensitivity.

Anomalies indicating possible buried pits within the southern part of the site

- 10.3.1 The 2021 geophysical survey also identified several discrete anomalies that could represent the locations of buried pits of undetermined age within the southern field. A notable group of anomalies is located close to the northern boundary of the field (P3). As isolated features or groups of features the anomalies do not appear to be associated with settlement and the most likely scenario is that, if they are archaeological that they are associated with agriculture. It is anticipated that these features will be targeted by trial trenching and a more precise interpretation and characterisation can be presented prior to the determination of the planning application.

- 10.3.2 With reference to Table 10.1, pits within the Site that are demonstrably of archaeological origin and associated with agriculture, would be considered to represent '*Locally important assets with cultural or educational value*' and comprise heritage assets of **Low** sensitivity. Should trial trenching demonstrate that pits are present that are associated with settlement, ritual activity or funerary activity then an alternative assessment will be concluded with the features ascribed a higher degree of sensitivity.

Slight earthworks and probable buried remains related to post-medieval boundary ditches and quarry pits

- 10.3.3 The remains of a former boundary bank, in the southern part of the Site, as well as slight depressions, in both the northern and southern parts, that probably relate to historic quarrying were identified from LiDAR data. These features were also identified as anomalies within the geophysical surveys and on historic maps along with other linear anomalies that correspond to former field boundaries identifiable on historic maps. Remains related to these features, which are likely to be of no earlier than post-medieval date and comprise slight earthworks and buried features such as infilled ditches and quarry pits would be of very low archaeological interest
- 10.3.4 With reference to Table 10.1, individually the features would be a '*heritage site or feature with very limited value or interest*', it is considered that the earthworks and related buried remains comprise a heritage asset of **Negligible** sensitivity.

Probable buried remains related to infilled furrows

- 10.3.5 The geophysical surveys identified the presence of probable infilled furrows across most of the Site. Judging by their appearance, these comprise a mixture of post-medieval and more recent ploughing as well as slightly wider spaced and slightly curving anomalies that suggest they are the remains of medieval ridge and furrow cultivation. It is evident that no surface earthworks related to these features have survived. Whilst post-medieval and later furrows would possess no archaeological interest, older medieval furrows may hold a very low degree of significance.
- 10.3.6 With reference to Table 10.1 (above), given that they now only comprise fragmented buried remains, the remains related to medieval ridge and furrow cultivation are a '*heritage site or feature with very limited value or interest*', it is considered that the furrows comprise a heritage asset of **Negligible** sensitivity.

Unrecorded Archaeological Remains

- 10.3.7 The Assessment identified an HER record for a possible Bronze Age ring ditch derived from aerial photographs viewed by Oxfordshire County Council and taken in 1961. The location of the record was subject to geophysical survey in 2015 which did not identify any corresponding anomalies. It is possible that the cropmark feature was non-archaeological or that it had been reduced by ploughing since 1961 and no longer exists. It is also possible that the feature was not identified by the geophysical survey. Regardless, it is anticipated that the feature's location will be targeted by trial trenching and the feature's validity confirmed one way or the other.
- 10.3.8 Otherwise, there is a low possibility for archaeological remains within the Site that have not been identified by the two geophysical surveys, such as buried infilled features dating from later prehistoric (Bronze Age/Iron Age) and Roman periods (i.e., settlement or agricultural features) or features of later periods associate with agricultural and extractive uses. It is anticipated that further information will be ascertained on this potential through trial trenching.
- 10.3.9 With reference to Table 10.1, unrecorded archaeological remains related to prehistoric or Roman period settlement or the denuded remains of a Bronze Age ring ditch would be considered to represent '*assets of regional or county importance*' and such archaeological features would comprise heritage assets of **Medium** sensitivity.
- 10.3.10 Unrecorded remains related to prehistoric or Roman period agriculture would be considered to represent '*Locally important assets with cultural or educational value*' and comprises heritage assets of **Low** sensitivity.
- 10.3.11 Remains related to infilled medieval furrows, or post-medieval or modern agricultural or extractive features would be considered to represent '*heritage sites or features with very limited*

value or interest and would comprise heritage assets of **Negligible** sensitivity.

Future Baseline

- 10.3.12 The Site is subject in all areas to an ongoing agricultural regime that includes arable farming. Such farming requires ploughing which has potential to gradually erode archaeological features present within the Site.
- 10.3.13 Should the present regime continue, it might be expected that all archaeological remains within the Site, as suggested by the geophysical survey, would be subject to gradual erosion and loss resulting in a loss of their archaeological interest and heritage value over time.

10.4 Mitigation

- 10.4.1 Mitigation measures are designed and intended to eliminate or reduce potentially significant effects from the Proposed Development.

Construction Phase

- 10.4.2 It is considered unlikely, but trial trenching may identify buried archaeological remains that are of Very High or High sensitivity and that may be considered of equivalent heritage interest to a scheduled monument, which would mean they are subject to the same policies as other designated heritage assets (NPPF footnote 63; Relevant paragraphs: 199, 200, 201 and 202).
- 10.4.3 In such circumstances the loss of these assets *may* be considered unacceptable and provision would have to be made in future reserved matters applications for their physical preservation *in situ* within the Site. It is anticipated that a decision to preserve, and the extent of preservation, will be ascertained through consultation with Oxfordshire County Council's Lead Archaeologist and controlled through a planning condition.
- 10.4.4 The archaeological trial trenching may identify buried remains of insufficient archaeological value to warrant preservation *in situ* but which will be destroyed by the Proposed Development. Subject to consultation with Oxfordshire County Council's Lead Archaeologist, the loss of such remains to development could be mitigated through a programme of archaeological recording. It is anticipated that this archaeological work would be undertaken by an appropriately qualified archaeological contractor following a Written Scheme of Investigation, the content of which will be agreed with Cherwell District Council, on the advice of Oxfordshire County Council's Lead Archaeologist prior to the commencement of the Proposed Development.
- 10.4.5 Archaeological mitigation work would either take the form of full area excavation, in advance of groundworks, or the monitoring and recording of groundworks associated with the construction of the Proposed Development to allow for the identification, investigation and recording of any exposed archaeological or artefactual deposits; i.e., a watching brief. The results of the fieldwork and any post-excavation analysis undertaken would need to be presented in an appropriately detailed and illustrated report and the project archive curated accordingly. Details of scope, methodology, reporting and archiving would be set out in the WSI in agreement with the Lead Archaeologist.

Operational Phase

- 10.4.6 No specific, additional mitigation measures are proposed to mitigate effects on heritage assets arising from the completed development, beyond those embedded in the proposals.

10.5 Residual effects

- 10.5.1 The residual effects assessment assumes that the mitigation described in the section above will be implemented in full.

Construction Phase

- 10.5.2 The programme of archaeological evaluation and mitigation described above will serve to create a record of archaeological features and deposits within the Site. Although this would not entirely mitigate the loss of these assets, the completion of an appropriate record would at least serve to compensate for this loss.
- 10.5.3 Consequently, taking this into account, the significance of effect is assessed as such for the following archaeological assets:

Geophysical anomalies suggesting prehistoric or Roman period settlement.

- 10.5.4 Any archaeological remains located within the footprint of the Proposed Development would be subject to total loss due to development. The geophysical survey indicates that the probable settlement remains are entirely within the Proposed Development footprint and so would be subject to total loss. It is anticipated that, through mitigation by record, any adverse effects on archaeological assets will be reduced accordingly.
- 10.5.5 With reference to Table 10.2, potential effects on buried archaeological remains of prehistoric or Roman period settlement would therefore comprise a Large magnitude of change. With reference to Table 10.3, a Large magnitude of change to an asset of Medium sensitivity would result in a Major Adverse permanent effect. Following the mitigation outlined above, this would be reduced to a **Moderate Adverse** permanent effect that would be 'significant'.
- 10.5.6 It is anticipated that greater clarity on the presence of such remains within the site, whether equating to geophysical anomalies or unrecorded features and whether discrete features or features that extend beyond the Site boundary, will be ascertained through archaeological trial trenching. As a result, the assessment of development impacts upon such features will be fully updated and revised prior to the determination of the planning application.
- 10.5.7 Anomalies indicating possible buried linear features within the site. The linear anomalies identified by the geophysical survey that are probably associated with the prehistoric or Roman period settlement are located within the footprint of development, albeit with some features appearing to continue beyond the site boundary to the east. As such, the Proposed Development would result in the total loss of these features within the Site but would not necessarily result in their complete loss altogether.
- 10.5.8 At the same time, it is anticipated that, through preservation by record, any adverse effects on archaeological assets would be further reduced.
- 10.5.9 With reference to Table 10.2, potential effects on buried archaeological remains of prehistoric or Roman period ditches would therefore comprise a Large magnitude of change. With reference to Table 10.3, a Large magnitude of change to an asset of Low sensitivity would result in a Moderate Adverse permanent effect. Following the mitigation outlined above, this would be reduced to a **Minor Adverse** permanent effect that would not be 'significant'.

Anomalies indicating possible buried ditches associated with a trackway of unknown date within the southern part of the site

- 10.5.10 The linear anomalies identified by the geophysical survey that may be associated with a trackway of undetermined date are located within the footprint of development, with a possibility

of a linear feature continuing beyond the site boundary to the west. As such, the Proposed Development would result in the total loss of these features within the Site but would not necessarily result in their complete loss altogether.

10.5.11 At the same time, it is anticipated that, through preservation by record, any adverse effects on archaeological assets would be further reduced.

10.5.12 With reference to Table 10.2, potential effects on buried archaeological remains of trackway ditches would therefore comprise a Large magnitude of change. With reference to Table 10.3, a Large magnitude of change to an asset of Low sensitivity would result in a Moderate Adverse permanent effect. Following the mitigation outlined above, this would be reduced to a **Minor Adverse** permanent effect that would not be 'significant'.

Anomalies indicating possible buried pits within the southern part of the site

10.5.13 The anomalies identified by the geophysical survey that are of possible pits of undetermined date are located within the footprint of development. As such, the Proposed Development would result in the total loss of these features within the Site.

10.5.14 At the same time, it is anticipated that, through preservation by record, any adverse effects on archaeological assets would be further reduced.

10.5.15 With reference to Table 10.2, potential effects on buried archaeological remains of archaeological pits related to agriculture would therefore comprise a Large magnitude of change. With reference to Table 10.3, a Large magnitude of change to an asset of Low sensitivity would result in a Moderate Adverse permanent effect. Following the mitigation outlined above, this would be reduced to a **Minor Adverse** permanent effect that would not be 'significant'.

Slight earthworks and probable buried remains related to post-medieval boundary ditches and quarry pits

10.5.16 The slight earthworks and buried remains related to post-medieval boundaries and quarry pits would be located entirely within the footprint of the Proposed Development. As such, these features would be subject to total loss due to development. As features of Negligible value, it is not anticipated that there would be any benefit in recording them other than through the record that is already available in the form of LiDAR and geophysical survey data. The loss of these features would not require mitigation by record.

10.5.17 With reference to Table 10.2, potential effects on earthwork or buried archaeological remains of post-medieval quarry pits or ditches would therefore comprise a Large magnitude of change. With reference to Table 10.3, a Large magnitude of change to an asset of Negligible sensitivity would result in a **Minor Adverse** permanent effect that is not 'significant'.

Probable buried remains related to infilled furrows

10.5.18 The buried remains of furrows would be located entirely within the footprint of the Proposed Development and would be subject to total loss due to development. As features of Negligible value, it is not anticipated that there would be any benefit in recording them other than through the record that is already available in the form of geophysical survey data. The loss of these features would not require mitigation by record.

10.5.19 With reference to Table 10.2, potential effects on earthwork or buried archaeological remains of post-medieval quarry pits or ditches would therefore comprise a Large magnitude of change. With reference to Table 10.3, a Large magnitude of change to an asset of Negligible sensitivity would result in a **Minor Adverse** permanent effect that is not 'significant'.

Unrecorded Archaeological Remains

- 10.5.20 As noted above, it is anticipated that trial trenching will determine whether the site contains any previously unrecorded or not fully confirmed archaeological remains that cannot be preserved in situ. This would include any remains related to a possible Bronze Age ring ditch and any previously unrecorded remains related to later prehistoric or Roman period settlement or historic quarrying and agricultural activity. It is likely that all such remains would be located within the development footprint and thus subject to total loss through development.
- 10.5.21 It is anticipated that mitigation by record, should it be deemed necessary through consultation with the OCC Lead Archaeologist, would reduce adverse effects to heritage assets accordingly.
- 10.5.22 With reference to Table 10.2, potential effects on unrecorded buried archaeological remains, for example, of prehistoric or Roman period settlement or, the remains of a Bronze Age ring ditch, would therefore comprise a Large magnitude of change. With reference to Table 10.3, a Large magnitude of change to an asset of Medium sensitivity would result in a Major Adverse permanent effect. Following the mitigation outlined above, this would be reduced to a **Moderate Adverse** permanent effect that would be 'significant.
- 10.5.1 With reference to Table 10.3, a Large magnitude of change to an asset of Low sensitivity (such as a prehistoric or Roman period boundary ditch) would result in a Moderate Adverse permanent effect. Following the mitigation outlined above, this would be reduced to a **Minor Adverse** permanent effect that would not be a significant effect.
- 10.5.2 Any effect on archaeological features of Negligible sensitivity (such as buried medieval furrows, post-medieval boundary ditches or quarry pits) would result in either a **Minor** or **Negligible Adverse** permanent effect that would not be a significant effect.

Operational Phase

- 10.5.3 The Archaeological and Heritage Assessment identified that the upper part of the tower of the Grade II* listed building Church of St Peter (1193248) would be visible in glimpsed views from the Site seen adjacent to trees of equivalent or greater height (Image EDP 11 in Appendix 10.1). No views are possible to the Site from the church due to surrounding buildings, trees and boundary features, such as walls and hedges, within the village of Stoke Lyne.
- 10.5.4 The Assessment concluded that the partial, glimpsed views to the church from the Site are incidental, not designed, and common to other places in the landscape and, whilst in addition no historical or functional association exists between the site and the church. Therefore, the Site forms only a peripheral element of the setting of the Church of St Peter and is not considered to contribute to the listed building's heritage interest.
- 10.5.5 The Proposed Development would not be visible from the Church due to the adjacent screening features within Stoke Lyne and would be subject to additional partial screening, by the proposed vegetation boundary and bund on the Site's southeast edge. As such, the Proposed Development would not be experienced with or from the church.
- 10.5.6 The Proposed Development would result in the loss of the view of the church tower from the Site. However, as noted above, this view and the Site itself contribute nothing to the Church's significance as a designated heritage asset and as such there would be no loss of heritage significance at the Church following the Proposed Development.
- 10.5.7 Hence, this chapter of the ES concludes that there would be No Effect on the Grade II* listed Church of St Peter (1193248).
- 10.5.8 The assessment has not identified any other effects on heritage receptors arising from the

operational phase of the development.

10.6 Implications of Climate Change

- 10.6.1 All of the effects assessed will be through construction impacts within the Site. As such future climate change will not alter the magnitude of these effects.

10.7 Cumulative effects

- 10.7.1 Effects have been identified to potential archaeological heritage assets located within the Site boundary from construction phase impacts. Cumulative effects on archaeological remains are only applicable where remains found within the Site extend to adjacent sites where development is either anticipated (via allocation) or approved but not yet implemented.
- 10.7.2 Most of the probable archaeological features identified by the geophysical survey which extend beyond the Site boundary are not known to extend into land that has consent or is proposed for development.
- 10.7.3 An exception to this is a single linear anomaly related to a possible ditch of a trackway located in the southern field. This feature appears to continue to the west, into the eastern part of the adjacent 'Land at Junction 10, M40' site (21/03267/OUT). A geophysical survey carried out in support of that proposal (Magnitude Surveys, 2021) identifies the linear feature as a very short natural feature rather than a potential archaeological anomaly.
- 10.7.4 Chapter 11 of the Environmental Statement that accompanied the application did not consider the feature in its own right, rather its consideration in the assessment falls under '*possible archaeological anomalies of currently unknown character identified during geophysical survey.*' In this regard the Chapter assesses a Residual Effect of Minor to Moderate adverse. Knowing that the feature in question is most likely to be a roadside ditch of undetermined date and thus of Low sensitivity, it is assessed that the effect would be Minor Adverse, rather than Moderate.
- 10.7.5 The present assessment assesses a Minor Adverse effect which would be in combination with a Minor Adverse effect from the development of the adjacent site. Given the apparent limited extent of the feature within the adjacent site and its equivalent sensitivity to the feature in the present application site it is assessed that both should be treated as the same archaeological feature and thus that an overall **Minor Adverse** effect, rather than an accumulating effect, is the appropriate assessment for both developments in-combination.
- 10.7.6 No other cumulative or in-combination cumulative effects from construction phase impacts have been identified for this Development.
- 10.7.7 Regarding operational phase impacts, the Chapter has not assessed any impacts from the Proposed Development to any heritage assets. As such, no in-combination effects with other committed or proposed development sites or allocated sites are assessed from the proposed development.

10.8 Summary

- 10.8.1 This chapter assesses the likely significant effects of the Proposed Development in terms of archaeology and cultural heritage.
- 10.8.2 A baseline assessment, in the form of an Archaeological and Heritage desk-based assessment and two geophysical surveys (Appendices 10.1 and 10.2) have identified potentially sensitive archaeological and cultural heritage receptors (heritage assets) within the Site.
- 10.8.3 The assessment established that the Site contains no designated heritage assets and that it does not contribute to the heritage interest of any designated heritage assets or non-designated heritage assets in the wider landscape as part of their settings.
- 10.8.4 It is concluded that the Proposed Development would not result in any adverse effects to any designated or non-designated heritage assets in the wider landscape. As such, in this regard the Proposed Development would conform to heritage legislation and the relevant policies set out in NPPF and the Cherwell Local Plan.
- 10.8.5 The baseline Assessment identified evidence for the Site to contain previously unrecorded archaeological remains. Geophysical surveys have identified anomalies thought to represent the buried remains of prehistoric or Roman period settlement that are probably of Medium sensitivity, as well as linear anomalies thought to represent boundary or drainage ditches associated with the settlement within the Site, ditches associated with a trackway and possible pits that are probably of Low sensitivity. Anomalies were also identified that represent probable buried infilled furrow related to medieval cultivation, as well as buried ditches and quarry pits of the post-medieval period; all being remains that would probably be of Negligible value.
- 10.8.6 The assessment considered the evidence for the Site to contain a Bronze Age ring ditch identified from aerial photographs and recorded on the HER, identifying that no such feature was recorded by the geophysical survey and thus the potential for the feature existing as buried remains within the Site is low.
- 10.8.7 Effects on unrecorded archaeological remains will depend on their sensitivity and where effects are significant (in EIA terms), they would be appropriately mitigated through archaeological recording to reduce the level of effect. Therefore, following the application of mitigation measures, the worst-case scenario would be a Moderate Adverse permanent effect, should assets of medium sensitivity (such as prehistoric or Roman period settlement or a ring ditch) be subject to a Large magnitude of change.
- 10.8.8 Trial trench evaluation has been requested by Oxfordshire County Council's Lead Archaeologist which should confirm the presence, location and date of archaeological features within the Site. The results of the trenching will determine whether the assessment of effects on archaeological remains will need to be revised and updated accordingly. Based on the results of that initial evaluation trenching, the requirement and scope of any further archaeological mitigation would be determined and implemented either in advance of, or during, construction works.
- 10.8.9 In terms of NPPF, effects on non-designated archaeological remains would need to be considered with reference to Paragraph 203 such that a '*balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset*'.

10.9 References

- ASWYAS, 2015, *Junction 10, M40 Ardley, Oxfordshire, Geophysical Survey*. Report number: 2736.
- ASWYAS, 2021a, *Symmetry Park, Ardley, Oxfordshire, Geophysical Survey Project Design*
- ASWYAS, 2021b, *Symmetry Park, Ardley, Oxfordshire, Geophysical Survey*. Report number 3526.
- Chartered Institute for Archaeologists (CIfA) 2020. Standard and Guidance for Historic Environment Desk-based Assessment. Reading;
- Cherwell District Council (CDC) 2008. *Fewcott Conservation Area Appraisal*;
- Cherwell District Council (CDC) 2019. *Ardley Conservation Area Appraisal*;
- Cherwell District Council, 2015, Cherwell Local Plan 2011-2031
- EDP 2021a, *Symmetry Park, Ardley, Oxfordshire, Written Scheme of Investigation for Archaeological and Heritage Assessment*. EDP2355_R007
- EDP 2021b, *Symmetry Park, Ardley, Oxfordshire, Archaeological and Heritage Assessment*. EDP2355_R009
- Historic England (HE) 2015. *Managing Significance in Decision-Taking in the Historic Environment: Historic Environment Good Practice Advice in Planning Note 2*. London;
- Historic England (HE) 2016. Conservation Area Designation, Appraisal and Management, Historic England Advice Note 1 London;
- Historic England (HE) 2017. Historic Environment Good Practice Advice in Planning Note 3 (Second Edition): The Setting of Heritage Assets London; and
- Magnitude Surveys, 2021, Junction 10, M40, Baynard's Green, Geophysical Survey Report,
- Ministry of Housing, Communities and Local Government (MHCLG) 2021. The National Planning Policy Framework. London.
- Quod, 2021, Environmental Statement Volume 1: Main Text. Land at junction 10, M40, Chapter 11 Cultural Heritage

Table 10.4 Summary of effects

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction phase					
Geophysical anomalies suggesting prehistoric or Roman period settlement.	Medium	Total loss due to construction groundwork	Following identification and characterisation of features by archaeological trial trenching, any required mitigation would be by archaeological recording prior to commencement to a methodology agreed in advance with the Oxfordshire County Council Lead Archaeologist	Moderate Adverse, permanent	Significant
Anomalies indicating possible buried linear features within the site	Low	Total loss due to construction groundwork	Following identification and characterisation of features by archaeological trial trenching, any required mitigation would be by archaeological recording prior to commencement to a methodology agreed in advance with the Oxfordshire County Council Lead Archaeologist	Minor Adverse, permanent	Not Significant
Anomalies indicating possible buried ditches associated with a trackway of unknown date within the southern part of the site	Low	Total loss due to construction groundwork	Following identification and characterisation of features by archaeological trial trenching, any required mitigation would be by archaeological recording prior to commencement to a methodology agreed in advance with the Oxfordshire County Council Lead Archaeologist	Minor Adverse, permanent	Not Significant
Anomalies indicating possible buried pits within the southern part of the site	Low	Total loss due to construction groundwork	Following identification and characterisation of features by archaeological trial trenching, any required mitigation would be by archaeological recording prior to commencement to a methodology agreed in advance with the Oxfordshire County Council Lead Archaeologist	Minor Adverse, permanent	Not Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Slight earthworks and probable buried remains related to post-medieval boundary ditches and quarry pits	Negligible	Total loss due to construction groundwork	None proposed	Minor Adverse, permanent	Not Significant
Probable buried remains related to infilled furrows	Negligible	Total loss due to construction groundwork	None proposed	Minor Adverse, permanent	Not Significant
Unrecorded archaeological remains.	Unknown	Total loss due to construction groundwork	Following identification and characterisation of features by archaeological trial trenching, any required mitigation would be by archaeological recording prior to commencement to a methodology agreed in advance with the Oxfordshire County Council Lead Archaeologist	Estimated as either Moderate or Minor Adverse, permanent. To be confirmed following archaeological trial trenching.	Moderate adverse effects would be significant

11 Hydrology, Flood Risk and Drainage

11.1 Introduction

11.1.1 This chapter assesses the effects of the proposed development on drainage and flood risk. In particular, it considers the potential effects of:

- Flood risk;
- Surface water quality (watercourses [rivers and canals]; reservoirs, lakes and ponds; and wetlands);
- Flood risk management; and
- Land drainage.

11.1.2 The chapter has been written by Tier Consult.

11.1.3 The study area used for this assessment includes both the Site and its nearby relevant hydrological features (extending at least to 1 km from the Site), including the catchments of local watercourses, surface water features and dependant habitats. It also includes hydrogeological features, including underlying geology, aquifers and nearby groundwater dependent features.

11.1.4 This chapter utilises the results of the Site specific Flood Risk Assessment (FRA) prepared for the Proposed Development as a requirement of and in accordance with the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance.

11.1.5 This chapter is supported by the Flood Risk Assessment report produced by Tier, which is presented in Appendix 11.1.

11.1.6 The assessment covers the construction and operational phases of the Proposed Development and identifies aspects that have the potential to affect the existing baseline situation. The following issues have been considered:

- effects on surface water quality;
- changes to the natural drainage patterns;
- effects on base flows;
- effects on runoff rates and volumes;
- effects on erosion and sedimentation;
- effects on water resources; and
- effects on flooding and impediments to flow.

11.1.7 Where likely effects are predicted, their significance has been assessed taking into account measures incorporated into the design to mitigate or reduce the significance of these effects. Additional mitigation measures are then outlined to reduce any outstanding significant effects with significance then assigned to any residual effects following the implementation of the additional mitigation measures.

11.2 Planning Policy Context

The Flood and Water Management Act 2010

11.2.1 The legislative framework for flood and coastal risk management is set out principally in The Flood and Water Management Act 2010. The legislation endorses the principle of an integrated approach to water and drainage management. The intentions of the Act are summarised below:

11.2.2 Deliver improved security, service and sustainability for people and their communities;

- Clarify responsibilities for managing all sources of flood risk;
- Protect essential water supplies by enabling water companies to control more non-essential uses of water during droughts;
- Modernise the law for managing the safety of reservoirs;
- Encourage more sustainable forms of drainage in new developments through new arrangements for adoption and future operation of such features; and
- Make it easier to resolve misconnections to sewers.

Water Framework Directive

- 11.2.3 The Water Framework Directive 2000/60/EC is a European Union directive designed to improve and integrate the way water, from all sources, is managed throughout Europe. In the UK, much of the implementation work is undertaken by competent authorities such as the Environment Agency and Local Authorities. It came into force in December 2000 and was transposed into UK law in 2003. Member States are required to achieve good chemical and ecological status for their inland and coastal waters by 2015.

Water Resources Act 1991

- 11.2.4 Under the Act, it is an offence to “cause or knowingly permit poisonous, noxious or polluting matter or any solid waste to enter controlled waters” unless it is covered by a consent to discharge issued by the Environment Agency. Failure to comply may result in a fine. This includes discharge to surface water drains.

National Planning Policy Framework

- 11.2.5 The National Planning Policy Framework (NPPF) aims to ensure that flood risk is taken into account by all relevant statutory bodies from regional to local authority planning departments to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of high risk. Where new development is, exceptionally necessary in high risk areas, the policy framework aims to make it safe, ensure that it will not increase flood risk elsewhere and, where possible, reduce overall flood risk in the local area (see Paragraph 159 of the NPPF).
- 11.2.6 Local Authorities should only consider development in flood risk areas as appropriate where it is informed by a Site-specific Flood Risk Assessment, based upon the Environment Agency’s Standing Advice on flood risk. The Assessment should identify and assess the risks of all forms of flooding to and from the development and demonstrate how flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account (see Paragraph 167 of the NPPF).

Adopted Cherwell Local Plan 2011-2031 (Part 1)

- 11.2.7 The Adopted Cherwell Local Plan 2011-2031 (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.
- 11.2.8 The Plan was formally adopted by the Council on 20 July 2015. Policy Bicester 13 was re-adopted on 19 December 2016.
- 11.2.9 Policy ESD 6: Sustainable Flood Risk Management states:

"The Council will manage and reduce flood risk in the District through using a sequential approach to development; locating vulnerable developments in areas at lower risk of flooding. Development proposals will be assessed according to the sequential approach and where necessary the exceptions test as set out in the NPPF and NPPG. Development will only be

permitted in areas of flood risk when there are no reasonably available Sites in areas of lower flood risk and the benefits of the development outweigh the risks from flooding.

In addition to safeguarding floodplains from development, opportunities will be sought to restore natural river flows and floodplains, increasing their amenity and biodiversity value. Building over or culverting of watercourses should be avoided and the removal of existing culverts will be encouraged.

Existing flood defences will be protected from damaging development and where development is considered appropriate in areas protected by such defences it must allow for the maintenance and management of the defences and be designed to be resilient to flooding.

Site specific flood risk assessments will be required to accompany development proposals in the following situations:

All development proposals located in flood zones 2 or 3

Development proposals of 1 hectare or more located in flood zone 1

Development Sites located in an area known to have experienced flooding problems

Development Sites located within 9m of any watercourses.

Flood risk assessments should assess all sources of flood risk and demonstrate that:

There will be no increase in surface water discharge rates or volumes during storm events up to and including the 1 in 100 year storm event with an allowance for climate change (the design storm event)

Developments will not flood from surface water up to and including the design storm event or any surface water flooding beyond the 1 in 30 year storm event, up to and including the design storm event will be safely contained on Site.

Development should be safe and remain operational (where necessary) and proposals should demonstrate that surface water will be managed effectively on Site and that the development will not increase flood risk elsewhere, including sewer flooding."

11.3 Assessment methodology

- 11.3.1 The approach to the assessment considers the significance of the likely effects upon the hydrological characteristics of the Site.
- 11.3.2 The approach to the assessment considers the degree (or the 'significance') of the likely effects upon the hydrological characteristics of the Site.
- 11.3.3 The study area used for this assessment includes both the Site and its nearby relevant hydrological features (extending at least to 1 km from the Site), including the catchments of local watercourses, surface water features and dependant habitats. It also includes hydrogeological features, including underlying geology, aquifers and nearby groundwater dependent features.
- 11.3.4 The following three criteria have been used in evaluating the significance of the effects of the Proposed Development:
- The sensitivity of the receiving water environment is assessed, as defined in Table 11.1.
 - The magnitude of the effect has been evaluated, as defined in Table 11.2.
 - The sensitivity of the receiving environment together with the magnitude of the effect defines the significance of the effect prior to application of mitigation measures as outlined within Table 11.3.
- 11.3.5 Professional judgement is used to assess the findings in relation to each of these criteria to give an assessment of significance for each effect. This approach has been used to inform the assessment of predicted effects.

Significance Criteria

- 11.3.6 The assessment takes into account any inherent mitigation measures to be applied in the implementation of the development proposals.
- 11.3.7 The significance of effects is determined by considering the magnitude of the effect against the sensitivity of the environmental feature. A matrix is used to combine magnitude and sensitivity to generate the overall level of the effect for each receptor, as illustrated in Table 11.3.

Table 11.1 Value/sensitivity assessment

Receptor value / sensitivity	Receptor type
High	<p>Receptor with a high quality and rarity, regional or national scale and limited potential for substitution / replacement.</p> <p>Inner Source Protection zone (Zone 1).</p> <p>Site of Special Scientific Interest (SSSI) or Special Area of Conservation (SAC).</p> <p>Excellent water quality.</p> <p>Large scale industrial agricultural abstractions >1000 m³/day within 2 km downstream, or abstractions for public drinking water supply.</p> <p>Designated salmonid fishery and/or salmonid spawning grounds present.</p> <p>Watercourse widely used for recreation, directly related to watercourse quality (e.g., swimming, salmon fishery etc.) within 2 km downstream.</p> <p>Conveyance of flow and material, main river >10 m wide.</p> <p>Active floodplain area (important in relation to flood defence), i.e., Flood Zone 3b.</p>
Medium	<p>Receptor with a high quality and rarity, local scale and limited potential for substitution / replacement or receptor with a medium quality and rarity, regional or national scale and limited potential for substitution / replacement.</p> <p>Outer Source Protection Zone (Zone 2).</p> <p>Principal Aquifer.</p> <p>Good water quality.</p> <p>Large scale industrial agricultural abstractions 500-1000 m³/day within 2 km downstream.</p> <p>Surface water abstractions for private water supply for more than 15 people.</p> <p>Designated salmonid fishery and / or cyprinid fishery.</p> <p>Watercourse used for recreation, directly related to watercourse quality (e.g., swimming, salmon fishery etc.).</p> <p>Conveyance of flow and material, main river >10 m wide.</p> <p>Active floodplain area (important in relation to flood defence), i.e., Flood Zone 3b and land having a 1 in 100 or greater annual probability of flooding, i.e., Flood Zone 3a.</p>
Low	<p>Receptor with a medium quality and rarity, local scale and limited potential for substitution / replacement or receptor with a low quality and rarity, regional or national scale and limited potential for substitution / replacement.</p> <p>Total Catchment Source Protection Zone (Zone 3).</p> <p>Secondary Aquifer.</p> <p>Fair water quality.</p> <p>Industrial / agricultural abstractions 50-499 m³/day within 2 km downstream.</p> <p>Designated cyprinid fishery or undesignated for fisheries - Occasional or local recreation (e.g., local angling clubs).</p> <p>Groundwater abstractions 50-500 m³/day - Private water supplies present.</p> <p>Designated cyprinid fishery, salmonid species may be present and catchment locally important for fisheries.</p> <p>Watercourse not widely used for recreation, or recreation use not directly related to watercourse quality.</p> <p>Land having between a 1 in 100 or greater annual probability of flooding, i.e., Flood Zone 2.</p>

Receptor value / sensitivity	Receptor type
Negligible	<p>Receptor with a low quality and rarity, local scale and limited potential for substitution / replacement.</p> <p>No SPZ.</p> <p>Unproductive Strata.</p> <p>Environmental equilibrium stable and resilient to changes that are greater than natural fluctuations, without detriment to its present character.</p> <p>Polluted / poor water quality.</p> <p>Industrial / agricultural abstractions < 50 m3/day within 2 km downstream.</p> <p>Fish sporadically present or restricted, no designated fisheries; not used for recreation.</p> <p>Watercourse < 5 m wide.</p> <p>Area does not flood / is located in Environment Agency Flood Zone 1.</p> <p>Receptor heavily engineered or artificially modified and may dry up during summer months.</p>

11.3.8 Magnitude of impact, based on the change that the Proposed Development would have upon the resource/receptor, is considered within the range of high, medium, low, negligible. Consideration is given to scale, duration of impact/effect (e.g., for construction, short-term for 1-2 years, medium-term for 3-5 years, long-term for 5 years and greater, and permanent, dependent upon project timeframes) and extent of Proposed Development with reference to the definitions in the Table 11.2.

Table 11.2 Magnitude of impact

Magnitude	Description
High	<p>Adverse: Increase in peak flood level* (> 100 mm); loss of fishery; deterioration in surface water ecological or chemical WFD element status or groundwater or quantitative WFD element status.</p> <p>Beneficial: Creation of additional flood storage and decrease in peak flood level* (> 100 mm), increase in productivity of size of fishery; improvement in surface water ecological or chemical WFD element status; improvement in groundwater qualitative or quantitative WFD element status.</p>
Medium	<p>Adverse: Increase in peak flood level* (> 50 mm); partial loss of fishery; measurable decrease in surface water ecological or chemical quality or flow with potential for deterioration in surface waste WFD element status or groundwater or quantitative WFD element status. Reversible change in the yield or quality of an aquifer, such that existing users are affected, with potential for deterioration in WFD element status.</p> <p>Beneficial: Creation of additional flood storage and decrease in peak flood level* (> 50 mm), measurable increase in surface water ecological or chemical quality or flow with potential for WFD element status to be improved. Measurable increase in the yield or quality of an aquifer, benefiting existing users, with potential for WFD element status to be improved. Improvement in groundwater qualitative or quantitative WFD element status.</p>
Low	<p>Adverse: Increase in peak flood level* (> 10 mm); measurable decrease in surface water ecological or chemical quality or flow; decrease in yield or quality of aquifer, not affecting existing users or changing any WFD element status.</p> <p>Beneficial: Creation of flood storage and decrease in peak flood level* (> 10 mm); measurable increase in surface water ecological or chemical quality; increase in yield or quality of aquifer not affecting existing users or changing any WFD element status. Measurable but limited change in a ground water supply reliability and quality.</p>
Negligible	<p>Negligible change to peak flood level* (< +/- 10 mm); discharges to watercourse or changes to an aquifer which lead to no change in the attribute's integrity and / or in a ground water supply reliability and quality.</p>

11.3.9 The predicted level of effect is based upon the consideration of magnitude of impact and sensitivity of the resource/receptor to come to a professional judgement of how important this effect is.

11.3.10 The sensitivity of the receiving environment together with the magnitude of the effect defines the level of the effect prior to application of additional mitigation measures, as outlined within Table 11.3.

Table 11.3 Level of effect

Receptor Sensitivity	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Consultation

11.3.11 Information regarding the current flood risk at the application Site, local flood defences and flood risk has been obtained from the Environment Agency and is contained within the FRA within Appendix 11.1.

Assumption and Limitations

11.3.12 In the event that the development proceeds with a layout different to that shown by 14-019-SGP-XX-XX-DR-A-001010 a revised FRA model may be required and subject to environmental reassessment. This would be subject to a scoping exercise at the appropriate time to determine the consistency of the model with the revised design details.

11.3.13 The assessment in this Chapter is reliant on the data presented in the FRA for the scheme and information obtained from Cherwell District Council as the Local Planning Authority (LPA), Oxfordshire County Council as the Lead Local Flood Authority (LLFA) and the Environment Agency. The Environment Agency's flood data can change over time. However, it is not considered that the above limitations would have a significant bearing on the outcome of the assessment for this proposal.

11.4 Baseline conditions

Current Baseline

- 11.4.1 This section identifies the current drainage and flood risk conditions of the Site and the study area.
- 11.4.2 The sources of information used in this desktop study are listed in Table 11.4.

Table 11.4 Data Sources

Topic	Sources of Information
Topography	Ordnance Survey Maps Site topographic survey
Geology	BGS Bedrock and Superficial Geological Map BGS online data
Hydrogeology	Environment Agency online data Relevant scientific literature
Hydrology	Meteorological Office Historic Rainfall Data Flood Estimation Handbook (FEH) National Soil Resource Institute Environment Agency Flood Risk Maps

Topography

- 11.4.3 The Site has ground levels between 110 and 119 metres Above Ordnance Datum (mAOD).

Catchment Hydrology / Existing Drainage

- 11.4.4 The nearest surface watercourse is Padbury Brook which is located adjacent to the south eastern boundary of the Site at approximately 2m below the Site ground levels.
- 11.4.5 Padbury Brook is a tributary of the River Great Ouse and is designated as an Ordinary Watercourse. Padbury Brook rises near Fringford, Oxfordshire and flows eastwards for approximately 26km to discharge into the River Great Ouse near Buckingham.
- 11.4.6 A field drainage ditch has been identified on the western boundary of the site, this is generally 0.50m to 1.00m in depth and is not known to carry significant flows of water and discharges into the Padbury Brook.
- 11.4.7 The majority of rainfall currently infiltrates into the ground where geological and hydrogeological conditions allow, and then runs off once the infiltration capacity of the ground has been exceeded.
- 11.4.8 There are no public sewers located on the site or within the vicinity of the site. Two surface water attenuation ponds are located to the south of the site, adjacent to Padbury Brook, at Junction 10 of the M40. It is assumed that these provide surface water attenuation for the nearby road network.

Rainfall

- 11.4.9 The Site is located within an area of moderate rainfall. The 1961-1990 Standard Average Annual Rainfall (SAAR) for the Site is 755 mm per annum. The UK national average is 832 mm per annum.

Ground Conditions

- 11.4.10 The British Geological Survey (BGS) Map indicates that no superficial deposits underlay the Site. The superficial deposits adjacent to The Twins / Padbury Brook is designated as Alluvium - clay, silt, sand and gravel.
- 11.4.11 The bedrock deposits that underlay the Site consists of the Great Oolite Group Sandstone,

Limestone and Argillaceous Rocks.

11.4.12 Information from the National Soil Resources Institute details the Site area as being situated on freely draining lime-rich loamy soils.

Hydrogeology

11.4.13 The superficial deposits adjacent to The Twins / Padbury Brook are designated as a Secondary A Aquifer. The bedrock deposits are designated as a Principal Aquifer and Secondary A Aquifer.

11.4.14 A Principal Aquifer is defined as geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers. A Secondary A Aquifer is designated as Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

11.4.15 The Site is not located within an Environment Agency Source Protection Zone (SPZ).

Licensed Discharges to Controlled Waters

11.4.16 The licensed discharges to controlled water within 2 km of the Site, under the Water Resources Act 1991, are shown in Table 11.5.

Table 11.5 Licensed Discharges to Controlled Waters

Location	Address	Details	
24m W	BAYNARDS GREEN SERVICE STATION, FORMER A43, BICESTER, OXON, OX6 9SG	Effluent Type: SEWAGE & TRADE COMBINED - UNSPECIFIED Permit Number: PRCLF17132 Permit Version: 1 Receiving Water: TO LAND	Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 16/02/2004 Effective Date: 06/02/2004 Revocation Date: 13/12/2011
24m W	BAYNARDS GREEN SERVICE STATION, FORMER A43, BICESTER, OXON, OX6 9SG	Effluent Type: SEWAGE & TRADE COMBINED - UNSPECIFIED Permit Number: PRCLF17132 Permit Version: 2 Receiving Water: TO LAND	Status: VARIED UNDER EPR 2010 Issue date: 14/12/2011 Effective Date: 14/12/2011 Revocation Date: -
82m SW	CHERWELL VALE (E) SERVICES, M40 JUNC 10, SYCAMORE GR, ARDLEY, OXON, OX27 7RD	Effluent Type: TRADE DISCHARGES - SITE DRAINAGE (CONTAM SURFACE WATER, NOT WASTE SIT Permit Number: PRCNF05172 Permit Version: 1 Receiving Water: Padbury Brook	Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 29/04/1993 Effective Date: 29/04/1993 Revocation Date: -
135m W	LITTLE CHEF RESTAURANT, BANYARDS GREEN, STOKE LYNE, BUCKINGHAMSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: PR1NF1391 Permit Version: 1 Receiving Water: Padbury Brook	Status: PRE NRA LEGISLATION WHERE ISSUE DATE 01-SEP-89 (HISTORIC ONLY) Issue date: 31/03/1983 Effective Date: 31/03/1983 Revocation Date: 18/02/1992

176m W	BAYNARDS GREEN FARM, BAYNARDS GREEN, NR BICESTER, OXON, OX6 9SG	Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: PR1NF2199 Permit Version: 1 Receiving Water: Trib Claydon Brook	Status: PRE NRA LEGISLATION WHERE ISSUE DATE 01-SEP-89 (HISTORIC ONLY) Issue date: 06/12/1985 Effective Date: 06/12/1985 Revocation Date: -
	BAYNARDS GREEN FARM, BAYNARDS GREEN, NR BICESTER, OXON, OX6 9SG	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: PR1LF2200 Permit Version: 1 Receiving Water: Into Land	Status: PRE NRA LEGISLATION WHERE ISSUE DATE 01-SEP-89 (HISTORIC ONLY) Issue date: 06/12/1985 Effective Date: 06/12/1985 Revocation Date: 13/12/2011
	BAYNARDS GREEN FARM, BAYNARDS GREEN, NR BICESTER, OXON, OX6 9SG	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: PR1LF2200 Permit Version: 2 Receiving Water: Into Land	Status: VARIED UNDER EPR 2010 Issue date: 14/12/2011 Effective Date: 14/12/2011 Revocation Date: -
215m SW	CHERWELL VALE (W) SERVICES, M40 JUNCT 10, SYCAMORE GR, ARDLEY, OXON, OX27 7RD	Effluent Type: TRADE DISCHARGES - SITE DRAINAGE (CONTAM SURFACE WATER, NOT WASTE SIT Permit Number: PRCNF05173 Permit Version: 1 Receiving Water: Padbury Brook	Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 29/04/1993 Effective Date: 29/04/1993 Revocation Date: -
339m SW	CHERWELL VALLEY SERVICE (E), M40 JUNCTION 10, ARDLEY, BICESTER, OXON, OX17 7RD	Effluent Type: MISCELLANEOUS DISCHARGES - EMERGENCY DISCHARGES Permit Number: PRCNF05229 Permit Version: 1 Receiving Water: Padbury Brook	Status: SURRENDERED UNDER EPR 2010 Issue date: 20/01/1994 Effective Date: 20/01/1994 Revocation Date: 06/10/2015
415m SE	STOKE LYNE STW, STOKE LYNE, BICESTER	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: AWCNF46 Permit Version: 1 Receiving Water: Padbury Brook NT	Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 17/08/1989 Effective Date: 17/08/1989 Revocation Date: -

Groundwater Abstractions

11.4.17 The licensed groundwater abstraction within 2 km of the Site are shown in Table 11.6. Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Table 11.6 Licensed Groundwater Abstractions

Location	Details	
188m W	<p>Status: Historical Licence No: 6/33/02/*G/0131 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Household Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BOREHOLE AT STOKE LYNE Data Type: Point Name: CURTIS Easting: 454790 Northing: 229380</p>	<p>Annual Volume (m3): - Max Daily Volume (m3): - Original Application No: - Original Start Date: 01/06/1997 Expiry Date: - Issue No: 100 Version Start Date: 01/06/1997 Version End Date: -</p>
188m W	<p>Status: Historical Licence No: 6/33/02/*G/0131 Details: General Farming & Domestic Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BOREHOLE AT STOKE LYNE Data Type: Point Name: CURTIS Easting: 454790 Northing: 229380</p>	<p>Annual Volume (m3): - Max Daily Volume (m3): - Original Application No: - Original Start Date: 01/06/1997 Expiry Date: - Issue No: 100 Version Start Date: 01/06/1997 Version End Date: -</p>
198m S	<p>Status: Historical Licence No: 6/33/02/*G/0130 Details: Spray Irrigation - Direct Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BOREHOLE AT STOKE LYNE Data Type: Point Name: MOTO HOSPITALITY LTD Easting: 455250 Northing: 228270</p>	<p>Annual Volume (m3): - Max Daily Volume (m3): - Original Application No: - Original Start Date: 01/08/1994 Expiry Date: 30/09/2004 Issue No: 101 Version Start Date: 11/11/2003 Version End Date: -</p>
273m NW	<p>Status: Historical Licence No: 6/33/02/*G/0007 Details: General Farming & Domestic Direct Source: GROUND WATER SOURCE OF SUPPLY Point: WELL AT BAYNARD GREEN Data Type: Point Name: CURTIS Easting: 454900 Northing: 229800</p>	<p>Annual Volume (m3): - Max Daily Volume (m3): - Original Application No: - Original Start Date: 01/04/1966 Expiry Date: - Issue No: 100 Version Start Date: 01/09/1966 Version End Date: -</p>
475m N	<p>Status: Active Licence No: 6/33/02/*G/0071 Details: Make-Up Or Top Up Water Direct Source: GROUND WATER SOURCE OF SUPPLY Point: NEW BOREHOLE AT HARDWICK Data Type: Point Name: Trans Properties Limited and Trans Securities Limited Easting: 455610 Northing: 229920</p>	<p>Annual Volume (m3): 22,730 Max Daily Volume (m3): 113.65 Original Application No: - Original Start Date: 01/03/1966 Expiry Date: - Issue No: 102 Version Start Date: 07/06/2017 Version End Date: -</p>

475m N	<p>Status: Active Licence No: 6/33/02/*G/0071 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Household Direct Source: GROUND WATER SOURCE OF SUPPLY Point: NEW BOREHOLE AT HARDWICK Data Type: Point Name: Trans Properties Limited and Trans Securities Limited Easting: 455610 Northing: 229920</p>	<p>Annual Volume (m3): 22,730 Max Daily Volume (m3): 113.65 Original Application No: - Original Start Date: 01/03/1966 Expiry Date: - Issue No: 102 Version Start Date: 07/06/2017 Version End Date: -</p>
475m N	<p>Status: Active Licence No: 6/33/02/*G/0071 Details: General Farming & Domestic Direct Source: GROUND WATER SOURCE OF SUPPLY Point: NEW BOREHOLE AT HARDWICK Data Type: Point Name: Trans Properties Limited and Trans Securities Limited Easting: 455610 Northing: 229920</p>	<p>Annual Volume (m3): 22,730 Max Daily Volume (m3): 113.65 Original Application No: - Original Start Date: 01/03/1966 Expiry Date: - Issue No: 102 Version Start Date: 07/06/2017 Version End Date: -</p>
475m N	<p>Status: Active Licence No: 6/33/02/*G/0071 Details: Spray Irrigation - Direct Direct Source: GROUND WATER SOURCE OF SUPPLY Point: NEW BOREHOLE AT HARDWICK Data Type: Point Name: Trans Properties Limited and Trans Securities Limited Easting: 455610 Northing: 229920</p>	<p>Annual Volume (m3): 22,730 Max Daily Volume (m3): 113.65 Original Application No: - Original Start Date: 01/03/1966 Expiry Date: - Issue No: 102 Version Start Date: 07/06/2017 Version End Date: -</p>
475m N	<p>Status: Active Licence No: 6/33/02/*G/0071 Details: Spray Irrigation - Storage Direct Source: GROUND WATER SOURCE OF SUPPLY Point: NEW BOREHOLE AT HARDWICK Data Type: Point Name: Trans Properties Limited and Trans Securities Limited Easting: 455610 Northing: 229920</p>	<p>Annual Volume (m3): 22,730 Max Daily Volume (m3): 113.65 Original Application No: - Original Start Date: 01/03/1966 Expiry Date: - Issue No: 102 Version Start Date: 07/06/2017 Version End Date: -</p>
504m N	<p>Status: Active Licence No: 6/33/02/*G/0064 Details: General Farming & Domestic Direct Source: GROUND WATER SOURCE OF SUPPLY Point: EXISTING BOREHOLE AT HARDWICK Data Type: Point Name: Trans Properties Limited and Trans Securities Limited Easting: 455610 Northing: 229950</p>	<p>Annual Volume (m3): 22,730 Max Daily Volume (m3): 113.65 Original Application No: - Original Start Date: 28/03/1966 Expiry Date: - Issue No: 102 Version Start Date: 07/06/2017 Version End Date: -</p>

504m N	<p>Status: Active Licence No: 6/33/02/*G/0064 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Household Direct Source: GROUND WATER SOURCE OF SUPPLY Point: EXISTING BOREHOLE AT HARDWICK Data Type: Point Name: Trans Properties Limited and Trans Securities Limited Easting: 455610 Northing: 229950</p>	<p>Annual Volume (m3): 22,730 Max Daily Volume (m3): 113.65 Original Application No: - Original Start Date: 28/03/1966 Expiry Date: - Issue No: 102 Version Start Date: 07/06/2017 Version End Date: -</p>
504m N	<p>Status: Active Licence No: 6/33/02/*G/0064 Details: Make-Up Or Top Up Water Direct Source: GROUND WATER SOURCE OF SUPPLY Point: EXISTING BOREHOLE AT HARDWICK Data Type: Point Name: Trans Properties Limited and Trans Securities Limited Easting: 455610 Northing: 229950</p>	<p>Annual Volume (m3): 22,730 Max Daily Volume (m3): 113.65 Original Application No: - Original Start Date: 28/03/1966 Expiry Date: - Issue No: 102 Version Start Date: 07/06/2017 Version End Date: -</p>
504m N	<p>Status: Active Licence No: 6/33/02/*G/0064 Details: Spray Irrigation - Direct Direct Source: GROUND WATER SOURCE OF SUPPLY Point: EXISTING BOREHOLE AT HARDWICK Data Type: Point Name: Trans Properties Limited and Trans Securities Limited Easting: 455610 Northing: 229950</p>	<p>Annual Volume (m3): 22,730 Max Daily Volume (m3): 113.65 Original Application No: - Original Start Date: 28/03/1966 Expiry Date: - Issue No: 102 Version Start Date: 07/06/2017 Version End Date: -</p>
504m N	<p>Status: Active Licence No: 6/33/02/*G/0064 Details: Spray Irrigation - Storage Direct Source: GROUND WATER SOURCE OF SUPPLY Point: EXISTING BOREHOLE AT HARDWICK Data Type: Point Name: Trans Properties Limited and Trans Securities Limited Easting: 455610 Northing: 229950</p>	<p>Annual Volume (m3): 22,730 Max Daily Volume (m3): 113.65 Original Application No: - Original Start Date: 28/03/1966 Expiry Date: - Issue No: 102 Version Start Date: 07/06/2017 Version End Date: -</p>
1290m NW	<p>Status: Historical Licence No: 6/33/02/*G/0093 Details: General Farming & Domestic Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BOREHOLE AT HORWELL FARM Data Type: Point Name: RANSOM Easting: 454000 Northing: 230300</p>	<p>Annual Volume (m3): - Max Daily Volume (m3): - Original Application No: - Original Start Date: 01/01/1968 Expiry Date: - Issue No: 100 Version Start Date: 01/01/1968 Version End Date: -</p>

1412m E	Status: Historical Licence No: 6/33/02/*G/0101 Details: General Farming & Domestic Direct Source: GROUND WATER SOURCE OF SUPPLY Point: WELL AT HARDWICK Data Type: Point Name: CURTIS Easting: 457640 Northing: 229620	Annual Volume (m3): - Max Daily Volume (m3): - Original Application No: - Original Start Date: 01/09/1967 Expiry Date: - Issue No: 100 Version Start Date: 01/09/1967 Version End Date: -
1420m W	Status: Historical Licence No: 6/33/02/*G/0056 Details: General Farming & Domestic Direct Source: GROUND WATER SOURCE OF SUPPLY Point: WELL AT GREEN FARM FRITWELL Data Type: Point Name: EVANS Easting: 453600 Northing: 229700	Annual Volume (m3): - Max Daily Volume (m3): - Original Application No: - Original Start Date: 01/06/1966 Expiry Date: - Issue No: 100 Version Start Date: 01/06/1966 Version End Date: -
1566m W	Status: Historical Licence No: 6/33/02/*G/0091 Details: General Farming & Domestic Direct Source: GROUND WATER SOURCE OF SUPPLY Point: WELL AT FEWCOTT Data Type: Point Name: GODWIN Easting: 453800 Northing: 227900	Annual Volume (m3): - Max Daily Volume (m3): - Original Application No: - Original Start Date: 15/01/1968 Expiry Date: - Issue No: 102 Version Start Date: 21/11/2003 Version End Date: -

Surface Water Abstractions

11.4.18 There are licensed surface water abstraction within 2 km of the Site. Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Potable Water Abstractions

11.4.19 The licensed potable water abstraction within 2 km of the Site are shown in Table 11.7. Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Table 11.7 Licensed Potable Water Abstractions

Location	Details	
188m W	Status: Historical Licence No: 6/33/02/*G/0131 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Household Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BOREHOLE AT STOKE LYNE Data Type: Point Name: CURTIS Easting: 454790 Northing: 229380	Annual Volume (m3): - Max Daily Volume (m3): - Original Application No: - Original Start Date: 01/06/1997 Expiry Date: - Issue No: 100 Version Start Date: 01/06/1997 Version End Date: -

475m N	Status: Active Licence No: 6/33/02/*G/0071 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Household Direct Source: GROUND WATER SOURCE OF SUPPLY Point: NEW BOREHOLE AT HARDWICK Data Type: Point Name: Trans Properties Limited and Trans Securities Limited Easting: 455610 Northing: 229920	Annual Volume (m3): 22,730 Max Daily Volume (m3): 113.65 Original Application No: - Original Start Date: 01/03/1966 Expiry Date: - Issue No: 102 Version Start Date: 07/06/2017 Version End Date: -
504m N	Status: Active Licence No: 6/33/02/*G/0064 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Household Direct Source: GROUND WATER SOURCE OF SUPPLY Point: EXISTING BOREHOLE AT HARDWICK Data Type: Point Name: Trans Properties Limited and Trans Securities Limited Easting: 455610 Northing: 229950	Annual Volume (m3): 22,730 Max Daily Volume (m3): 113.65 Original Application No: - Original Start Date: 28/03/1966 Expiry Date: - Issue No: 102 Version Start Date: 07/06/2017 Version End Date: -

Surface Water Quality

11.4.20 The surface water body Water Framework Directive (WFD) designations within 2 km of the Site are shown in Table 11.8.

Table 11.8 WFD Surface Water Bodies

Location	Type	Name	Water Body ID	Overall Rating	Chemical Rating	Ecological Rating	Year
10m S	River	Padbury Brook	GB105033038210	Moderate	Fail	Moderate	2019

Groundwater Water Quality

11.4.21 The groundwater body WFD designations within 2 km of the Site are shown in Table 11.9.

Table 11.9 WFD Groundwater Bodies

Location	Name	Water Body ID	Overall Rating	Chemical Rating	Quantitative	Year
On Site	Upper Bedford Ouse Oolite Principal 1	GB40501G402300	Poor	Poor	Good	2019

Flooding

11.4.22 The FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

11.4.23 The Site is not at risk of flooding from a major source (e.g., fluvial and/or tidal). The Site has a 'low probability' of fluvial flooding as the Site is located within Flood Zone 1 with less than a 1 in 1000 annual probability of river/tidal flooding in any year (<0.1%). A secondary flooding source has been identified which may pose a low risk to the Site. This is:

- Surface Water (pluvial) Flooding.

11.4.24 The risk of flooding from all sources is considered to be low or not significant, due to a relatively low water depth and water velocity, will only last a short period of time, in very extreme cases and will not have an impact on the whole of the proposed development Site.

11.4.25 The Proposed Development is classified as 'less vulnerable', 'less vulnerable' uses are appropriate within Flood Zone 1 after the completion of a satisfactory FRA. The flood risk at the Site, will be further managed and mitigated by using a number of risk management techniques, and mitigation strategies to manage and reduce the overall flood risk at the Site.

11.4.26 In conclusion, the flood risk to the Site can be considered to be limited; the Site is situated in Flood Zone 1, with a low annual probability of flooding and from all sources. The Site is unlikely to flood except in very extreme conditions.

Environmentally Sensitive Sites

11.4.27 The Site is located within a nitrate vulnerable zone.

11.4.28 The identified environmentally sensitive Site designations within 2 km of the Site are shown in Table 11.10.

Table 11.10 Environmentally Sensitive Sites

Location	Name	Designation
1658m SW	Ardley Cutting and Quarry	Site of Special Scientific Interest (SSSI)
1921m SW	Ardley Trackways	SSSI
119m NE	Stoke Bushes	Ancient & Semi-Natural Woodland
330m S	Stoke Wood	Ancient & Semi-Natural Woodland
390m SW	Stoke Wood	Ancient Replanted Woodland
474m NE	Stoke Bushes	Ancient Replanted Woodland
688m NE	Limekiln Copse	Ancient & Semi-Natural Woodland
947m SE	Stoke Little Wood	Ancient Replanted Woodland
968m SE	Stoke Little Wood	Ancient & Semi-Natural Woodland
1111m NE	Tusmore Wood	Ancient & Semi-Natural Woodland
1240m NE	Tusmore Wood	Ancient Replanted Woodland
1406m S	Unknown	Ancient & Semi-Natural Woodland
1589m SW	Ardley Wood	Ancient & Semi-Natural Woodland
1965m SE	Twelveacre Copse	Ancient & Semi-Natural Woodland

Recreation and Fisheries

11.4.29 There are no designated fishery waterbodies and / or watercourses used for recreation within 2 km of the Site.

Sensitive Receptors

11.4.30 Based on the baseline conditions presented above, Table 11.11 presents the sensitive receptors which have been considered in the following assessment, along with their sensitivity to change which is based on the general criteria outlined below.

Table 11.11 Sensitive Receptors

Receptor	Medium	Sensitivity	Description
Flood Risk (all sources including river, surface water, groundwater, etc.)	Construction workers	Low	Flooding may impact upon construction workers, but their sensitivity is lowered as a result of their competency in their role as well as operating in teams and/or prescribed systems. However, the flood risk posed is low.
	Residents/users of the surrounding area	Low	Residents/users of the surrounding areas generally have little awareness of flood risk and residents vulnerability is high given their presence overnight (via sleeping accommodation). However, the flood risk posed is low.
	Future Site occupants (staff and public)	Low	The vulnerability is reduced as all buildings are located outside and above the design flood level. However, the flood risk posed is low.
Watercourses	Water quantity/ quality	Medium	This would only be felt over short distance of the watercourses compared to the overall length of the watercourses. Water quality issues would also be diluted rapidly within the watercourses.

11.5 Mitigation

11.5.1 The Proposed Development has the potential to affect the hydrology and hydrogeology in the vicinity of the Site, impacting surface water runoff, groundwater levels, flow direction and quality.

11.5.2 The significance of any potential pollution or changes in groundwater levels and flow would be dependent on the nature of the incident, incorporated mitigation measures and sensitivity of the potential receptor.

Construction Phase

Procedures

11.5.3 The design and implementation of the construction works will be undertaken in accordance with ISO 14001 and industry and regulatory procedures. As such, it is envisaged that the following documents will be prepared and, where appropriate, agreed with the regulatory bodies:

- Construction Environmental Management Plan (CEMP);
- Site Drainage Plan;
- Incidence Response Plan (IRP);
- Environmental training for personnel;
- Record keeping; and,
- The identification, mitigation and remediation of contaminated land.

11.5.4 The management of runoff during construction would be included in the CEMP. In summary, the Pollution Prevention Guidance¹ (PPG), Environment Agency guidance² and CIRIA

¹ Pollution Prevention Guidelines PPG1: Understanding Your Environmental Responsibilities (July 2013).

Guidance for Pollution Prevention GPP2: Above ground oil storage tanks (January 2018).

Guidance for Pollution Prevention GPP5: Works and maintenance in or near water (January 2017).

Pollution Prevention Guidelines PPG6: Working at construction and demolition Sites (March 2012).

Pollution Prevention Guidelines PPG7: The safe operation of refuelling facilities (July 2011).

Guidance for Pollution Prevention GPP8: Safe storage and disposal of used oils (July 2017).

Guidance for Pollution Prevention GPP13: Vehicle washing and cleaning (April 2017).

Guidance for Pollution Prevention GPP21: Incident Response Planning (July 2017).

Guidance for Pollution Prevention GPP22: Dealing with spills (October 2018).

Guidance for Pollution Prevention GPP23: Safe storage - drums and intermediate bulk containers (February 2019).

² Environment Agency Guidance 'Oil storage regulations for businesses' (2015).

Environment Agency Guidance 'Manage water on land: guidance for land managers' (2015).

guidance³ states that the following methods of surface water management should be put in place during the construction phase to ensure pollution, sediment and erosion control.

11.5.5 Mitigation measures will be included within the CEMP, a Site Drainage Plan and as part of the Incident Response Plan. Mitigation will include:

- 8m working standoff from the watercourses/ditches to be retained (excluding drainage works and the construction of the attenuation ponds);
- Bunds will be used to prevent runoff entering watercourses;
- Compounds will have hard surfacing to prevent infiltration;
- Areas of localised contamination identified during the ground investigation will be remediated/ removed as appropriate;
- A procedure will be put in place to manage previously unidentified contaminated ground that is encountered during the works; and,
- Any surplus soil arisings from levelling or excavation works that has visual or olfactory evidence of contamination will be stored in sheeted stockpiles placed on hardstanding or sheeting pending its removal or treatment.

11.5.6 There is potential for the introduction of contaminated materials to the ground or groundwater due to incorrect storage or spillages of construction materials/fuels. Design of operational pollution prevention measures will be included in the CEMP. Impacts due to incorrect storage and spillage will be mitigated by the following:

- Design of a Drainage Plan for the Site;
- Compounds will comprise hardstanding;
- Environmental training for all personnel;
- Designated re-fuelling areas on hardstanding with interceptor drainage, bunds, plant nappies or similar;
- Spill kits will be readily available;
- Storage areas for materials will be identified; and,
- Deliveries will be planned in advance.

Excavated and Exposed Ground

11.5.7 To limit the volume of runoff reaching the exposed ground, runoff diversion or interception devices can be placed upstream. To help prevent pollution from entering a watercourse, silt fences, hay bales or stilling ponds can be placed downstream.

11.5.8 The extent of all excavations would be minimised as far as is reasonably practicable. During construction activities, surface water flows would be captured through a series of cut-off drains to prevent water entering excavations or eroding exposed surfaces. If dewatering of excavations is required, pumped discharges would be passed through a washout area, settlement/attenuation ponds and silt fences to capture sediments before release to a watercourse/ drain.

Stockpiles

11.5.9 Stockpiles will be located away from a watercourse or Site drainage system to prevent leaching of contaminants. Protective coverings will help prevent runoff stripping a stockpile. Concrete should also be stored to prevent release into drains.

11.5.10 Topsoil / subsoil would be stored away from watercourses and on flat lying land (minimum 20m

³ CIRIA C502 Environmental Good Practice on Site.
CIRIA C532 Control of Water Pollution from Construction Sites.
CIRIA C753 The SuDS Manual.

on flat land). Where this is not possible and it is to be stockpiled for longer than a two week period, the material would, as soon as possible either be covered with geotextile mats, seeded to promote vegetation growth, or drainage provided to a suitable settlement area.

Plant and Wheel Washing

11.5.11 Plant wheel washing will take place in designated locations. The area will be tanked and will not be allowed to discharge into a watercourse or infiltrate to groundwater. Some proprietary vehicle washing systems offer a recycling facility, which filter and settle solids, with effluent being pumped back into the system. The solid waste materials from this process need to be treated as contaminated waste due to the high hydrocarbon content.

11.5.12 Mud deposits would be controlled at entry and exits to the Site using wheel washing facilities and / or road sweepers operating during earthworks or other times as considered necessary.

11.5.13 Tools and plant would be washed out and cleaned in designated areas within the Site compound where runoff can be isolated for treatment before discharge to surface water drainage under appropriate consent and / or agreement with the Environment Agency and / or the LLFA, or otherwise removed from Site for appropriate disposal at a licenced waste management facility.

Haul Roads

11.5.14 Haul roads will be designed so that the length is kept to a minimum, but still serves its purpose. The gradient will be shallow to prevent increasing runoff velocity and, if possible, bunds and / or discrete ditches constructed to intercept the runoff. Haul roads will be sprayed regularly to keep down dust. If any section of a haul road is hard surfaced, then it will be swept on a regular basis to prevent accumulation of dust and mud. Gullies will be covered when not in use before the final bituminous running surface is laid.

11.5.15 The movement of construction traffic (to / from and between main construction areas) would be controlled via defined tracks and hardstanding areas.

Oils and hydrocarbons

11.5.16 Simple measures can be taken to prevent oil and hydrocarbons becoming pollutants, such as:

- Maintenance of machinery and plant
- Drip trays
- Regular checking of machinery and plant for oil leaks
- Correct storage facilities
- Check for signs of wear and tear on tanks
- Care with specific procedures when refuelling
- Designated areas for refuelling
- Emergency spill kit located near refuelling area
- Regular emptying of bunds
- Tanks located in secure areas to stop vandalism

11.5.17 In accordance with the Environment Agency PPGs, all fuel tanks on-Site will have a bunded containment of a minimum of 110% fuel tank capacity. There would be no drainage point from the bunded catchment area and tamperproof taps / valves would be installed. All empty fuel containers or drums would be stored within a catchment area prior to their removal from the Site. Oil traps would be incorporated in pertinent drainage systems to prevent accidental spillage being discharged into the surface runoff. Furthermore, spill kits would be stored at refuelling areas in the event of accidental spillage.

11.5.18 Best practice measures would be undertaken when refuelling plant and machinery. Where

fuelling of large machinery is required, drip trays and absorbent mats or pellets would be utilised. General maintenance would also be undertaken in a designated area and similar contamination prevention measures would be adopted.

11.5.19 All runoff from the Site would be intercepted and treated to remove sediment, oils and other substances prior to discharge. As construction of the Proposed Development progresses the drainage system would be progressively implemented and would also include pollution prevention control systems.

Watercourses / Drainage Channels

11.5.20 The gradient of any constructed drainage channels needs to be carefully considered. If the gradient is made too flat, then the channel is likely to silt up and reduce the flow capacity of the channel and prevent sediment travelling downstream. Alternatively, if the gradient is made too steep, this can increase erosion of the ditch banks which would result in an increase in the quantity of sediments which migrate downstream.

Operational Phase

11.5.21 The flood risk posed to the Site would be reduced by using the following mitigation measures:

- **Minimum Floor Level:** There is no minimum finished floor level required. However, it is recommended that generally floor levels are located above the highways by 150mm (apart from HGV loading areas) to enable the full capacity of any secondary flood conveyance to be utilised.
- **Flood Resilience and Resistance:** Relatively simple measures such as raising utility entry points, using first floor or ceiling down electrical circuits and sloping landscaping away from the buildings can be easily and economically incorporated into the development of the Site.
- **Access and Egress:** The Site and surrounding area is not located within the floodplain therefore a permanently safe and dry access can be maintained.

11.5.22 Increasing the area of impermeable surface has the potential to increase surface water runoff rates and volumes. An increase in impermeable area across the Site could result in increased rates and volume of runoff that would not otherwise occur. A SuDS Strategy is proposed as part of the Proposed Development, details of which are contained in Appendix 11.1.

11.5.23 The SuDS Strategy ensures that a sustainable drainage solution can be achieved which reduces the peak discharge rate to manage and reduce the flood risk posed by the surface water runoff from the Site. One of the aims of the NPPF is to provide not only flood risk mitigation but also to maximise additional gains such as improvements in runoff quality and provision of amenity and biodiversity. The SuDS Strategy takes into account the following principles:

- No increase in the volume or runoff rate of surface water runoff from the Site.
- No increase in flooding to people or property off-Site as a result of the development.
- No surface water flooding of the Site.
- The proposals take into account a 40% increase in rainfall intensity due to climate change during the next 100 years which is the lifetime of the development.

11.5.24 For all development, a hierarchical approach to surface water management. This approach has been adopted within this SuDS Strategy with discharge via infiltration methods with an overflow to the drainage ditch being utilised and will take the form of:

- Attenuation basins and/or swales.

- Overflow into the drainage ditch at Greenfield runoff rates.

- 11.5.25 As a consequence of limiting the rate of discharge from the site, at times of heavy rainfall the volume of water leaving the site will be significantly less than that draining from it. In order to prevent this water backing up in the system and causing flooding, attenuation storage will be incorporated into the site layout. The size of this attenuation storage has been calculated such that the proposed development has the capacity to accommodate the 100 year rainfall event including a 40% increase in rainfall intensity that is predicted to occur as a result of climate change.
- 11.5.26 The remainder of the site that is not formally drained, i.e., landscaped areas, will be permeable (grass). The majority of rainwater falling on these areas will soak into the ground. Surface water runoff would be directed to the drainage system through drainage gullies located around the perimeter of the buildings and through contouring of the hardstanding areas.
- 11.5.27 These methods will reduce peak flows, the volume of runoff, and slow down flows and will provide a suitable SuDS solution for this site. The adoption of a SuDS Strategy for the site represents an enhancement from the current conditions as the current surface water runoff from the site is uncontrolled, untreated, unmanaged and unmitigated. In adopting these principles, it has been demonstrated that a scheme can be developed that does not increase the risk of flooding to adjacent properties and development further downstream.
- 11.5.28 Storage and handling of fuels and oils at the Site would comply with the Environment Agency PPGs, Environment Agency guidance and CIRIA guidance. Standard pollution prevention procedures to mitigate the risks to surface water quality would be implemented throughout operation of the Proposed Development. Examples of some of the measures that would be adopted at the Site are: bunded fuel storage; provision of spill kits etc.; and minimising the amount of exposed ground.
- 11.5.29 In accordance with the Environment Agency PPGs, all fuel tanks on-Site shall have a bunded containment of a minimum of 110% fuel tank capacity. There would be no drainage point from the bunded catchment area and tamperproof taps / valves would be installed. All empty fuel containers or drums would be stored within a catchment area prior to their removal from the Site. Oil traps would be incorporated in pertinent drainage systems to prevent accidental spillage being discharged into the surface runoff. Furthermore, spill kits would be stored at refuelling areas in the event of accidental spillage.
- 11.5.30 Best practice measures would be undertaken when refuelling plant and machinery. Where fuelling of large machinery is required, drip trays and absorbent mats or pellets would be utilised. General maintenance would also be undertaken in a designated area and similar contamination prevention measures would be adopted.
- 11.5.31 There will be no detriment to the flood storage capacity of the Site. The overall direction of the movement of water will be maintained within the developed Site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed. The proposed development will have no impact on the movement of floodwater across the Site. There will be no increase in the floodwater levels due to the proposed development. There will be no loss in flood storage capacity and no change in the on-Site and off-Site flood risk.

11.6 Residual effects

- 11.6.1 This section summarises the significance of the anticipated residual environmental effects, which are those that remain after all proposed mitigation measures are implemented.

Construction Phase

Impact on Flood Risk - Construction Workers

- 11.6.2 The implementation of the mitigation measures will result in a negligible effect and no significant residual effect.

Impact on Flood Risk - Residents/Users of the Surrounding Area

- 11.6.3 The implementation of the mitigation measures will result in a negligible effect and no significant residual effect.

Watercourses – water quantity/quality/supply

- 11.6.4 The implementation of the mitigation measures will result in a negligible effect and no significant residual effect.

Operational Phase

Impact on Flood Risk - Residents/Users of the Surrounding Area

- 11.6.5 The implementation of the mitigation measures will result in a negligible effect and no significant residual effect.

Watercourses – water quantity/quality/supply

- 11.6.6 The implementation of the mitigation measures will result in a negligible effect and no significant residual effect.

11.7 Implications of Climate Change

- 11.7.1 Hydrological systems are in a state of constant flux. Two main influences on the hydrology of the Site have been identified, namely land use and climate change.
- 11.7.2 Climate is also variable, with observed historical and predicted future changes in global climate due to a combination of both natural and human causes. Projections of future climate change in the UK indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall
- 11.7.3 Guidance included within the NPPF recommends that the effects of climate change are incorporated into FRA. The FRA has assessed the effects of climate change on the flood risk posed to the Proposed Development and includes a 15% climate change allowance as per guidance. The SuDS Strategy includes a 40% model climate change allowance as per guidance.

11.8 Cumulative effects

- 11.8.1 An assessment of the cumulative effects on flood risk and drainage of the adjacent proposal Land at Junction 10, M40 has been undertaken. These proposals include measures to ensure that the development do not give rise to unacceptable effects on flood risk and drainage.
- 11.8.2 'Land at Junction 10, M40 lies within the same catchment as the Proposed Development there is the potential for some degree of cumulative effect on flood risk and drainage, in particular in a scenario where an extreme weather event occurs which exceeds the capacity of the designed

surface water management schemes.

- 11.8.3 The Proposed Development includes mitigation measures as described above, if an extreme weather events occurs which exceeds the capacity of the SuDS Strategy, there is additional capacity with the system to accommodate this (i.e., within the manholes, pipes etc.). Consequently, the impact of an exceedance event is not considered to represent any significant flood hazard.
- 11.8.4 However, on the basis that Land at Junction 10, M40 and the Proposed Development would employ forms of flood risk and drainage mitigation it is considered unlikely that the cumulative effects of these developments, when considered at a catchment scale, would give rise to significant effects.

11.9 Summary

- 11.9.1 This impact assessment has considered the potential adverse impacts on the waterbodies at or near the Site from the Proposed Development. The principal risks during construction are considered to be the potential for excess fine sediment, hydrocarbons, chemicals polluting waterbodies and increase in surface water runoff volumes. This could be exacerbated by the extensive earthworks that would be required at the Site.
- 11.9.2 An FRA (Appendix 11.1) has been prepared to inform this Chapter of the ES.
- 11.9.3 In conclusion, the flood risk to the Site can be considered to be limited; the Site is situated in Flood Zone 1, with a low annual probability of flooding from all sources. The Site is unlikely to flood except in very extreme conditions.
- 11.9.4 The Proposed Development is classified as 'less vulnerable', 'less vulnerable' uses are appropriate within Flood Zone 1.
- 11.9.5 There will be no detriment to the flood storage capacity of the Site. The overall direction of the movement of water will be maintained within the developed Site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed. The proposed development will have no impact on the movement of floodwater across the Site. There will be no increase in the floodwater levels due to the proposed development. There will be no loss in flood storage capacity and no change in the on-Site and off-Site flood risk.
- 11.9.6 A SuDS Strategy is proposed as part of the Proposed Development, details of which are contained in Appendix 11.1.
- 11.9.7 The SuDS Strategy ensures that a sustainable drainage solution can be achieved, which reduces the peak discharge rate to manage and reduce the flood risk posed by the surface water runoff from the Site as well as providing water quality benefits.
- 11.9.8 It is proposed that the surface water runoff from the Site will discharge into attenuation basins and/or swales which will allow infiltration of the surface water into the soil substrate. The system will include an overflow into the drainage ditch which ultimately discharges into Padbury Brook. All surface water runoff that cannot be discharged via infiltration will be managed on site and discharged to the drainage ditch via an overflow at Greenfield runoff rates for all events up to and including the 1 in 100 year (+40%) event.
- 11.9.9 A range of pollution prevention and mitigation measures have been described that would adequately manage the flood risk and water quality/quantity during construction. The assessment concludes that the mitigation measures described would reduce the magnitude of

impacts to a negligible level and would prevent significant adverse effects arising.

11.9.10 In terms of operational impacts, a series of mitigation measures are incorporated into the design to avoid potential adverse effects on flood risk and water quality/quantity. The assessment concludes that the mitigation measures described would reduce the magnitude of impacts to a negligible level and would prevent significant adverse effects arising.

11.9.11 The findings of this assessment have demonstrated that the development would not result in any significant residual adverse impacts on surface waters, groundwaters or flood risk.

11.9.12 A summary of the assessment is set out in Table 11.12 overleaf.

11.10 References

Ministry of Housing, Communities and Local Government (2021) National Planning Policy Framework.

Department for Communities and Local Government (2014) Planning Practice Guidance - Flood Risk and Coastal Change.

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#high-allowances>.

Table 11.12 Summary of effects

Receptor	Sensitivity of Receptor	Magnitude of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction phase					
Impact on Flood Risk - Construction Workers	Low	Low Adverse	CEMP, Site Drainage Plan, IRP	Negligible	Not significant
Impact on Flood Risk - Residents/Users of the Surrounding Area	Low	Low Adverse	CEMP, Site Drainage Plan, IRP	Negligible	Not significant
Watercourses - Water Quantity/Quality	Medium	Low Adverse	CEMP, Site Drainage Plan, IRP	Negligible	Not significant
Operational phase					
Impact on Flood Risk - Future Site occupants (staff and public)	Low	Low Adverse	Finished Floor Levels, SuDS Strategy	Negligible	Not significant
Impact on Flood Risk - Residents/Users of the Surrounding Area	Low	Low Adverse	Finished Floor Levels, SuDS Strategy	Negligible	Not significant
Watercourses - Water Quantity/Quality	Medium	Low Adverse	SuDS Strategy	Negligible	Not significant

12 Socio-economic effects

12.1 Introduction

- 12.1.1 This chapter of the ES has been prepared by Savills and presents an assessment of 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.

12.2 Policy Context

Planning Policy Context

National Planning Policy

- 12.2.1 The National Planning Policy Framework (NPPF) 2021 gives policy direction on how development should be delivered sustainably, with a focus on community interest and social benefit. Development should perform an economic role by building a strong economy, perform a social role by supporting strong vibrant economies, and should perform an environmental role by contributing to and enhancing the natural, built, and historic environment.
- 12.2.2 The policy framework set out within Chapter 6 'Building a Strong, Competitive Economy' is of the greatest importance to this assessment. Paragraph 83 states that planning policies and decisions should recognise and address the specific locational requirements of different sectors. This includes making provision for storage and distribution operations at a variety of scales and in suitably accessible locations.

Regional Planning Policy

- 12.2.3 The Oxfordshire Plan 2050 is an emerging policy document at the regional level (currently at Regulation 18 Part 2). Policy Option 22 encourages the creation of jobs, and Policy Option 23 supports appropriate growth of economic assets.

Local Planning Policy

- 12.2.4 The Cherwell Local Plan (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. The Local Plan's Strategic Objectives include: *"SO 1 To facilitate economic growth and employment and a more diverse local economy with an emphasis on attracting and developing higher technology industries; SO 2 To support the diversification of Cherwell's rural economy; and SO 3 To help disadvantaged areas, support an increase in skills and innovation, improve the built environment and make Cherwell more attractive to business by supporting regeneration."*
- 12.2.5 Cherwell District Council (CDC)'s Developers Contributions SPD (2018) is also of relevance to the Proposed Development, which seeks to secure an Employment, Skills and Training Plan (ESTP) as part of S106 agreements, to cover both the construction and end-use phases. S106 agreements will be used by the Council to support/provide the training and skills needed by local people to access the new job opportunities created by the development's end users.

Guidance

- 12.2.6 Planning Practice Guidance (PPG) (Live Document) is an online resource which provides further detail on the policies set out within the NPPF. The PPG is relevant to the Proposed Development

and highlights the need for local authorities to identify economic needs in their areas in order to plan efficiently and effectively. This can be informed by the analysis of market signals, and engagement with logistics developers and occupiers to understand the changing nature of requirements in terms of the type, size and location of facilities.

12.3 Assessment Methodology

12.3.1 This section presents the approach to the assessment of socio-economic impacts of the Proposed Development, consistent with the requirements of Town and Country Planning (Environmental Impact Assessment) Regulations 2017.

12.3.2 The stages of the assessment include:

- Review of legislation, policy and guidance - Review relevant legislation, policy, and guidance to establish the baseline of community expectations for the Proposed Development;
- Define socio-economic baseline conditions - Including a review of the existing demographic and economic profile of the local population;
- Impact assessment - Consider the nature, scale and performance of the likely impacts and effects on the relevant impact areas during both the construction and operational phase of the Proposed Development, and also consider proposed mitigation measures where there are any likely significant adverse effects;
- Cumulative impacts and effects and residual impacts and effects; and
- Summary of impacts and effects.

12.3.3 The following sections provide further detail regarding the assessment of socio-economic impact assessments.

12.3.4 To arrive at a judgement on the significance of the effect on the population, the assessment considers the sensitivity of receptors listed in Table 12.1 below.

12.3.5 As there are no standard criteria for assessing a receptor's sensitivity, that has been determined by using the baseline research and professional judgement. Table 12.1 presents the assessed receptor's sensitivity.

Table 12.1 Receptors Sensitivity

Receptor	Receptor Sensitivity	Commentary
Construction industry and its employees	Low (Region)	Effects on the construction industry are assessed at a Regional level due to the mobility of the construction workforce. There are 253,000 construction workers in the South East region. The baseline research shows that the unemployment rate in Cherwell is lower than the South East of England and Great Britain average.
Local economy and labour market	Low (Local and District)	Accessibility of employment is key to the success of a population. Equally so, businesses are sensitive to access to the labour market. Baseline analysis shows that unemployment is relatively low in the local area surrounding the Site and the District as a whole compared to the Regional average.

Source: Savills (2021)

12.3.6 Magnitude of impact, based on the change that the Proposed Development would have upon the resource/receptor, is considered within the range of high, medium, low, negligible. Impacts

are either beneficial or adverse. Such terms are relative to the receptor affected by the impact. The magnitude of an impact is determined with reference to planning policy, best practice guidance, and relevant contextual factors. For example, the employment generation of 100 new jobs could be considered a high beneficial impact in a settlement of 1,000 residents, but it would be a less significant impact in a larger settlement of 100,000 residents.

12.3.7 The assessment is objective and quantifies impact, where possible. Where quantification has not been possible, qualitative assessments have been used and justified. The relative significance of an effect is largely a product of the value and sensitivity of the identified receptor and the magnitude and duration of the impact.

12.3.8 Beneficial and adverse effects are based on a standard set of significance criteria defined as follows:

- Neutral
- Minor
- Moderate
- Major

12.3.9 Table 12.2 shows how the receptor's sensitivity and the impact's magnitude are used to estimate the significance of an effect.

Table 12.2 Matrix of Significance

Receptor Sensitivity	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Neutral
Medium	Major	Moderate	Minor	Neutral
Low	Moderate	Minor	Minor	Neutral
Negligible	Negligible	Negligible	Negligible	Neutral

12.3.10 Effects are defined as either:

- Beneficial - An advantageous impact on the impact area;
- Negligible - Imperceptible impacts on the impact area; and
- Adverse - Detrimental impacts on the impact area.

12.3.11 Major effects are significant in EIA terms with other types of effects considered not significant. Effect significance is assigned to residual impacts, post-mitigation.

Impact Area

12.3.12 The concept of a primary area of influence or study area is standard in EIA practice, however, there is no standard measure. For socio-economic impact assessments, this is further complicated by the mobility and network of potential receptors. The baseline assessment considered the current social and economic conditions at different spatial levels (i.e. study area) as defined below:

- Site Level - The Site (where data is available at this spatial level);
- Local Area - Fringford and Heyfords ward;
- District - Cherwell;
- Regional - South East of England; and
- National - England.

12.3.13 Figure 12.1 presents a map of the Impact Area assessed.

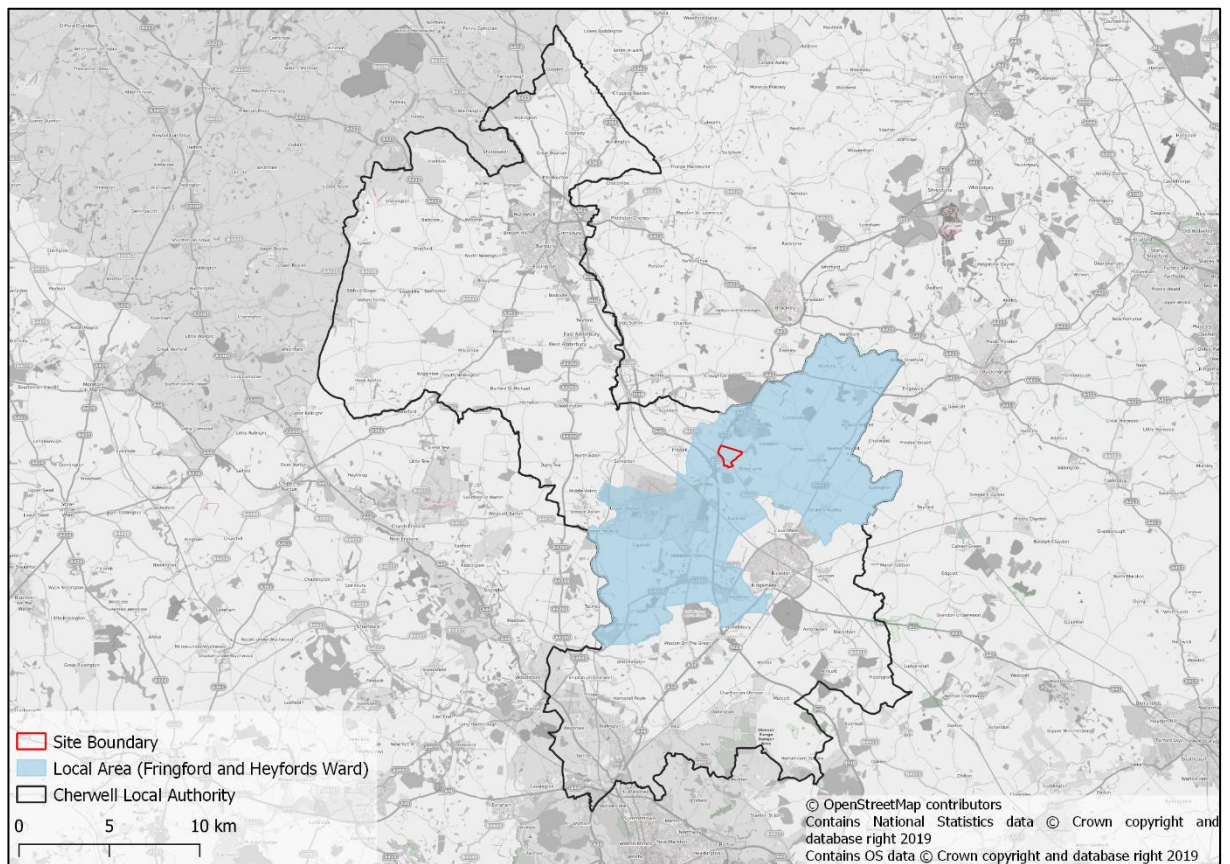


Figure 12.1 Site Context Map Source: Savills (2022)

Temporal Scope

12.3.14 The temporal scope for the assessment has considered the length of the preparation and construction phase, which has been estimated at 3 years (2023-2025), and the operational phase. This is used to consider temporary and permanent impacts and effects of the Proposed Development. The temporal scope includes:

- Short term - Generally identified as temporary impacts lasting 0-2.5 years;
- Long term - Permanent impacts during the operational phase of the Project.

Cumulative Impacts

12.3.15 The ES sets out several cumulative developments within Chapter 4. This Chapter assesses their likely cumulative impact on the assessment at a high level.

Assumptions and Limitations

12.3.16 By the nature of the methodology, estimates of change in the socio-economic elements such as economic and employment impacts are subject to uncertainty. The estimates in the chapter are based on good practice, but there would likely be a degree of uncertainty around estimates.

12.3.17 We estimate that actual impacts are likely to be in a range of +/- 20% of figures given to account for this uncertainty, as is standard practice with such matters.

12.3.18 In respect of the current Coronavirus circumstances the analysis and conclusions should be considered as potentially relevant to the situation once the UK economy has recovered from the most significant impacts of Coronavirus.

Consultation

- 12.3.19 It has not been possible to arrange consultation on the development proposals prior to the submission of the application in this instance. However, the consultation responses to the Land at Junction 10, M40 planning application on the adjoining site have been reviewed, and these have been taken into account.
- 12.3.20 In response to the Land at Junction 10, M40 application, Cherwell District Council requested the consideration of the proposed Oxfordshire Strategic Rail and Freight Interchange (SFRI). This scheme has been considered within the cumulative assessment.

12.4 Baseline conditions

- 12.4.1 This section provides details on the existing conditions and future trends in Fringford and Heyfords ward and relevant impact areas. Where appropriate, conditions are framed in the context of Cherwell district, the South East region, and national metrics for context.
- 12.4.2 The baseline is structured around the following subjects. These provide context for the impact assessment:
- Population demographics;
 - Economic and employment; and
 - Deprivation.
- 12.4.3 Baseline socio-economic conditions were established through analysis of nationally recognised research and survey information and datasets including:
- Census data (2011);
 - Office for National Statistics (ONS) Mid-Year Population Estimates (2020);
 - Business Register and Employment Survey (BRES) data (2020);
 - Indices of Multiple Deprivation (IMD) (2019); and
 - Claimant Count Data (2020/21).
- 12.4.4 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.
- 12.4.5 The future baseline is established using ONS 2018-based population projections data for 2025 when the Proposed Development is expected to be complete and operational. This data is not available at ward level.

Current Baseline

- 12.4.6 The Site is close to Junction 10 of the M40 motorway in Fringford and Heyford ward. The Site and surrounding area is predominantly agricultural. Cherwell Valley Services are directly 1.3 miles south of the Site. Baynards Green comprising a petrol station, takeaway restaurant and a small number of industrial units and residential units is directly 0.6 miles west of the Site. Stoke Lyne is the closest village located approximately 800 metres to the east.
- 12.4.7 Ardley is located 2.7 miles to the south west. Whilst outside of the Local Area, the village of Fritwell is also close to the Site (2.2 miles), located to the west of the Site boundary. Baseline data for Fritwell, located within the Deddington ward, has therefore also been considered alongside the Local Area in the economic baseline below, because employment is considered the most relevant socio-economic baseline for considering the effects of a new employment proposal.

Demographic Baseline

12.4.8 The ONS Mid-2020 Population Estimates report that the population of the Local Area was 11,369 people.

12.4.9 Table 12.3 presents the total population, the percentage of the population between 0-15 years, the working population (persons aged 16-64), and the percentage of the population over 65 years for the Local Area, Cherwell, South East of England, and England.

Table 12.3 Total Population and Age Structure in Fringford and Heyfords Ward, Cherwell, South East of England and England (2020)

	Local Area	Cherwell	South East of England	England
Total Population (All Ages)	11,369	151,846	9,217,265	56,550,138
0-15 Population of Total Population (%)	2,841 (25%)	30,699 (20%)	1,774,415 (19%)	10,852,240 (19%)
Working Age Population (16-64) of Total Population (%)	6,732 (59%)	93,089 (61%)	5,630,846 (61%)	35,233,879 (62%)
Population Over 65 of Total Population (%)	1,796 (16%)	28,058 (18%)	1,812,004 (20%)	10,464,019 (19%)

Source: ONS Mid-2020 Population Estimates

12.4.10 Table 12.3 shows that the percentage of the population aged 0-15 years in the Local Area (25%) is higher than in Cherwell (20%), South East of England (19%) and England (19%) average.

12.4.11 The working age population is lower in the Local Area (59%) than Cherwell (61%), South East of England (61%) and England (62%) average.

12.4.12 The Local Area has the lowest percentage of the population over 65 years (16%), compared to Cherwell (18%), South East of England (20%), and England average (19%).

12.4.13 The ONS Household Projections (2018) for England report that Cherwell had an average household size of 2.43 in 2018, which is higher than the England average 2.37¹.

Economic and Employment Baseline

12.4.14 Table 12.4 shows a number of employment indicators comparing Cherwell district, South East of England and Great Britain.

Table 12.4 Employment Indicators

	Cherwell	South East of England	Great Britain
In Employment (16-64) (%)	87.1%	77.4%	74.4%
Unemployment (% is a proportion of economically active)	3.0%	4.1%	5.0%

Source: ONS Annual Population Survey (July 2020-June 2021)

12.4.15 Table 12.4 shows that the percentage of the population aged 16-64 in employment in Cherwell district (87.1%) is almost 10% higher than in the South East of England (77.4%), and almost 13% higher than in Great Britain (74.4%). The percentage of the economically active population who are unemployed is lower in Cherwell District (3.0%), than the South East of England region (4.1%), and Great Britain average (5.0%).

12.4.16 Claimant count provides data on the proportion of working age residents claiming

¹ ONS Household Projections for England (2018 Based) Table 427 Change in Average Household Size, Local Authorities and Higher Administrative Areas within England

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.

- 12.4.17 The most recent claimant count data available is for November 2021 which indicates a claimant rate of 3.1% in Cherwell which is lower than the rates in the South East (3.8%) and England (4.9%).

Qualifications

- 12.4.18 The 2020 ONS Annual Population Survey suggests that a higher proportion of residents in Cherwell hold National Vocational Qualification 4 (NVQ4) and Above level qualifications with 48.6% of residents aged 16-64, compared to 45.1% in the South East, and 43.1% in Great Britain.

- 12.4.19 Cherwell has a higher proportion of residents aged 16-64 with no formal qualifications (5.5%) than the South East region (4.8%), but is still lower than the average for Great Britain (6.4%).

Occupation of Residents

- 12.4.20 The 2021 ONS Annual Population Survey suggests that Cherwell has a lower percentage of residents employed in highly-skilled occupations (managerial, professional and technical positions) at 47.1%, compared to 53.0% in the South East and 50.0% in Great Britain. The proportion of residents employed in Process Plant, Machine Operatives and Elementary occupations is higher in Cherwell (16.5%) compared with the South East average (12.1%), and the average for Great Britain (14.7%).

Business Structure

- 12.4.21 According to 2020 BRES data, there are 4,500 jobs in the Local Area. The largest sector is the Professional, Scientific and Technical sector, accounting for 13% of jobs, which is greater than proportions in Cherwell (7%), South East (9%) and England (9%).

- 12.4.22 The second largest sector in the Local Area is the Retail sector, joint with the Accommodation and Food Services sector, both accounting for 11% of jobs. In the Retail sector, this compares to 13% in Cherwell, 9% in the South East and England, and 6% in Cherwell, and 7% in the South East and England for Accommodation and Food Services.

- 12.4.23 Deddington ward has 2,500 jobs. The largest sector is Accommodation and Food Services, accounting for 16% of jobs in Deddington ward.

- 12.4.24 The largest sectors in Cherwell are Retail and Business Administration and Support Services, both accounting for 13% of all jobs. In contrast, the largest sector at the regional and national level is health, accounting for 13% of jobs in the South East and England.

Construction Industry

- 12.4.25 Construction jobs comprise 7% of Local Area employment, which is higher than proportions across Cherwell (5%), the South East (6%) and England (5%). The construction workforce is highly mobile, with workers frequently travelling regionally, and sometimes nationally and internationally, to fill vacancies. Therefore, the construction economy is best considered at the regional level, in which there are 253,000 construction jobs in the South East region.

Gross Value Added (GVA) Per Worker

- 12.4.26 Gross Value Added (GVA) per worker data is not available at the Local Area or Cherwell level but it is available at the South East, and UK level as shown in Table 12.5 below. The largest

GVA per worker for the South East region is Real Estate Activities, followed by Non-Manufacturing Production and Agriculture. The average for all industries in the South East is £61,438, which is higher than the UK average of £58,261.

Table 12.5 GVA per Worker by Industry

Industry	South East	UK
L: Real Estate Activities	£608,976	£457,048
ABDE: Non-Manufacturing Production and Agriculture	£109,434	£109,593
J: Information and Communication	£103,940	£95,274
K: Finance and Insurance	£93,374	£114,793
C: Manufacturing	£80,647	£73,067
O: Public Administration and Defence	£70,281	£67,423
F: Construction	£60,449	£57,741
G-J and L-T: Services (Excluding Finance)	£59,003	£55,499
H: Transportation and Storage	£57,876	£49,663
M: Professional, Scientific and Technical Activities	£57,096	£54,111
G: Wholesale and Retail Trade	£48,365	£41,404
S and T: Other Service Activities and Activities of Households as Employers	£45,678	£43,192
N: Administrative and Support Services Activities	£38,628	£36,654
P: Education	£38,232	£41,090
R: Arts, Entertainment and Recreation	£36,904	£32,651
Q: Human Health and Social Work Activities	£32,562	£34,944
I: Accommodation and Service Activities	£24,392	£24,801

Source: ONS Region by Industry Labour Productivity 2019 (2021)

Economic and Employment Baseline Summary

12.4.27 Table 12.6 Presents the economic and employment profile summary.

Table 12.6 Economic and Employment Baseline

	Local Area	Cherwell	South East of England	England/Great Britain/UK
Working Age Residents	England			
Total Number of Working Age Residents (16-64)	6,732	93,089	5,630,846	35,233,879
Economic Activity (Residents)	Great Britain			
In Employment		87.1%	77.4%	74.4%
Unemployed		3.0%	4.1%	5.0%
Claimant Count (Residents)	England			
Claimants (November 2021)		3.1%	3.8%	4.9%
Highest Level of Qualification (Residents)	Great Britain			
NVQ4 and Above		48.6%	45.1%	43.1%
NVQ3 and Above		66.2%	63.8%	61.3%
NVQ2 and Above		80.8%	80.5%	78.1%
NVQ1 and Above		88.8%	90.2%	87.7%
Other Qualifications			5.0%	5.9%
No Qualifications		5.5%	4.8%	6.4%
Occupation (Residents)	Great Britain			
Management/Professional/Technical		47.1%	53.0%	50.0%
Admin/Skilled Trades		24.0%	19.4%	19.2%
Caring/Leisure/Sales/Customer Service		12.3%	15.6%	16.1%
Process Plant/Machine Operatives/Elementary		16.5%	12.1%	14.7%

Occupations				
Key Employment Sectors (jobs)			England	
Total Jobs	4,500	87,000	4,231,000	26,671,000
Accommodation and Food Services	500 (11%)	5,000 (6%)	304,000 (7%)	1,892,000 (7%)
Retail	500 (11%)	11,000 (13%)	390,000 (9%)	2,472,000 (9%)
Professional, Scientific and Technical	600 (13%)	6,000 (7%)	376,000 (9%)	2,428,000 (9%)
Construction Sector	300 (7%)	4,500 (5%)	253,000 (6%)	1,298,000 (5%)
Gross Value Added (GVA)			UK	
GVA Average for All Industries			£61,438	£58,261

Source: ONS Mid-2020 Population Estimates, ONS 2021 Annual Population Survey, ONS 2020 Annual Population Survey, ONS Claimant Count by Unitary and Local Authority (2021), Business Register and Employment Survey (BRES) (2020), ONS Region by Industry Labour Productivity 2019 (2021)

Indices of Multiple Deprivation

12.4.28 The Ministry of Housing, Communities and Local Government (MHCLG) publish the English Indices of Deprivation to measure relative deprivation in communities across the country. The latest indices were released in 2019. A measure is provided for every local authority and Lower Super Output Area (LSOA) in England, and allows areas to be ranked accordingly to how deprived they are relative to each other.

12.4.29 The indices consider a range of indicators, and a household is considered deprived if they meet one or more of the following conditions:

- Employment - Any member of a household, not a full-time student, is either unemployed or long-term sick;
- Education - No person in the household has at least Level 2 education, and no person aged 16-18 is a full-time student;
- Health and Disability - Any person in the household has general health 'bad or very bad' or has a long term health problem; and
- Housing - Household's accommodation is either overcrowded, with an occupancy rating -1 or less, or is in a shared dwelling, or has no central heating.

12.4.30 At the Local Authority level, Cherwell ranks 217 out of 317 local authority districts in England (with 1 being the most deprived area)². Cherwell also ranks 195 out of 317 for the proportion of LSOAs in the first decile (the 10% most deprived LSOAs in England), where 1 would indicate the highest proportion of LSOAs within the most deprived 10%.

12.4.31 At the LSOA level, the site is located in Cherwell 011B (E01028477) which ranks 15,914 out of 32,844 LSOAs in England (where 1 is the most deprived)³. The IMD decile for the LSOA is 5, where 1 indicates an area is most deprived, and 10 is the least deprived.

12.4.32 Figure 12.2 presents the location of the Site and LSOA deprivation in the Surrounding Area.

² MHCLG (2019) English Indices of Multiple Deprivation - File 10 Local Authority District Summaries (lower-tier)

³ MHCLG (2019) English Indices of Multiple Deprivation - File 1

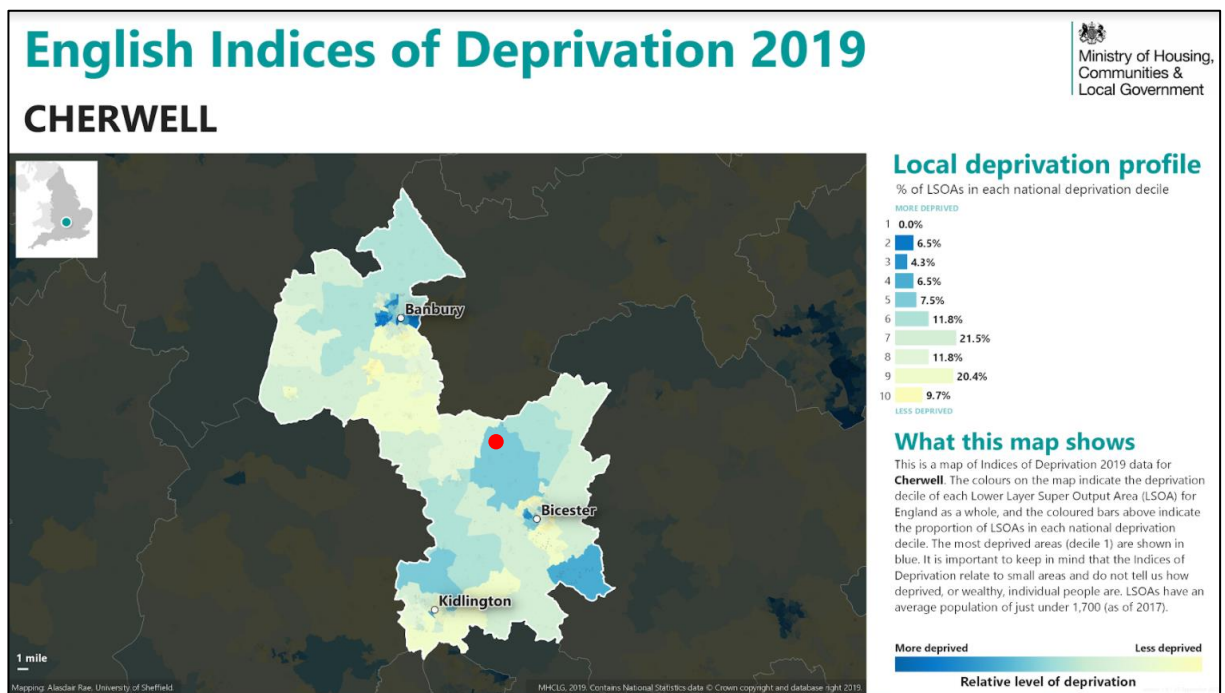


Figure 12.2 Location of Site and LSOA Deprivation in the Surrounding Area

Source: MHCLG (2019) *Indices of Multiple Deprivation 2019 - Local Authority Focus*

12.4.33 As shown in Figure 12.2, Cherwell does not experience high levels of deprivation, although there are some areas in Banbury to the north of the District which fall within the top 20% most deprived in England.

Future Baseline

Demographic Baseline

12.4.34 Figure 12.3 shows the projected population increase in 2025, 2030, 2035 and 2040 for all ages, using 2020 as the base year, in Cherwell, the South East and England.



Figure 12.3 Projected population increase *Source: ONS Population Projections (2021)*

12.4.35 Figure 12.3 shows that the greatest population increase from 2020 to 2040 is in Cherwell, at 111%, compared to 107% and 108% in South East and England respectively.

12.4.36 The ONS Household Projections (2018) for England report that the average household size in Cherwell will decrease from 2.43 in 2018 to 2.28 in 2038, which compares to 2.37 and 2.26 in England in 2018 and 2038 respectively.

12.5 Identifying Likely Significant Effects

12.5.1 This section describes the likely socio-economic effects that are anticipated to arise from the construction (temporary) and operation (permanent) phases of the Proposed Development. The likely impacts and the significance of the effects are characterised in the absence of mitigation measures, beyond those identified and described as inherent design mitigation.

Construction Impacts and Effects

12.5.2 In terms of construction impacts, the most significant effects are likely to be on employment, as the population is not expected to increase significantly during construction as workers are unlikely to relocate to the area. Therefore, population, housing, and social infrastructure have been scoped out of the assessment of construction effects.

Construction Employment

12.5.3 The construction of the Proposed Development would help support construction firms operating in the region and provide jobs in the industry. This would lead to the creation of new direct and indirect jobs, through supply chain benefits and new expenditure introduced to the local economy.

Direct Employment

12.5.4 To estimate the number of jobs required for the construction of the Proposed Development, the average output per construction worker for the South East of England⁴ is used in combination

⁴ Business Population Estimates for the UK and Regions (2020) Department for Business, Energy, and Industrial Strategy

with the estimated construction cost. Table 12.7 sets out the steps involved in estimating construction employment. The construction phase is expected to support 500 on-site jobs per annum during the construction period of 3 years from 2023-2025⁵.

Table 12.7 Construction Jobs Generated

	Steps Involved	
A	Estimated Construction Cost (£) ⁶	£283,432,500
B	Average turnover per construction employee in the South East of England (2019-2021)	£187,845
C	Estimate of the number of worker years required for the construction of the Proposed Development (jobs) (A/B)	1,509
D	Duration of Construction Phase (years)	3
E	Average On-Site Construction Jobs per annum (C/D)	503

Figures may not sum due to rounding

Source: Savills (2022)

- 12.5.5 Given that construction is made up of many discrete elements of work undertaken by specialists, additional construction workers may be employed on the Site for shorter periods.
- 12.5.6 Due to the nature of the construction industry, not all trades would be required on the Site permanently, and some would be on the Site for less time than others. The construction process would include a range of occupational levels, including unskilled or labouring jobs to more senior positions, as well as across a range of professional disciplines. The construction of the Proposed Development could facilitate the growth of the local construction industry, thus enabling firms to expand and potentially take on employees.
- 12.5.7 Occupation and skill demand in the construction sector revolves around specialist skills, i.e. electricians, plumbers, bricklayers, carpenters, and plant operation trades. These skills tend to be contract labour offered by construction/building firms locally. In addition, low skilled manual labour would be expected to be in demand. In this case, employment tends to be contracted via Job Centres and Employment Agencies on a needs basis.

Indirect and Induced Employment

- 12.5.8 Businesses in the local and regional economy would benefit from the trade linkages that would be established to construct the development, meaning that further indirect jobs would be supported locally in suppliers of construction materials and equipment. Local businesses would generally also benefit to some extent from temporary increases in expenditure as a result of the direct and indirect employment effects of the construction phase, for example, as construction workers spend some of their wages in local shops, accommodation and other facilities.
- 12.5.9 The development would set off a chain reaction of increases in expenditure, such as through the sale of building materials, design services, legal services and insurance. This in turn can result in jobs close to the Site, generating an increase in demand for goods and services, and generate growth in the local economy. The above form the multiplier effects.

Additional Employment

- 12.5.10 There are further steps involved in estimating the 'additionality' of development. The first is leakage, which refers to the proportion of output that benefits those outside of the intervention's

⁵ A construction period of 3 years presents a 'worst-case' scenario as the construction may be delivered in 2 years. If the construction period is 2 years, this will result in a higher number of average on-site construction jobs per annum.

⁶ Estimate based upon BCIS Average Price Calculator

target area or group. Taking into account the Proposed Development's specific characteristics and the guidance of the Homes and Communities Agency (HCA)'s Additionality Guide (2014), leakage of constructions workers is assumed to be 26%.

12.5.11 The second step is estimating displacement. Displacement is where the proposed activity could displace another activity in the target area, thereby reducing its additionality. In this case, the amount of employment on-site per annum is c.500 construction workers, out of an existing construction workforce in Cherwell of 4,500, and 253,000 in the South East region, therefore it is likely to have a negligible impact. To be conservative, 25% has been applied as per the Additionality Guide.

12.5.12 The third step is estimating the indirect benefits of the construction activity, the benefits to companies in the supply chain, and the benefits to the local economy by the new expenditure introduced to the area from the construction workers. The construction multiplier is 2.1⁷. Table 12.8 presents the assumptions used to calculate construction employment.

Table 12.8 Construction Employment Assumptions

Use	Leakage	Displacement	Multiplier
Construction	26%	25%	2.1
Notes:			
<ul style="list-style-type: none"> Leakage assumptions are based on Census 2011 and comprise the proportion of employees with a commuting distance longer than 10km. Category used is F Construction. Displacement effects are based upon the Homes and Communities Agency Additionality Guide (2014). ONS Input-Output Analytical Tables 2015 are used to estimate multiplier effects. 			

Source: Census (2011), Homes and Communities Agency (2014), ONS (2015), Savills (2021)

12.5.13 Table 12.9 sets out the steps involved in estimating the additionality of the construction employment associated with the Proposed Development.

Table 12.9 Construction Jobs - Additionality

	Steps Involved	
A	Construction Workers on-site (gross, direct, per annum)	503
B	Leakage (26%) (A*26%)	-131
C	On-Site jobs (direct, for residents from the impact area) (A+B)	372
D	Displacement (25%) (C*25%)	-93
E	Multiplier (2.1 for Construction) ((C+D)*(2.1-1))	328
F	Off-site employment induced by construction employment (net, indirect) (D+E)	235
G	Net additional employment from the construction of the Proposed Development (C+F)	607

Figures may not sum due to rounding

Source: Savills (2022)

12.5.14 Table 12.9 shows that the construction phase will generate a total of approximately 500 on-site construction jobs per annum. Once the effects of leakage, displacement and multiplier effects have been considered, this equates to 610 net additional construction jobs per annum. The construction phase is estimated to have a low positive impact on the low sensitivity construction

⁷ ONS Input Output Tables (2015)

workers in Cherwell (4,500) and in the South East Region (253,000), resulting in a minor beneficial effect over the short term.

Occupational Impacts and Effects

12.5.15 This section identifies the likely significant socio-economic effects from the completion and operation phase of the Proposed Development. The delivery of new logistics floorspace will provide new employment.

Operational Employment

12.5.16 Operational phase jobs would be generated once the construction has been completed and the Proposed Development is occupied. The assessment also considers displacement of jobs elsewhere, and indirect multiplier effects as a result of the new jobs on-site.

12.5.17 Employment was calculated by applying the standard job density ratios from the Homes and Communities Agency (HCA) Employment Density Guide (2015) to the floorspace of the Proposed Development. For B8 floorspace, the job density is estimated between 70-95 sq.m GEA per Full Time Equivalent (FTE)⁸. The employment density used for this assessment is 95 sq.m GEA per FTE, which represents the 'worst-case scenario' in terms of economic benefits, i.e., the lower number of jobs within the range that is likely.

12.5.18 Table 12.10 presents the assumptions used to calculate the total net local employment effects. This incorporates leakage, multiplier and displacement effects. Additionally, appropriate vacancy levels typical to the local market are accounted for.

Table 12.10 Operational Employment Assumptions

Use	Leakage	Displacement	Multiplier	Vacancy
Storage and Distribution (B8)	34%	25%	1.60	3%
Notes: <ul style="list-style-type: none"> Leakage assumptions are based on Census 2011 and comprise the proportion of employees with a commuting distance longer than 10km. Categories used are G, I Distribution, Hotels and Restaurants, and H, J Transport and Communication. Displacement effects are based upon the Homes and Communities Agency Additionality Guide (2014). ONS Input-Output Analytical Tables 2015 are used to estimate multiplier effects. Vacancy rates are based upon CoStar local market data. 				

Source: Census (2011), Homes and Communities Agency (2014), ONS (2015), CoStar (2020), Savills (2021)

12.5.19 It is estimated that the proposal would generate 3,060 gross on-site jobs.

12.5.20 Once leakage, displacement, and multiplier effects have been considered, the Proposed Development is expected to generate some 2,430 on and off-site jobs. Table 12.11 presents the calculation steps for operational jobs.

Table 12.11 Operational Jobs

	Steps Involved	
A	Workers on-site (gross, direct)	3,063
B	Leakage (34%) (A*34%)	-1,041

⁸ Homes and Communities Agency Additionality Guide (2014)

C	On-site jobs (direct, for residents from the impact area) (A+B)	2,022
D	Displacement (25%) (C*25%)	-505
E	Multiplier ((C+D)*(1.60-1))	910
F	Off-site employment induced by operational employment (D+E)	404
G	Net additional employment from operation of Proposed Development (C+F)	2,426

Figures may not sum due to rounding

Source: Savills (2021)

- 12.5.21 The magnitude of employment in the Proposed Development is considered to be high positive. This is because the number of unemployed totals 2,800 people in Cherwell. The sensitivity of the employees is low. Therefore the effect of operational jobs from the Proposed Development is predicted to be moderate beneficial over the long-term.

Gross Value Added

- 12.5.22 Gross Value Added (GVA) is an indicator of wealth creation, measuring the contribution to the economy of economic activity associated with the operation of the Proposed Development. The operational jobs created will produce value for the regional economy (GVA). Table 12.12 presents the GVA assumptions.

Table 12.12 GVA Assumptions

Job Type	Average GVA per worker per annum for South East England (2019)
Storage and Distribution (B8)	£57,876
Notes:	
<ul style="list-style-type: none"> Storage and Distribution (B8) is based on industry H: Transportation and Storage in the ONS Region by Industry Labour Productivity (2019). 	

Source: ONS Region by Industry Labour Productivity 2019 (2021)

- 12.5.23 The GVA that the Proposed Development is expected to generate is £148 million per annum.

12.6 Mitigation

- 12.6.1 This section provides a description of any additional enhancement and mitigation measures proposed to minimise the potential adverse effects identified by the assessment as set out previously. The mitigation measures will reduce the severity of impacts, and their significance.

Construction Phase

- 12.6.2 Any potential for disruption during construction is anticipated to be controlled and managed through the implementation of the Construction Environmental Management Plan (CEMP).
- 12.6.3 The development will be phased in such a way to ensure that essential infrastructure and services are delivered to ensure that those who occupy the development in the early phases of the project are adequately served.
- 12.6.4 Proposed mitigation will reflect the impacts of the Proposed Development in accordance with the Community Infrastructure Levy Regulations. Proposed mitigation measures for socio-economic impacts will be directly related to meeting policy and infrastructure requirements as necessary and in a proportionate manner.

Operational Phase

- 12.6.5 There is no primary mitigation of relevance to the operational phase of the socio-economic

assessment.

12.7 Residual effects

- 12.7.1 The likely effects of the Proposed Development during the construction phase are considered to be minor beneficial (not significant). As no adverse effects are identified, no additional mitigation is required beyond implementation of the CEMP.
- 12.7.2 CDC'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 generation, through helping local people better access job opportunities arising from the Development, including through providing construction apprenticeships.
- 12.7.3 All residual effects remain as the potential effects stated. No monitoring is considered necessary as no adverse effects are identified.
- Construction Employment: Not Significant
 - Operational Employment: Not Significant
- 12.7.4 The above assessment is based on the assessment of the residual effects with the significance criteria set out in Section 12.3.

12.8 Cumulative effects

- 12.8.1 The potential for likely significant effects on the environment resulting from developments in the area coming forward at the same time as the Proposed Development have been considered.
- 12.8.2 The schemes listed in Table 4.1 have been considered for the cumulative assessment.

Construction Employment

- 12.8.3 The Proposed Development together with the cumulative developments would be expected to generate employment opportunities during demolition and construction. It is not feasible to make detailed projections of the construction employment given the high number of new developments and limited detail on the construction materials, building forms, and duration of construction.
- 12.8.4 The baseline assessment found that the construction industry account for 5% (4,500 people) of total employment in Cherwell, and 6% in the South East (253,000 people). The construction of these developments would support construction firms operating in Cherwell, the South East region, and the wider UK economy.
- 12.8.5 The Proposed Development is expected to deliver 610 net additional jobs per annum over a 3 year construction period (2023-2025), and deliver 300,000 sq.m GEA of logistics and ancillary office floorspace. Considering it is estimated that the cumulative developments will deliver over 1,000,000 sq.m (GIA) of floorspace, this is a significant increase upon the Proposed Development.
- 12.8.6 It is judged that the cumulative development will have a medium positive impact, and considering the sensitivity is low, it is likely that the overall impact will remain minor beneficial.

Operational Employment

- 12.8.7 The cumulative developments would support job creation in the local area. It is not feasible to make detailed projections on the number of jobs created given the high number of new development and limited detail. However, from the listed development there could be at least:

- 1,175 residential units
- 60 close care dwellings
- 498 room hotel
- 13,635 sq.m (GIA) light industrial
- 72,459 sq.m (GIA) industrial
- 992,734 sq.m (GIA) warehouse
- 7,964 sq.m (GIA) office
- 1,400 sq.m (GIA) meeting space
- 3,740 sq.m (GIA) amusement and entertainment
- 1,000 sq.m (GIA) restaurant
- 8,340 sq.m (GIA) waterpark
- 929 sq.m (GIA) retail
- 670 sq.m (GIA) medical centre
- 925 sq.m (GIA) community
- 1.5 FE to 2 FE of primary education and 1.5 FE of secondary education

12.8.8 Should the identified cumulative schemes come forward in the form summarised above, they would generate approximately 15,700 on-site jobs.

12.8.9 Table 12.13 presents the assumptions used to calculate the employment associated with the cumulative schemes.

Table 12.13 Cumulative Development Employment Assumptions

Use	Leakage	Displacement	Multiplier	Vacancy
Homeworkers	0%	0%	1.60	0%
Hotels	33%	25%	1.10	10%
Schools	39%	25%	1.00	0%
Office	35%	25%	1.60	13%
Meeting Space	35%	25%	1.60	10%
Light Industrial	36%	25%	2.20	2%
Industrial	36%	25%	2.20	8%
Warehouse	34%	25%	1.60	3%
Retail	33%	25%	1.10	9%
Restaurants and Cafes	33%	25%	1.10	10%
Community	39%	25%	1.20	10%
Care Homes	39%	25%	1.00	10%
GP Surgery	39%	25%	1.10	10%
Amusement and Entertainment	33%	25%	1.60	10%
Waterpark	33%	25%	1.60	10%

Notes:

- Leakage assumptions are based on Census 2011 and comprise the proportion of employees with a commuting distance longer than 10km.
- Displacement effects are based upon the Homes and Communities Agency Additionality Guide (2014).
- ONS Input-Output Analytical Tables 2015 are used to estimate multiplier effects.
- Vacancy rates are based upon CoStar local market data.

12.8.10 Table 12.14 below estimates the possible jobs associated with the operation of the cumulative developments.

Table 12.14 Cumulative Developments Operational Employment

	Steps Involved	Cumulative Developments
A	Workers on-site (gross, direct)	15,738
B	Leakage (0-39%)	-5,331
C	On-site jobs (direct, for residents from the impact area) (A+B)	10,407
D	Displacement (25%)	-2,550
E	Multiplier (1.00-2.20)	5,235
F	Off-site employment induced by operational employment (net, indirect) (D+E)	2,685
G	Net additional employment from operation of Proposed Development (C+F)	13,092

Source: Savills (2021)

12.8.11 Therefore it is estimated that overall, 13,100 on and off-site jobs would be created. The magnitude of employment is considered to be high positive. The sensitivity of employees is low. Therefore the cumulative effect is predicted to be moderate beneficial over the long term.

12.9 Summary

12.9.1 The baseline research showed that the population of the Local Area in 2020 was 11,369 people.

12.9.2 The percentage of the population aged 0-15 years in the Local Area (25%) is higher than in Cherwell (20%), the South East of England (19%), and England (19%) average. The working age population is lower in the Local Area (59%) than in Cherwell (61%), South East of England (61%) and England (62%) average. The Local Area has the lowest percentage of the population over 65 years (16%) compared to Cherwell (18%), South East of England (20%), and England average (19%).

12.9.3 The population growth over the 2020 baseline conditions estimates that Cherwell's population is projected to increase by 3% by 2025, which is a greater rate of growth compared to regional projections (2%), and is consistent with national projections (3%).

12.9.4 The unemployment rate within Cherwell for the working aged population in 2021 stood at 3.0%, which is lower than the South East of England (4.1%), and the average for Great Britain (5.0%).

12.9.5 Cherwell has a higher proportion of its population with an NVQ4 and above qualification (48.6%), compared to the South East of England (45.1%), and the average for Great Britain (43.1%).

12.9.6 Cherwell has a lower percentage of residents employed in highly-skilled occupations (Managerial, Professional, and Technical positions) at 47.1%, compared to 53.0% in the South East and 50.0% in Great Britain.

12.9.7 According to 2020 BRES data, there are 4,500 jobs in the Local Area. The largest sector in the Professional, Scientific and Technical Sector, accounting for 13.0% of jobs, which is greater than proportions in Cherwell (7.0%), South East (9.0%) and England (9.0%).

12.9.8 With respect to deprivation, at the Local Authority Level, Cherwell ranks 217 out of 317 local authority districts in England (with 1 being the most deprived area). At the LSOA level, the site is located in Cherwell 011B which ranks 15,914 out of 32,844 LSOAs in England (where 1 is the most deprived).

- 12.9.9 The construction of the Proposed Development is anticipated to deliver 500 on-site jobs per annum during the construction period of 3 years. Once leakage, displacement, and multiplier effects are considered, it is anticipated there will be a net addition of 610 jobs per annum. This has been judged to be a minor beneficial effect over the short term⁹.
- 12.9.10 The operation of the Proposed Development is expected to deliver 3,060 on-site jobs per annum during its lifetime. Once leakage, displacement and multiplier effect are considered, it is anticipated there will be 2,430 jobs supported. Therefore the operational jobs in the Proposed Development are predicted to be moderate beneficial.
- 12.9.11 Due to the increase in employment from the Proposed Development, the GVA is estimated at £148 million per annum.
- 12.9.12 Development in the surrounding area has also been considered. The cumulative effect of development on construction and operational employment is anticipated to be minor and moderate beneficial respectively.

⁹ A construction period of 3 years presents a 'worst-case' scenario as the construction may be delivered in 2 years. If the construction period is 2 years, this will result in a higher number of average on-site construction jobs per annum.

12.10 References

- Ministry of Housing, Communities and Local Government (MHCLG) (2021) National Planning Policy Framework.
- Oxfordshire Partnership (2021) Oxfordshire Plan Regulation 18 (Part 2) Consultation Document.
- Cherwell District Council (2015) The Cherwell Local Plan 2011-2031.
- Cherwell District Council (2018) Developer Contributions Supplementary Planning Document (SDP).
- Cherwell District Council. Mid-Cherwell Neighbourhood Plan 2018-2031.
- MHCLG (Live Document) Planning Practice Guidance.
- MHCLG (2019) Index of Multiple Deprivation.
- Office for National Statistics (ONS) (2011) Census.
- ONS (2015) Input Output Tables.
- ONS (2021) Region by Industry Labour Productivity.
- Building cost Information Services (BCIS) (2021) Average Price Calculator.
- Department for Business, Energy, and Industrial Strategy (2020) Business Population Estimates.
- ONS (2021) Mid-2020 Population Estimates.
- ONS (2021) Claimant Count by Unitary and Local Authority.
- ONS (2021) Annual Population Survey.
- ONS (2020) Annual Population Survey.
- ONS (2018) Household Projections.
- Homes and Communities Agency (HCA) (2015) Employment Density Guide.
- HCA (2014) Additionality Guide.
- Business Register and Employment Survey (BRES) (2020).

Table 12.15 Summary of effects

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction phase					
Employment for Local Residents	Low	Temporary, Local	None required	Beneficial	Not Significant
Operational phase					
Employment for Local Residents	Low	Permanent, Local	None required	Beneficial	Not significant

13 Climate change

13.1 Introduction

- 13.1.1 This chapter assesses the effects of the proposed development (see chapter 3 and the Parameters Plan) in relation to climate change. It considers impacts that may arise as a result of the proposed development on receptors sensitive to climate change.
- 13.1.2 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, the mitigation measures required to prevent, reduce, or offset the impacts and the residual impacts.
- 13.1.3 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 CO₂ equivalent (CO₂eq).

13.2 Policy Context

- 13.2.1 Details of planning policy and legislation relating to Climate Change is provided in the following paragraphs.

Legislative Background

UK Net Zero Emissions by 2050

- 13.2.2 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.

Planning Policy Context

National Planning Policy Framework

- 13.2.3 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

- 13.2.4 With respect to energy considerations, the following policies are relevant to Climate Change and the district's development.
- 13.2.5 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'.*

- 13.2.6 *'Policy PSD 1: 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'.*
- 13.2.7 *'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'.*
- 13.2.8 *'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.*
- 13.2.9 *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'.*
- 13.2.10 *'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'.*
- 13.2.11 *'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'.*
- 13.2.12 *'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 1,000m2 floorspace'.*

13.2.13 *'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 1,000m² floorspace'*

13.2.14 *'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'.*

13.2.15 *'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'.*

13.2.16 *'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

13.2.17 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

13.2.18 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.'*

13.2.19 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

13.2.20 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.’*

13.3 Assessment methodology

13.3.1 In accordance with the EIA regulations (2017), this chapter will address:

- The impact of the project on climate change.
- The vulnerability of the project to climate change (climate change resilience).

Impact of the project on climate change

Construction impacts

13.3.2 Given that the scheme 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 the early 2000's.

Operational impacts

13.3.3 Data from the Transport Assessment has been used to determine operational transport related CO_{2eq} emissions. An assessment has been undertaken by Dunwoody 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

13.3.4 According to the IEMA guidance (IEMA, 2017), 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 13.1. It is assumed that the development will be constructed from 2023 and will become operational in 2025. 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 13.1 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

13.3.5 Significance will be determined as per Table 13.2.

Table 13.2 Significance

Low magnitude	Minor significance
Medium magnitude	Moderate significance
High magnitude	Major significance

13.3.6 Mitigation measures which are already being incorporated within the development will be taken into account when determining the significance.

Climate Change Resilience Assessment

13.3.7 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:

13.3.8 **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/prevaling 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/prevaling climatic conditions.
- High susceptibility: receptor has no ability to withstand/not be substantially altered by the projected changes to the existing/prevaling 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/prevaling 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 13.3 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)

13.3.9 **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 13.4 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)

13.3.10 **Significance:** The potential significance of each impact will be based on the magnitude of the impact and the sensitivity of the receptor.

Table 13.5 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)

Study area

13.3.11 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.

13.3.12 The study area for the climate change resilience assessment is the Proposed Development itself.

Assumption and Limitations

- 13.3.13 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 and will vary depending on the construction materials, construction methods etc.
- 13.3.14 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.
- 13.3.15 The estimation of Energy use in Occupation for the proposed development is not precise due to the variation in the nature of storage and operation. The warehouses may require specific temperature control to protect stock as well as maintaining good working conditions for staff.
- 13.3.16 The assessment is therefore based on estimated figures using typical load profiles, normal working practices and the impact of external climate conditions. Actual carbon emissions are likely to be different to the estimations provided, depending on both detailed design and operational use of the buildings. It is not possible to fully understand, at this time, how energy use and emissions will vary, but it has been assumed that energy use will remain the same, year on year, throughout the assessment period. Unregulated energy use could vary substantially when the proposed development is operational, but it is not possible to accurately predict this energy use.
- 13.3.17 The energy related CO_{2eq} figures represent 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.
- 13.3.18 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.

13.4 Baseline conditions

Impact of the project on climate change

- 13.4.1 In relation to the impact of the project on climate change, i.e. carbon emissions, the baseline is a scenario whereby the Proposed Development does not proceed.

Climate change resilience

Current climate

- 13.4.2 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 August 2020) 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 13.6.

Table 13.6 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

- 13.4.3 The Met Office baseline climate averages for the South of England region (Met Office website, accessed August 2020) 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 13.7.

Table 13.7 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

- 13.4.4 The Met Office website (accessed August 2020) 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.

Future climate

- 13.4.5 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 13.8 provides a summary of predications for summer and winter changes by the 2070s (Met Office, 2018).

Table 13.8 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

13.5 Assessment of Effects

Impact of the project on climate change

Construction

- 13.5.1 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.
- 13.5.2 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).

- 13.5.3 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 the early 2000's. Based on the worst-case benchmark of 1100kgCO₂/m², the proposed development (300,000m²) can be estimated to result in carbon emissions of 330,000,000kgCO₂. A Life Cycle Assessment will be undertaken during the 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

- 13.5.4 It is estimated that the construction of the Proposed Development may result in 330,000,000 kgCO₂. Based on the UK Carbon Budget period 4 (2023-2037), this equates to 0.0169% of the overall UK Carbon Budget. Based on these figures, the construction stage may result in an adverse impact of medium magnitude. Significance prior to any additional mitigation is therefore considered to be moderate.

Operation

Operational transport

- 13.5.5 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 (Chapter 5 of the ES) includes an estimation of the additional road trips generated by the development. Information has been provided from Vectos, the transport consultants on the average trip distance. 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 as shown in Table 13.9.

Table 13.9 Potential CO_{2eq} emissions associated with transport

Type	Daily (Weekday) Trips	Average trip distance (km)	Average km per year	Carbon Factor	Total Yearly Average kg CO _{2eq}
Car	5765	25.4	38,072,060	0.17148	6,528,596.85
HGV	2241	107	62,344,620	0.86407	53,870,115.80
Total					60,398,712.65

- 13.5.6 Please note this figure does not include transport of staff using methods other than the private car, as this information was not readily available.

Operational Energy

- 13.5.7 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 not precise because at present the full details of the plant and equipment to be installed are not known.
- 13.5.8 A Report on Energy Use in Occupation has been prepared by Dunwoody (2021) which considers a typical B8 warehouse, with a floor area of 20,000m². The assessment is based on estimated figures using typical load profiles, normal working practices and the impact of external climate conditions.
- 13.5.9 Dunwoody has confirmed that the total building energy intensity for a 20,000m² B8 unit including the office, warehouse and electric vehicle charging is 82.5kWhr/m² per annum, and that this

figure can be utilised as a typical intensity. Therefore, based on a total floor area of 300,000m², the total building energy use across the site is estimated as 24,750,000 kWhr per annum. It is assumed 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. This indicates a figure of 5,255,168kg CO_{2eq}/annum.

Summary of operational impacts

13.5.10 In terms of transport related emissions, it is estimated that the Proposed Development could result in 60,398,712kg CO_{2eq}/annum.

13.5.11 In terms of emissions from building operations, it is estimated that the Proposed Development could result in 5,255,168kg CO_{2eq}/annum.

13.5.12 Therefore, the total emissions during the operation of the development are 65,653,880kg CO_{2eq}/annum or 65,654 tonnes.

13.5.13 Based on the UK Carbon Budget periods, and assuming that the development is operational by 2025, this equates to:

- Budget 4 (2023-2027): 131,308 tonnes CO₂ out of 1,950MtCO₂ (0.007%).
- Budget 5 (2028-2032): 328,270 tonnes CO₂ out of 1,765MtCO₂ (0.019%).
- Budget 6 (2033-2037): 328,270 tonnes CO₂ out of 965MtCO₂ (0.034%).

13.5.14 The above assessment does not consider emissions beyond 2037.

13.5.15 These figures are a worst-case assumption without mitigation. They assume that the CO₂ 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.

13.5.16 Based on these figures, the magnitude of the operational impact is considered to be medium. Significance is therefore considered to be moderate.

Climate Change Resilience Assessment

13.5.17 Given the relatively short timescale for the construction phase 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.

13.5.18 Table 13.10 identifies the potential impacts associated with climate change, the receptors affected (and the sensitivity of those receptors), the magnitude of the impact (likelihood*consequence of impact) and the overall significance (based on mitigation already incorporated).

Table 13.10 Climate Change Resilience Assessment

Hazard associated with climate change	Impact	Receptor	Magnitude			Significance
			Likelihood	Consequence	Summary of magnitude	
Increased flooding	<p>Rising Flood levels can cause inundation of basements and ground floor accommodation.</p> <p>The site is located in Flood Zone 1 which has a 'low' probability of fluvial flooding. The FRA shows that the site will not be inundated with floodwater during the 1 in 100 year (+15%) or 1 in 1000 year events. The majority of the site has very low risk of surface water flooding with a chance of flooding of less than 1 in 1000 (0.1%) years). However, small areas of the site have a low to medium risk of surface water flooding with a chance of flooding of 1 in 1000 (0.1%) years to greater than 1 in 30 (3.3%) years. See Chapter 11 and the FRA.</p>	Buildings and infrastructure (Medium sensitivity)	1	3	Medium	Moderate
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
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
	<p>Increased rate of run off risks of system inundation leading to localised flooding.</p> <p>The site is located in Flood Zone 1 which has a 'low' probability of fluvial flooding. The FRA shows that the site will not be inundated</p>	Buildings and infrastructure (Medium sensitivity)	1	3	Medium	Moderate

Hazard associated with climate change	Impact	Receptor	Magnitude			Significance
			Likelihood	Consequence	Summary of magnitude	
	with floodwater for all events up to and including the 1 in 100 year (+15%) or 1 in 1000 year events. The majority of the site has very low risk of surface water flooding with a chance of flooding of less than 1 in 1000 (0.1%) years). However, small areas of the site have a low to medium risk of surface water flooding with a chance of flooding of 1 in 1000 (0.1%) years to greater than 1 in 30 (3.3%) years. See Chapter 11 and the FRA.					
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
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
More precipitation e.g. rain and snow	Increased rate of run off risks of system inundation leading to localised flooding.	Buildings and infrastructure (Medium sensitivity)	1	3	Medium	Moderate
	The site is located in Flood Zone 1 which has a 'low' probability of fluvial flooding. The FRA shows that the site will not be inundated					

Hazard associated with climate change	Impact	Receptor	Magnitude			Significance
			Likelihood	Consequence	Summary of magnitude	
	with floodwater during the 1 in 100 year (+15%) or 1 in 1000 year events. The majority of the site has very low risk of surface water flooding with a chance of flooding of less than 1 in 1000 (0.1%) years). However, small areas of the site have a low to medium risk of surface water flooding with a chance of flooding of 1 in 1000 (0.1%) years to greater than 1 in 30 (3.3%) years. See Chapter 11 and the FRA.					
	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
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

13.5.19 The Climate Change Resilience Assessment identifies that climate change is likely to result in a number of hazards that may impact upon the development.

13.6 Mitigation and Monitoring

Impact of the project on climate change

Construction

- 13.6.1 Tritax Symmetry has made a commitment that all their new commercial buildings will be ‘Net Zero Carbon in Construction’. 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).
- 13.6.2 Management of construction effects will form part of a comprehensive and auditable Construction Environmental Management Plan (CEMP). The building will also be assessed under BREEAM and a minimum ‘Very Good’ rating targeted. As part of the 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.

Operation

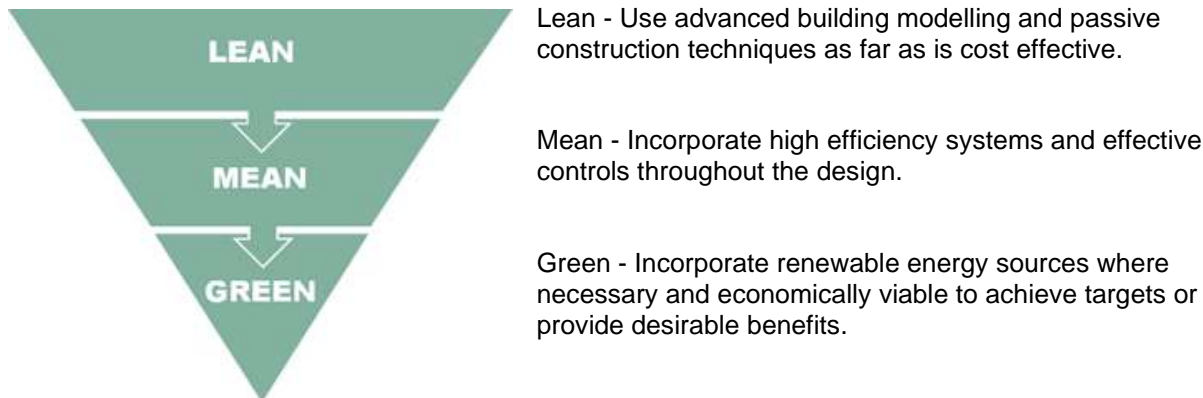
Transport Related Carbon

- 13.6.3 The Travel Plan (Vectos, 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.
- 13.6.4 These measures include:
- On site covered cycle parking.
 - Shared pedestrian/cycle routes.
 - 25% of spaces to be electric vehicle recharging facilities.

Energy Related Carbon

- 13.6.5 To mitigate for the anticipated operational energy related emissions, the Proposed Development will use the ‘energy hierarchy’ to reduce carbon emissions.

Figure 13.1 The Energy Hierarchy



Reduce demand (passive measures)

- 13.6.6 The first level in the hierarchy is to reduce operational energy usage using passive measures included within the design of the development. These will reduce energy use and the associated CO₂ emissions and include: U values which exceed Building Regulation requirements; Engineered facade design; Reduced air permeability.
- 13.6.7 U Values: Limiting heat losses across the entire building envelope will future proof the energy efficiency of the development over its whole life. To achieve this, the fabric thermal U-Value requirements as detailed within Approved Document L2A 2013 of the Building Regulations will be improved upon.
- 13.6.8 The targeted values will be confirmed during the detailed design stage of the buildings in conjunction with finalisation of the energy efficiency measures included.
- 13.6.9 Engineered Facade Design: Wall glazing and rooflights will maximise the use of natural daylight to offset demand for artificial lighting. This will maximise passive solar gains, and the façade will also be designed to minimise thermal losses through the use of high performance glazing and enhanced insulation levels above the minimum set down by Building Regulations.
- 13.6.10 Reduced Air Permeability: A significant percentage of heat loss from buildings is due to air infiltration associated with poor air tightness. By improving on the air tightness of the building it is possible to reduce infiltration rates and thus reduce the heat losses, energy use and the associated CO₂ emissions. The development will be constructed to improved building air tightness criteria beyond the level required to comply with the Building Regulations.

Energy Efficiency

- 13.6.11 The next level in the energy hierarchy is to maximise energy efficiency. High efficiency systems, plant, controls and equipment will be incorporated into the development as follows:
- Energy efficient LED lighting - Internal lighting within the process and office areas will incorporate energy efficient LED lighting where practicable.
 - Enhanced lighting controls - Automatic presence detection will be included in appropriate areas of the building. This form of control will ensure lights are automatically switched off during periods of non-occupancy. External lighting will be designed to incorporate energy efficient luminaires and an automatic lighting control system utilising daylight sensors and time clock control to ensure energy-efficient operation of the lighting.
 - Optimised plant controls - Control of heating plant will be optimised, and weather compensated to ensure plant operates as close to demand as possible and not a full capacity.
 - Variable speed drives - Variable speed drives will be installed on circulation pumps and ventilation fans to allow the speed of the respective motors to be amended by the automatic controls to suit changing load of the building. This will ensure energy usage matches demand requirements thus reducing the carbon emissions to a minimum based on end user occupation.
 - Inclusion of heat recovery on ventilation systems - The ventilation systems installed within the development will incorporate heat recovery within the air handling plant to recover heat from the air exhausted to heat the incoming fresh air and therefore reduce energy usage. The air handling plant will have a low specific fan power to minimise the energy used by the fans.

Renewable / Low Carbon Technology

13.6.12 The final level in the energy hierarchy is to incorporate renewables / low carbon technology. It is anticipated that the following will be incorporated:

- Photovoltaics (PVs) - Planning permission is sought for a PV array extending to 100% of the useable roof area (i.e. the omission of space taken by roof lights; safe working and the roof signage). The level of PVs installed will be subject to individual occupier requirements or a technical ability and viability in the exportation of electricity generated by the PV array into the National Grid. This is to prevent installation of PV panels that would then not produce energy, and allows the most up to date technology to be fitted when required. A minimum of 18% of PV of the array will be installed prior to the use commencing. This will provide the normal base load of electricity to the unit prior to occupier specific requirements.
- Air source heat pumps - These technologies provide the most suitable renewable technology for use to heat and cool the office areas. They are highly energy efficient, do not use fossil fuel and are low carbon emission.

Climate Change Resilience Assessment

13.6.13 The following measures should be incorporated into the design of the development to ensure it is climate change resilient:

- The flood risk at the site is to be managed and mitigated by using a number of risk management techniques, and mitigation strategies to manage and reduce the overall flood risk at the site. With regards to pluvial flood risk, the site to be designed with a 40% climate change allowance for rainfall.
- 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 to be fully designed for snow loads.
- Selection of hardy plants for the landscaping scheme.
- Fully investigate ground conditions and ensure the structure and main slab components are designed to accommodate ground conditions.

13.7 Residual Impacts – during construction / operation

Impact of the Project on Climate Change

Construction

- 13.7.1 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

- 13.7.2 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 moderate significant effect.

Climate Change Resilience Assessment

- 13.7.3 The Climate Change Resilience Assessment has been repeated, this time incorporating the additional mitigation, see Table 13.11 below.

Table 13.11 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.	The flood risk at the site, will be managed and mitigated by using a number of risk management techniques, and mitigation strategies to manage and reduce the overall flood risk at the site. With regards to pluvial flood risk, the site has been designed with a 40% climate change allowance for rainfall.	Buildings and infrastructure (Medium sensitivity)	1	2	Medium	Moderate
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.	Planting designed to thrive across extremes of temperature and, precipitation events	Planting (Medium sensitivity)	1	2	Low	Minor
Wetter winters (including increased moisture and	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	Buildings and infrastructure (Medium sensitivity)	2	2	Medium	Moderate

Hazard associated with climate change	Impact	Mitigation	Receptor	Magnitude			Significance
				Likelihood	Consequence	Summary of magnitude	
driving rain)		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.					
	Increased rate of run off risks of system inundation leading to localised flooding. See Chapter 11 and the FRA.	The flood risk at the site, will be managed and mitigated by using a number of risk management techniques, and mitigation strategies to manage and reduce the overall flood risk at the site. With regards to pluvial flood risk, the site has been designed with a 40% climate change allowance for rainfall.	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
	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	Roof and external wall materials will	Buildings and	2	2	Medium	Moderate

Hazard associated with climate change	Impact	Mitigation	Receptor	Magnitude			Significance
				Likelihood	Consequence	Summary of magnitude	
	the durability of roof and external wall materials.	be guaranteed to perform for a minimum of 25 years and in reality will do so for much longer.	infrastructure (Medium sensitivity)				
	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
	Landscape planting may be affected.	Planting designed to thrive across extremes of temperature and, precipitation events	Planting (Medium sensitivity)	1	2	Low	Minor
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.	The flood risk at the site, will be managed and mitigated by using a number of risk management techniques, and mitigation strategies to manage and reduce the overall flood risk at the site. With regards to pluvial flood risk, the site has been designed with a 40% climate change allowance for rainfall.	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

Hazard associated with climate change	Impact	Mitigation	Receptor	Magnitude			Significance
				Likelihood	Consequence	Summary of magnitude	
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

13.7.4 This assessment identifies that the additional mitigation measures will result in impacts of minor to moderate adverse significance.

13.8 Cumulative Impacts

- 13.8.1 Regarding intra-project cumulative effects, there are a number of potential interactions between the future effects of climate change and other ES topics, for example, in relation to Flood Risk and Transport. Where necessary, reference has been made to the relevant chapter / supporting documentation.
- 13.8.2 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 neighbouring development.

13.9 Conclusion

Impact of the project on climate change

- 13.9.1 In terms of construction impacts, the development will be Net Zero Carbon. If there are any residual embodied 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. The effect will therefore be negligible, not significant.
- 13.9.2 In terms of operational impacts, the combined operational transport and energy related CO_{2eq} emissions of the development is predicted to result in a medium magnitude adverse effect. Significance is considered to be moderate.

Climate Change Resilience Assessment

- 13.9.3 The proposed development is likely to be at increased risk of climate change related hazards. Given the mitigation measures identified this is considered to have potential for adverse impacts of minor to moderate significance.
- 13.9.4 A summary of effects is provided in Table 13.12 overleaf.

Table 13.12 Summary of effects

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction phase					
Global Climate	High	Construction-related CO _{2eq} emissions	Achieve Net Zero Carbon in Construction Construction Environmental Management Plan	Negligible	Not Significant
Operational phase					
Global Climate	High	Operational CO _{2eq} emissions	Use of Energy Hierarchy Installation of renewable technology (.e.g PVs) Implementation of Travel Plan Measures	Adverse	Significant
Buildings & Infrastructure	Medium	Rising Flood Levels / increased rate of run-off causing inundation	Flood Risk Management Site designed with a 40% climate change allowance for rainfall	Adverse	Significant
		High winds resulting in structural damage and reduction in mechanical ventilation capacity	Design of building and roof to mitigate against impact of high winds Intake and exhaust positions protected from direct wind impact	Adverse	Significant
		Extreme cold events leading to plant failure due to freezing or defrost cycles	Plant selection based on projected temperatures. Include use of waste heat on air based equipment to raise operating temperatures.	Adverse	Significant
		Drying soils could result in structural damage to buildings	Ensure design of foundations is mitigated against the risk of ground shrinkage and movement.	Adverse	Significant

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
		Increased moisture and rain causing damage to building fabric and services	External fabric designed as weathertight structure Roof and external walls guaranteed to perform for 25 years. Roofs designed for snow loads and to avoid ponding Intake and exhaust positions protected from water ingress	Adverse	Significant
Building occupants	Medium	Extremes of temperature resulting in building services 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	Adverse	Significant
		Droughts may decrease water available	Water supplies and storage to include allowance for more potable water consumption. Low water use sanitary fittings specified. Pulsed output water meters will be installed on the water supply.	Adverse	Significant
Planting	Medium	Planting affected by extreme temperatures and drought	Planting design to thrive across extremes of temperature and precipitation events.	Adverse	Significant

13.10 References

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14 Ground conditions and soils

14.1 Introduction

- 14.1.1 This chapter identifies the existing soil and geological conditions and development constraints, evaluates the potential for contamination and assesses the potential effects on ground conditions during both the construction and operational phases. For full details please refer to Chapter 3 for details on the Proposed Development.
- 14.1.2 This 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 from changes in topography, ground contamination, ground gas regime and the potential for re-use of soils, the mitigation measures required to prevent, reduce, or offset the impacts and the residual impacts. It has been written by Tier Environmental Ltd.
- 14.1.3 This chapter is supported by the Preliminary Risk Assessment for Symmetry Park Ardley (Ref TE1628-TE-00-XX-RP-GE-001-V02) Appendix 14.1.
- 14.1.4 A ground investigation will be undertaken to assess the ground conditions for geotechnical and geo-environmental parameters. If required, a Remediation Strategy will also be produced based on the findings of the ground investigation and the risks to controlled waters and human health.

14.2 Assessment Methodology

Policy and Planning Guidance

- 14.2.1 The National Planning Policy Framework (2021) has been utilised for this chapter and the following legislation forms the framework for undertaking this chapter:
- Construction (Design and Management) Regulations 2007;
 - Town and Country Planning Act 1990;
 - Environmental Protection Act 1990, Part 2A, Section 78;
 - Environmental Protection Act 1995, Section 57; and,
 - Contaminated Land (England) Regulations, 2006.
- 14.2.2 The following guidance has been considered when undertaking this section of the ES:
- Environmental Protection Act 1990, Part 2A Contaminated Land Statutory Guidance; 2012;
 - Land Contamination Risk Management, DEFRA, 2020;
 - CIRIA C552 'Contaminated Land Risk Assessment – A guide to good practice 2001'; and,
 - Local Planning Practice Guidance.

Assessment Methodology

- 14.2.3 This ES has been informed by information contained within the following reports to enable the establishment of baseline conditions and assessment of potential contaminant pathways which may, if unmitigated, present a potentially active contaminant linkage.
- 14.2.4 The Preliminary Risk Assessment for Symmetry Park Ardley (Ref TE1628-TE-00-XX-RP-GE-001-V02) by Tier Environmental includes Groundsure Enviro Insight and Geo Insight reports which presented data from the Local Authority, Environment Agency, British Geological Survey and the Coal Authority.
- 14.2.5 A conceptual site model (CSM) and qualitative risk assessment have been prepared to identify

potential sources, pathways and receptors for any geo-environmental contamination or potential contaminants of concern in respect to human health and controlled waters. The approach adopted follows the Environment Agency's Land Contamination Risk Management.

- 14.2.6 For each of the potential contaminant linkages, an estimate has been made of the potential severity of the risk and the likelihood of the risk occurring. An overall evaluation of the level of risk is gained from a comparison of the severity and likelihood.
- 14.2.7 The assessment of risks associated with each of the potential contaminant linkages identified at the Site is used as a basis for assessment of the Significance during both the Construction Phase and Operation Phase of the Proposed Development.
- 14.2.8 The spatial scope for this assessment includes both on-site and off-site human health and controlled waters receptors. Where multiple receptors of varying sensitivity are present, such as with neighbouring properties, the most sensitive have been selected when determining the magnitude of the effect.
- 14.2.9 The following will be considered in the assessment:
- Geology and soils;
 - Controlled waters;
 - Imported soils;
 - Ground gas; and,
 - Ground stability.

Assessment Criteria

- 14.2.10 The assessment takes into account any mitigation measures to be applied in the implementation of the development proposals in respect to the Ground Conditions.
- 14.2.11 The significance of effect is determined by considering the magnitude of the effect against the sensitivity of the environmental feature. A matrix is used to combine magnitude and sensitivity to generate the overall significance of the effect, as illustrated in Table 14.1

Table 14.1 Assessment Matrix

Sensitivity of Receptor	Magnitude of Impact			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Minor	Minor	Moderate
Medium	Negligible	Minor	Moderate	Major
High	Negligible	Moderate	Major	Major

- 14.2.12 The criteria for determining any effects associated with the proposal are summarised in Table 14.2.

Table 14.2 Assessment of effects

Significance Criteria	Definition
Major Adverse	Considerable detrimental impact (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability/ legislation/ policy standards
Moderate Adverse	Limited detrimental impact (by extent, duration or magnitude) that may be considered significant
Minor Adverse	Slight, very short or highly localised detrimental impact
Negligible	No appreciable impact on the attribute, or the attribute of negligible importance

Minor Beneficial	Advantageous or positive impact to an environmental resource or receptor (e.g., improvement in groundwater quality) of slight, very short or highly localised impact of no significance
Moderate Beneficial	Advantageous or positive impact to an environmental resource or receptor (e.g., improvement in groundwater quality) of limited impact (by extent, duration or magnitude) that may be considered significant
Major Beneficial	Advantageous or positive impact to an environmental resource or receptor (e.g., improvement in groundwater quality) of considerable impact (by extent, duration or magnitude) of more than local significance

Scope of Assessment

14.2.13 The scope of the assessment is to understand the risks from contaminative processes and actions that could have led to potential contamination of the ground and controlled waters. The first stage is to assess the risks with a Preliminary Risk Assessment in line with Land Contamination Risk Management.

Consultation

14.2.14 At this stage there is no reason to liaise with statutory or regulatory bodies based on the findings of the Preliminary Risk Assessment from potential contaminants of concern.

Assumptions and Limitations

14.2.15 The Site is to be developed for logistics (Use Class B8) and ancillary office (Use Class E(g)(i)) floorspace with associated infrastructure. Ground levels will be regraded to accommodate the development with a cut/fill balance to maximise the sustainability of the enabling works.

14.2.16 There may be other conditions prevailing on the Site which have not been revealed by these investigations and which have not been taken into account by this report.

14.3 Baseline conditions

Current Baseline

14.3.1 The majority of the Site is currently in agricultural use and extends across several open fields. The site is located to the east of the Baynards Green Roundabout, off the A43 and B4100, Bicester, OX27 7SS. The surrounding land use of the Site is primarily open fields used for agricultural purposes, and commercial properties located immediately west, including a petrol station 70m west.

Geology and Ground Conditions

14.3.2 The current baseline is based on the Preliminary Risk Assessment report and will be expanded upon and confirmed by future ground investigation work to inform the detailed design based on the geo-environmental and geotechnical parameters.

14.3.3 The geology of the Site is anticipated to comprise:

Made Ground

- A small, localised area of artificial ground in the north-western part of the Site
- Localised Made Ground may be present due to agricultural land uses and a former well
- The former potentially infilled 'old quarry' in the far southeast of the Site

Superficial Deposits

- The vast majority of the Site is not shown to be underlain by superficial deposits; however, there is a small section of the far southern part of the Site shown to be underlain by Head

Deposits – comprising clay and silt.

Bedrock Geology

- White Limestone Formation – Limestone.
- Forest Marble Formation – Interbedded Limestone and Mudstone.
- Bladon Member – Interbedded Limestone and Mudstone.

14.3.4 The Site is in an area where between 1% and 3% of properties are likely to be above the Action Level for radon; however, no protection measures are required unless stipulated by Local Building Control.

Controlled Waters

Surface Waters

14.3.5 The nearest surface water is 5m south and comprises an inland river not influenced by normal tidal action. Padbury Brook is 45m south and a further inland river not influenced by normal tidal action is located 175m southeast.

Groundwaters and Aquifer Designation - Superficial Deposits

14.3.6 The Head Deposits have a Secondary A Aquifer designation.

Groundwaters and Aquifer Designation - Bedrock Deposits

14.3.7 The Forest Marble Formation and Bladon Member have a Secondary A Aquifer designation.

14.3.8 The White Limestone Formation has a Principal Aquifer designation.

Preliminary Contamination Assessment

14.3.9 The PRA Report highlighted the following potential issues with contaminants of concern:

- Made Ground - from the former well, localised due to agricultural land use and potentially infilled quarry in the southeast - moderate to low risk from asbestos, heavy metals, TPH, phenols, pH and PAH for direct contact, ingestion, dust inhalation, vapour inhalation, leaching and migration in groundwater and preferential pathways.
- The petrol station and former garage to the west of the Site - moderate /low risk from TPH, BTEX/MTBE via leaching and migration in groundwater.

Preliminary Ground Gas Assessment

14.3.10 Potential Made Ground on Site associated with the former well, localised artificial ground and potentially infilled quarry in the southeast and historic off-site infilled quarries - moderate risk from ground gases via inhalation and migration of ground gases / explosion pathways.

14.3.11 Shallow monitoring wells have been recommended within the footprint of the proposed building to confirm the conceptual site model in conjunction with monitoring of groundwater.

Further Investigations and Future Baseline

14.3.12 A detailed design ground investigation will be undertaken to assist with the development design phase, this will incorporate targeting the potential contaminative sources for geo-environmental issues and also obtain geotechnical data for design purposes.

14.3.13 Dependent on the findings of the ground investigation, a Remediation Strategy Options Appraisal and Remediation Strategy may be required in line with LCRM (Land Contamination Risk Management).

14.3.14 Any remedial/enabling works will consider the use of a Materials Management Plan and

Earthworks Specification to retain soils on site for reuse where the following criteria are met:

- A certainty of use in form of a cut and fill design;
- Chemically suitable for reuse; and,
- Geotechnically suitable for reuse.

14.3.15 This is in line with CL:AIRE Definition of Waste: Code of Practice and is a sustainable way to reduce the carbon footprint of developments. Sustainable remediation is covered by CL:AIRE SuRF-UK Framework (2020).

14.4 Potential Impacts (prior to mitigation)

14.4.1 The majority of the Site is readily developable. Ground levels will be regraded to accommodate the proposed development with a cut/fill balance to maximise the sustainability of the enabling works.

Human Health Risk Assessment - Geology and Soils

14.4.2 A detailed risk assessment of the geology and soils is yet to be undertaken but based on the commentary from the PRA Report, the risk to human health will be localised and a low to moderate risk for construction workers and site end users.

14.4.3 Preliminary site strip and development preparatory works associated with the construction phase will create the potential for adverse impacts to construction workers due to oral, inhalation or dermal contact with harmful potential contaminants of concern present within Made Ground soils and/or groundwater and the inhalation of soil derived dust that are potentially locally impacted based on the PRA CSM. The potential generation of dust, including during any regrading works, may also pose a potential risk to adjacent site users. The unmitigated effect is moderate (adverse). These works are likely to be undertaken on a phased basis during the development of the site.

14.4.4 Construction activities that are likely to lead to exposure of construction workers to these soils include those listed below and it is anticipated that these works will be ongoing during the development works and will have a negligible effect:

- Excavation of material during regrading works, for foundations and working platforms;
- Excavations for installation of services/utilities; and,
- Stockpiles of arisings from reprofiling earthworks/construction works.

14.4.5 During the earthworks and construction, there is the potential for the release of dust to the atmosphere, which is addressed in Chapter 6: Air Quality.

Controlled Waters Risk Assessment

14.4.6 Adverse impacts to controlled waters may locally arise due to the mobilisation of potential contaminants of concern within the potentially locally impacted Made Ground, shallow soils and perched groundwaters and the creation of preferential pathways during the installation of foundations. This could allow potential contaminants of concern to impact the surface waters offsite, the underlying groundwater and potential off-site receptors. It is considered, however, that a uniform aquitard/aquiclude is not currently present between these soils and the underlying groundwater across the majority of the site, therefore they will have an unmitigated negligible effect on controlled waters in the short to long term. There is a potential for mobilisation of contaminants into the groundwater and surface waters. It is anticipated that unmitigated effects could be minor (adverse).

14.4.7 There is potential for introduction of contaminated materials to the ground or groundwater during the construction phase, such as the importation of unsuitable materials, the incorrect storage or spillages of materials such as paints, fuels or cement. Depending on the location of the spill, pollutants could infiltrate into the ground and contaminate groundwater, or run-off directly to watercourses and/or drainage systems. This is considered to be an unmitigated minor (adverse) impact.

14.4.8 The superficial and bedrock geology on Site is classed into Secondary A Aquifers and Principal Aquifers. It is not considered within the CSM that the groundwater is one continuous body, due to the potential for localised aquitards within some of the weathered bedrock geology. Ground investigations and post fieldwork monitoring will confirm the groundwater regime. Given the likely potential for localised contaminants of concern on site, localised areas of potential contamination may be present. Left unmitigated, the magnitude of effect could be minor (adverse).

Ground Gas

14.4.9 Currently there is limited information on the potential for ground gas on site for construction workers risk and site end users. There are several minor potential sources, such as localised Made Ground and infilled former quarries, that will be assessed and quantified during detailed ground investigations. If left unmitigated, ground gas may present a moderate (adverse) impact.

14.4.10 The Site is located in an area where between 1% and 3% of properties are likely to be above the Radon Action Level; however, no protection measures are required unless specified by Local Building Control. If left unmitigated, radon presents a negligible impact.

Imported Soils (if required)

14.4.11 Soils/aggregates may need to be imported for the installation of vibro stone columns (if implemented), a construction/working platform, beneath areas of hardstanding and as backfill to drainage/utilities. If left unmitigated, the importation of potentially contaminated soils/aggregates may have a moderate (adverse) impact.

Ground Stability and Geotechnical Hazards

14.4.12 Given the anticipated shallow ground conditions, there may be localised geotechnical issues for shallow soils. Left unmitigated, these may present a potential moderate (adverse) impact due to unacceptable total and/or differential settlements affecting the structural integrity of structures, services and infrastructure during the construction phase.

Foundations

14.4.13 Dependent upon the loadings and geotechnical properties of the bedrock, shallow spread foundations (potentially following ground improvement) may be suitable. It is likely from a geotechnical point of view that all foundations will be within the bedrock to avoid unacceptable settlements. These can create preferential pathways for potential contaminants of concern, if, unmitigated, may present a potential moderate (adverse) impact; to be confirmed during the proposed intrusive ground investigation.

Operational Phase

Human Health Risk Assessment - Geology and Soils

14.4.14 The proposed regrading works may result in the retention/relocation of potentially contaminated Made Ground within soft landscaped areas. If left unmitigated, this could result in minor/moderate (adverse) impacts in the long term. The proposed ground investigation and human health risk assessment will confirm these potential impacts.

Controlled Waters Risk Assessment

14.4.15 If contaminated soils and/or shallow groundwater are present within the proposed development area, these may have a minor/moderate adverse effect.

14.4.16 Assuming that any earthworks on Site and any imported soils are suitable for reuse/use and do not introduce any additional potential contaminants, the proposed development is considered to have a negligible effect on controlled waters in the short to long term.

Ground Gas Risk Assessment

14.4.17 The PRA assessed no significant potential sources of ground gas. However, there is the possibility of localised areas of Made Ground and off-site former quarries that could be potential sources. If left unmitigated, there is a potential impact moderate (adverse) to future site users and structures/services.

14.4.18 The Site is located in an area where between 1 and 3% of properties are likely to be above the Radon Action Level with regard to radon gas; however, no protection measures are required unless stipulated by Local Building Control. If left unmitigated, radon presents a negligible impact in the short to long term.

Imported Soils (if required)

14.4.19 Soils / aggregates may need to be imported for the installation of vibro stone columns, a construction/working platform, beneath areas of hardstanding and as backfill to drainage / utilities. If left unmitigated, the importation of potentially contaminated soils/aggregates may have a moderate (adverse) impact in the long term.

Ground Stability and Geotechnical Hazards

14.4.20 The development could cause issues with localised settlement in areas of differing geology in particularly the Head Deposits located in the far southern part of the development, and the 3 No. bedrock types located beneath the Site. If left unmitigated, it may present a potential moderate (adverse) impact to the structural integrity of buildings, infrastructure and utilities/services on site.

14.5 Mitigation

Demolition and Construction Phase Mitigation

14.5.1 Specific mitigation measures to address potential adverse impacts to construction personnel from potentially contaminated soil and ground gas risks during the site works may include but are not limited to:

- Selection of appropriate Personal Protective Equipment (PPE) (e.g., gloves and overalls).
- Monitoring of gas concentrations in excavations and at surface if required, and ensuring procedures are in place to manage this risk.
- Implementation of site rules such as washing hands before eating, no eating in the work area and possibly shower facilities located close to the site entrance.
- Clear signage of contaminated land.
- Adequate site security is required to prevent trespassers gaining access to the site during the demolition and construction phase.

14.5.2 These and other necessary best practice measures relating to management of ground conditions and related factors will be included within the Construction Environmental

Management Plan (CEMP). This includes dust management measures (see Chapter 6: Air Quality for further detail).

- 14.5.3 A Materials Management Plan (MMP) will be produced in accordance with the CL:AIRE Definition of Waste: Code of Practice (DoW CoP). The DoW CoP sets out good practice for the development industry to use when assessing whether excavated materials are classified as waste or not. It also allows the determination, on a site-specific basis, when treated excavated waste can cease to be waste for a particular use. Further, it describes an auditable system to demonstrate that this Code of Practice has been adhered to. If materials are dealt with in accordance with the DoW CoP, the Environment Agency (EA) considers that those materials are unlikely to be waste if they are used for the purpose of land development. This may be because the materials were never discarded in the first place, or because they have been submitted to a recovery operation which has been completed successfully so that they have ceased to be waste.

Human Health Risk Assessment - Geology and Soils

- 14.5.4 Detailed risk assessment from potentially contaminative sources on site is required to determine the risk to construction workers and future site end users, the Preliminary Risk Assessment has been undertaken and detailed ground investigation will determine the level of mitigation measures required. This will be undertaken in line with Land Contamination Risk Management (LCRM) and BS10175.

Protection of Controlled Waters

- 14.5.5 A detailed assessment of the controlled waters has not been undertaken and will be required to determine the potential risks to the surface waters and groundwaters. This will be undertaken with data from the detailed ground investigation.
- 14.5.6 Mitigation measures will be included within the CEMP, a Site Drainage Plan and as part of the Incident Response Plan. Mitigation will include:
- Protection of existing surface water (in line with Ecology report in Chapter 8).
 - Bunds and surface water management system will be used to prevent run-off entering watercourses.
 - Compounds will have hard surfacing to prevent infiltration from any spillages.
 - Any areas of localised contamination identified during the proposed ground investigation will be remediated/removed as appropriate.
 - A procedure will be put in place to manage previously unidentified contaminated ground that is encountered during the enabling works.
 - Any surplus soil arisings from levelling or excavation works that have visual or olfactory evidence of contamination will be stored in covered skips, or on a sheeted stockpile placed on hardstanding or sheeting pending its removal or treatment.
- 14.5.7 There is potential for the introduction of contaminated materials to the ground or groundwater due to mobilisation of existing contaminants or the incorrect storage/ spillages of construction materials/fuels. Design of operational pollution prevention measures will be included in the Construction Environmental Management Plan. Impacts due to incorrect storage and spillage will be mitigated by the following:
- Groundwater monitoring in the vicinity of each development phase (if deemed necessary).
 - Design of a Drainage Plan for the site.
 - Compounds will comprise hardstanding.
 - Environmental training for all personnel (as per CR-E).

- Designated re-fuelling areas on hardstanding with interceptor drainage, bunds or similar.
- Spill kits will be readily available.
- Storage areas for materials will be identified.
- Deliveries will be planned in advance.

Ground Gas

- 14.5.8 Detailed assessment of the ground gas risk is required to assess and mitigate any potential risk. The Health & Safety Executive has published information defining safe occupational exposure levels for various ground gases and substances and the latest guidance must be consulted to determine whether the ground gas regime necessitates specific precautions during site works.

Imported Soils (if required)

- 14.5.9 All soil materials imported to achieve the proposed development platform, the installation of vibro stone columns (if required) and backfill to drainage/utilities will be chemically and geotechnically assessed prior to importation to ensure that they are suitable for the intended use in accordance with the Materials Management Plan (MMP).

Ground Stability and Geotechnical Hazards

- 14.5.10 Potential areas of deeper Made Ground and soft soils (such as Head Deposits) will need assessing to confirm the risk of unacceptable settlements.

Foundations and Floor Slabs

- 14.5.11 It is anticipated that the main building and floor slabs will predominantly be founded on vibro stone columns or shallow pad foundations installed to the shallow bedrock; care is to be taken on the differing shallow rock formations that sub-crop on site to ensure no significant total and/or differential settlement occur.
- 14.5.12 The final foundation solution will be dependent on the loads of the various structures within the proposed development, the associated regrading works and the depth to bedrock; the intrusive ground investigation will confirm.

Operational Phase Mitigation

Human Health Risk Assessment - Geology and Soils

- 14.5.13 All of the existing site soils/materials which are considered suitable for retention and reuse beneath floor slabs, areas of hardstanding and within the landscaped and/or open spaces would be beneath an adequate depth of suitably verified clean cover soils (if required). This will be confirmed by the detailed ground investigation and if required, a Remediation Options Appraisal and Remediation Strategy.

Controlled Waters Risk Assessment

- 14.5.14 The risk to controlled waters is to be determined but based on the PRA the risk is considered low to moderate / low and any potentially impacted soils are to be localised and will be dealt with during the construction phase.

Ground Gas Risk Assessment

- 14.5.15 Ground gas monitoring and risk assessment will be undertaken to mitigate any risks to future site users. Any ground gas protection measures required will be designed in accordance with BS8485:2015A1:2019. If required, a separate Verification Plan and Verification Report will be produced for the gas protection measures in accordance with CIRIA C735.
- 14.5.16 No radon ground gas protection measures are required, unless stipulated by Local Building Control.

Imported Soils (if required)

- 14.5.17 The site preparatory works associated with the proposed development are likely to include the importation of suitable soils (vibro stone columns (if implemented), hardstanding and drainage). Chemical and geotechnical testing of these materials will be undertaken to ensure that they are suitable for use.

Ground Stability and Geotechnical Hazards

- 14.5.18 Detailed ground investigation will confirm if there are any risks to ground stability or future geotechnical hazards.

Foundations

- 14.5.19 Detailed ground investigation is to confirm the final solution to mitigate any risks.

14.6 Residual effects

Construction Phase

Human Health Risk Assessment - Geology and Soils

- 14.6.1 There is a requirement for a detailed ground investigation and risk assessments to assess the risk to construction workers and future site end users. This will inform any remediation options and/or strategy in line with the relevant guidance and assist with any potential reuse of materials on site for the MMP and Earthworks Specification. This will result in a minor (beneficial) effect within the development area and result in no significant residual impact.

Controlled Waters Risk Assessment

- 14.6.2 There is a requirement to assess the risk to the underlying aquifer and surface waters from potential localised areas of Made Ground with potential contaminants of concern.
- 14.6.3 Following the implementation of any required mitigation measures proposed for the construction period, the potential for groundwater impact on the underlying aquifer will be significantly reduced. The removal of a potential pathway constitutes a minor (beneficial effect), which is not significant.

Ground Gas

- 14.6.4 Safe methods of working and ground gas monitoring to confirm the CSM within the development will determine the risk, appropriate mitigation measures during construction and operational phase will potentially result in a minor (beneficial) effect on construction workers and site end users, which is not significant.

Imported Soils (if required)

- 14.6.5 All soil materials imported to achieve the proposed development platform will be chemically and geotechnically assessed prior to importation to ensure that they are suitable for the intended use in accordance with the Materials Management Plan (MMP) will provide a minor (beneficial) effect to the site end user.

Ground Stability and Geotechnical Hazards

- 14.6.6 If potential hazards and stability issues are highlighted in the ground investigation then the mitigation measures will be implemented and there will be a potential minor (beneficial) effect to the site end user.

Operational Phase

Human Health Risk Assessment - Geology and Soils

- 14.6.7 There is a requirement for a detailed ground investigation and risk assessments to determine the risk to future site end users. This will inform any remediation options and/or strategy in line with the relevant guidance and assist with any potential reuse of materials on site for the MMP and Earthworks Specification. This will result in a minor (beneficial) effect within the development area and result in no significant residual impact.

Controlled Waters Risk Assessment

- 14.6.8 Ground investigation to confirm the risk and potential localised impacted soils, if required the implementation of remediation strategies will reduce the risk to the underlying aquifer or surface waters which will result in a minor (beneficial) effect as the pathways will have been removed.

Ground Gas Risk Assessment

- 14.6.9 Detailed ground investigation and monitoring to confirm the CSM to be undertaken and, if required, ground gas protection measures will result in a moderate (beneficial) effect to future site users.

Imported Soils

- 14.6.10 If clean cover soils are required within soft landscaped areas, these will have a moderate (beneficial) impact for site end users.

Ground Stability and Geotechnical Hazards

- 14.6.11 Localised areas of potentially impacted Made Ground areas to be confirmed by ground investigation and it will have a negligible effect on future site end users.
- 14.6.12 The residual impact effects of the above are summarised in Table 14.3.

14.7 Implications of Climate Change

- 14.7.1 Reuse of soils will help reduce transportation (export and import of soils) and associated emissions and carbon footprint.

14.8 Cumulative Effects

- 14.8.1 No cumulative effects are considered likely in respect to the ground conditions and soils.

14.9 Summary

- 14.9.1 The majority of the Site has been farmland for over 100 years, with a former well and potentially an infilled small quarry in the southeast. A petrol station and former garage is located 70m west.
- 14.9.2 The residual risk to the environment does not pose any significant environmental risks until it is disturbed. There is potential for localised contaminants of concern associated with localised Made Ground.
- 14.9.3 The risk to controlled waters is considered low to moderate / low.
- 14.9.4 The risk to human health is considered moderate to low (localised).
- 14.9.5 The Preliminary Risk Assessment and the Conceptual Side Model have confirmed a moderate to low risk for potential localised contaminants of concern.
- 14.9.6 A detailed ground investigation is required to confirm the PRA and CSM. This will in turn, inform the need for any remedial measures and mitigations.
- 14.9.7 Temporary construction effects were identified, and these can be dealt with in the Construction Environmental Management Plan and other methods of working to reduce the impact on the construction works and adjacent site users.
- 14.9.8 No significant residual effects would remain following implementation of all stated mitigation during the enabling works and Construction Phase.
- 14.9.9 No significant residual effects would remain following implementation of all stated mitigation within the Completed Development.

14.10 References

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Table 14.3 Summary of effects

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect	Significant / not significant
Construction phase					
Human Health	High	Moderate Adverse	Detailed Ground Investigation, CEMP/MMP/Earthworks, Methods of working and PPE	Minor Beneficial	Not Significant
Controlled Waters	Low/Moderate	Minor Adverse	Detailed Ground Investigation, CEMP and methods of working	Minor Beneficial	Not Significant
Ground gas	High	Moderate Adverse (localised)	Detailed Ground Investigation, earthworks, methods of working and monitoring	Minor Beneficial (localised)	Not Significant
Ground Stability and Geotechnical Hazards	Moderate/High	Moderate Adverse	Slope stability analysis, ground investigation, safe methods of working and earthworks/stabilisation	Negligible, Minor Beneficial	Not Significant
Imported Soils (if required)	Moderate	Moderate Adverse	Methods of working and CEMP	Minor Beneficial	Not Significant
Operational phase					
Human Health	High	Minor Adverse	MMP, remediation (if required) and verification	Minor Beneficial	Not Significant
Controlled Waters	Low/Moderate	Minor/Moderate Adverse	Assessment and potential source removal of soils/groundwaters of concern	Minor Beneficial	Not Significant
Ground Gas	Moderate	Moderate Adverse (localised)	Gas Protection Measures (if required)	Minor Beneficial (localised)	Not Significant
Ground Stability and Geotechnical Hazards	Moderate	Moderate Adverse	Stabilisation and ground improvement of areas affected by deep Made Ground and soft natural soils	Negligible, Minor Beneficial	Not Significant
Imported Soils (if required)	Moderate	Low/Moderate Adverse	Protocols and testing to confirm all imported soils are suitable for use	Moderate Beneficial	Not Significant

15 Summary of mitigation, residual and interaction effects

15.1 Introduction

- 15.1.1 This final Chapter provides a summary of the proposed mitigation, residual effects predicted with the mitigation in place (15.2 – 15.11), and potential interaction effects caused by a combination of impacts on a receptor (15.12). This Chapter does not provide a summary of the ES. A Non-Technical Summary is provided separately.
- 15.1.2 The summary of proposed mitigation measures is provided to assist the formulation of planning conditions and clauses of any legal agreement required, to ensure that the measures contained and assessed in this ES are implemented (Table 15.13).
- 15.1.3 If planning consent is granted, it is likely to include a condition ensuring that the development takes place in accordance with the parameters plans, which therefore secures the implementation of the inherent mitigation measures. Additional mitigation is not generally capable of being shown on assessment parameter plans and other planning application drawings. It is this additional mitigation that is detailed below.
- 15.1.4 These measures together with other elements of the planning application demonstrate the commitment of the Applicant to the implementation of necessary mitigation measures in agreement with the local planning authority.

15.2 Transport and access

- 15.2.1 The impact of construction traffic has been assessed as negligible, and as no significant effect would occur, no mitigation is required. However, a Construction Traffic Management Plan will be submitted to CDC and agreed as a management control measure. This will include information relating to construction vehicle routing as well as operational hours, wheel washing, monitoring and reviewing the construction programme.
- 15.2.2 Residual effects of the completed development in operation are shown in the table below.

Table 15.1 Transport

Receptor	Residual Effect	Significant?
Pedestrian Severance	Minor adverse	No
Pedestrian Amenity	Minor adverse	
Pedestrian Delay	Minor adverse	
Fear and Intimidation	Negligible	
Driver Delay	Negligible	
Accidents and Safety	Minor adverse	

15.3 Air quality

- 15.3.1 Dust emissions caused by construction activities will be controlled using best practice management measures via the implementation of a Construction Environmental Management Plan. This will control activities in proximity to surrounding human receptors, deemed to be of high sensitivity, and ecological receptors, characterised as of low sensitivity.
- 15.3.2 The assessment has demonstrated that the overall effect of development-generated traffic emissions would have a negligible impact on local air quality. The effects associated with NO_x,

NO₂, PM₁₀ and PM_{2.5} concentrations at all assessed receptor locations are assessed as 'not significant'. Whilst mitigation is not required, the reduction of pollutant emissions from road traffic associated with the proposal will be promoted through implementation of Travel Plan.

15.3.3 Residual effects are shown in the table below.

Table 15.2 Air quality

Potential impact	Residual effect	Significant?
Particulate matter / dust deposition to human / ecological receptors	Negligible	No
NO ₂ , PM ₁₀ and PM _{2.5} pollutants affecting human / ecological receptors	Negligible	

15.4 Noise and vibration

15.4.1 A Construction Environmental Management Plan will be submitted to CDC for approval prior to commencement of construction. The objectives of the CEMP will be to control and limit noise and vibration levels, so far as is reasonably practicable, to minimise disturbance following the recommendations set out in paragraph 7.5.1.

15.4.2 No significant effects have been identified associated with noise from operation of the Proposed Development affecting existing receptors during the daytime, or through the night.

15.4.3 The potential change in road traffic noise levels near the A41 and the A34 have been assessed. For each of these links, the impact and associated effect is considered negligible, such that mitigation for road traffic noise at existing receptors is not required.

Table 15.3 Noise and vibration

Potential impact	Residual effect	Significant?
Construction noise and vibration	Negligible	No
Construction traffic noise	Negligible	
Noise from completed development		
Vehicle movements/fixed plant	Negligible to low	No
Off-site road traffic noise	Negligible	

15.5 Biodiversity

15.5.1 Mitigation in the Construction Environmental Management Plan will identify any specific locations for the protection of ecology, in particular to ensure appropriate management and operational systems are in place to avoid or minimise adverse pollution effects on watercourses and the area of ancient woodland.

15.5.2 An Ecological Construction Method Statement will set out in detail the measures to be implemented to protect important ecological features, overseen by an appointed Ecological Clerk of Works. This document will cross reference with the CEMP, where relevant, and a detailed Arboricultural Method Statement which will set out measures to protect trees and hedgerows during the construction phase.

15.5.3 A Landscape and Ecological Management Plan will detail the measures to be implemented to ensure the successful installation of new habitats/features and the long-term maintenance and management of both existing and new habitats/features proposed as part of the soft landscape scheme.

15.5.4 Residual effects are set out in the Table below, none of what are categorised as significant in the EIA.

Table 15.4 Biodiversity

Receptor	Residual effect	Significant?
Construction		
Stoke Bushes LWS	Negligible	No
Habitats / vegetation	Negligible	
Fauna	Negligible	
Completed Development		
Stoke Bushes LWS	Negligible	No
Habitats / vegetation	Negligible	
Fauna	Negligible	

15.6 Landscape and visual effects

15.6.1 Mitigation at the construction phase will be controlled by a CEMP to protect retained features and implement best site practice.

15.6.2 The key aspect of the mitigation strategy are the soft landscape scheme design principles, which include:

- Existing boundary hedgerows and trees would be retained where possible (with buffers to the proposed development), reinforced and brought into regular, long-term management;
- Creation of a landscaped buffer from proposed development zones to protect and enhance retained boundary features of landscape and ecological interest;
- Provision of structural landscaping, native trees and shrubs that reflect the local context, particularly within the eastern areas of the Application Site, existing landscape features would be reinforced with additional planting;
- Provision of landscape screening, in the form of landscaped bunds and native tree planting, to properties and PRow in close proximity to the site;
- Native heavy standard tree planting within landscape buffers to fragment views of the proposed development, particularly for receptors in close proximity to the east;
- Additional structural landscaping proposed to the eastern boundary would provide a new landscape corridor that would provide a connection between existing woodland blocks within the local landscape context;
- Species-rich wildflower grassland to be created within areas of green open space to provide nectar-rich habitats for pollinating insects such as bees, butterflies and moths;
- The proposals should complement the existing landscape features of the Site and character of adjacent uses and rural areas; and
- The landscape strategy should take into consideration the long-term vision for the Site, using tree planting to filter into the proposed development from adjacent green corridors and to frame and buffer the proposed built form.

15.6.3 Residual effects are set out in the Table below.

Table 15.5 Landscape and visual

Receptor	Residual effect	Significant?
Construction (Short-term, adverse and temporary effects)		
Landscape Character of the Site and Context	Major/Moderate	Significant
On-site Landscape Features	Major/Moderate	Significant
Wooded Estatelands LCT	Moderate	Significant
Plateau Farmland LCT	Minor	No
Landscape Character after Dark	Moderate/Minor	No
Visual receptors travelling past the Site on A43	Minor	No
Visual receptors (PRoW and minor road users) in close proximity to the Site	Major/Moderate	Significant
Road users and pedestrians in the wider context only	Minor	No
PRoW users in the wider context only	Moderate/Minor	No
Residential receptors in Stoke Lyne	Major/Moderate	Significant
Residential receptors in the wider context	Moderate/Minor	No
Operation (Year 1) (Medium-term, adverse and temporary effects)		
Landscape Character of the Site and Context	Moderate	Significant
On-site Landscape Features	Moderate	Significant
Wooded Estatelands LCT	Minor	No
Plateau Farmland LCT	Minor	No
Landscape Character after Dark	Moderate/Minor	No
Visual receptors travelling past the Site on A43	Minor	No
Visual receptors (PRoW and minor road users) in close proximity to the Site	Major/Moderate	Significant
Road users and pedestrians in the wider context only	Minor/Negligible	No
PRoW users in the wider context only	Minor	No
Residential receptors in Stoke Lyne	Moderate	Significant
Residential receptors in the wider context	Moderate/Minor	No
Operation (Year 15) (Long-term, permanent effects)		
Landscape Character of the Site and Context	Moderate/Minor Adverse and Beneficial	No
On-site Landscape Features	Moderate Beneficial	Significant
Wooded Estatelands LCT	Minor Adverse	No
Plateau Farmland LCT	Minor Adverse	No
Landscape Character after Dark	Minor Adverse	No
Visual receptors travelling past the Site on A43	Minor Adverse	No
Visual receptors (PRoW and minor road users) in close proximity to the Site	Moderate Adverse	Significant
Road users and pedestrians in the wider context only	Minor/Negligible Adverse	No
PRoW users in the wider context only	Minor Adverse	No
Residential receptors in Stoke Lyne	Moderate Adverse	Significant
Residential receptors in the wider context	Moderate/Minor Neutral	No

15.7 Heritage

15.7.1 The potential physical loss of sub-surface archaeology will be addressed through a programme of archaeological works, to be agreed with Cherwell District Council, on the advice of Oxfordshire County Council's Lead Archaeologist prior to the commencement of the Proposed Development. The results of the fieldwork and any post-excavation analysis undertaken would need to be presented in an appropriately detailed and illustrated report and the project archive curated accordingly.

15.7.2 This additional mitigation is considered in the evaluation of residual effects recorded in the table below.

Table 15.6 Heritage

Receptor	Residual effects (permanent)	Significant?
Construction		
Geophysical anomalies suggesting prehistoric or Roman period settlement.	Moderate Adverse	Significant
Anomalies indicating possible buried linear features within the site	Minor Adverse	No
Anomalies indicating possible buried ditches associated with a trackway of unknown date within the southern part of the site	Minor Adverse	No
Anomalies indicating possible buried pits within the southern part of the site	Minor Adverse	No
Slight earthworks and probable buried remains related to post-medieval boundary ditches and quarry pits	Minor Adverse	No
Probable buried remains related to infilled furrows	Minor Adverse	No
Unrecorded archaeological remains.	Estimated as either Moderate or Minor Adverse. To be confirmed following archaeological trial trenching.	Moderate adverse effects would be significant

15.8 Drainage and flood risk

15.8.1 Mitigation measures required over and above the inherent mitigation of the drainage strategy are outlined below. The prediction of residual effects assumes that these mitigation measures have been implemented via the Construction Environmental Management Plan and a Site Drainage Plan during construction operations. This is to control surface water run-off and the potential for the release of pollutants, including sediment.

15.8.2 The proposed surface water drainage system with sustainable drainage features is sufficient to ensure negligible effects and therefore no additional mitigation measures are required. The SuDS will reduce peak flows, the volume of runoff, and slow down flows, and will continue to operate for the lifespan of the Proposed Development. The onsite drainage network is designed to accommodate a 40% increase in rainfall intensity as an allowance for climate change. It will provide treatment of surface water run-off before it is returned to the environment. The proposals will not result in an increase in flood risk downstream.

Table 15.7 Drainage and flood risk

Receptor	Residual effect	Significant?
Construction phase		
Flood Risk on or off-site	Negligible	No
Watercourse – quality/quantity	Negligible	
Completed Development		
Flood Risk on-site	Negligible	No
Flood Risk off-site	Negligible	
Watercourse – quality/quantity	Negligible	

15.9 Ground conditions and soils

- 15.9.1 Mitigation for the change in use is limited to reuse of the soils in an appropriate manner to re-establish the existing functions of the soil, principally for storing and cycling water and carbon, and for supporting habitats, biodiversity and landscape planting.
- 15.9.2 The disturbance of ground during the construction works will be undertaken in accordance with current best practice guidance and legislation. This will be supplemented by the management to be defined in the Construction and Environmental Management Plan, a Materials Management Plan for earthworks and any remediation necessary.
- 15.9.3 These measures will be designed to minimise waste, reduce off-site disposal and importation of materials, limit construction movements as far as reasonably practicable, and minimise impacts to neighbours.
- 15.9.4 With the implementation of this best practice, the environmental effects during construction and operation are listed below.

Table 15.8 Ground conditions and soils

Receptor	Residual effect	Significant?
Human health	Minor Beneficial	No
Controlled waters	Minor Beneficial	
Ground gas	Minor Beneficial Localised	
Ground stability	Negligible / Minor Beneficial	
Soils	Minor Beneficial	

15.10 Climate change

- 15.10.1 During construction, the development will use the methodology 'Net Zero Carbon in Construction' outlined in the UKGBC's net zero framework. Consequently, carbon emissions will be reduced as much as feasibly possible. Following this, if there are any residual construction related 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
- 15.10.2 The travel plan will assist in reducing carbon emissions associated with operational transport. These measures include:
- Cycle parking;
 - Shared pedestrian/cycle routes;
 - Electric vehicle recharging facilities.
- 15.10.3 To mitigate for operational energy related emissions, the Proposed Development will use passive measures included within the design of the development. These will reduce energy use

and the associated CO₂ emissions and include: U values which exceed Building Regulation requirements; Engineered facade design; Reduced air permeability. The next level in the energy hierarchy is to maximise energy efficiency. High efficiency systems, plant, controls and equipment will be incorporated into the development.

15.10.4 The third level in the energy hierarchy is to incorporate renewables / low carbon technology. A number of options have been considered, with the following being identified as suitable:

- Photovoltaic Panels (a minimum of 18% of useable roof area to be installed initially).
- Air source heat pump for the office areas.

Table 15.9 Climate change

Impact	Residual effects	Significant?
Construction carbon emissions	Negligible	No
Operational carbon emissions	Adverse	Significant

15.11 Economic effects

15.11.1 As the creation of jobs both during the construction and operational phase and increased GVA at various scales are all considered to be beneficial, mitigation is not required. The residual effects are set out in the table below.

Table 15.10 Economic effects

Receptor	Residual effects	Significant?
Construction		
Workforce employment	Minor beneficial Temporary	No
Completed development		
Workforce employment	Moderate beneficial Permanent	No

15.12 Interaction of effects on receptors

15.12.1 The potential for effects caused by a combination of impacts from the Proposed Development on a particular receptor, acting together, may cause a more significant impact collectively than individually, or potentially, a combination of beneficial and adverse effects may be experienced at a particular location. For interaction between effects to be possible, there would need to be an identifiable residual effect from one or more environmental aspects after considering the mitigation proposed. Tables 15.11 and 15.12 below, list all of the receptors for which a residual effect greater than negligible has been identified in the principal assessment topic for that receptor (shown by ✓ - positive or adverse, significant or not significant) for the construction period and when the development is in operation.

15.12.2 For each of the identified receptors, professional judgement of the EIA coordinator has then been used to consider whether the receptor might also experience interaction effects connected with other assessment topics in the ES. Those that are identified in these tables with a ? are considered in the paragraphs below.

Potential for interaction effects during construction

Table 15.11 Construction

Receptor	Assessment topic										
	Transport	Air quality	Noise	Biodiversity	Landscape	Visual	Heritage	Drainage/ water quality	Economics	Climate	Ground / soils
Landscape Character /Features	X	X	X	X	✓-ve	X	X	X	X	X	X
Visual Receptors	X	X	X	X	X	✓-ve	X	X	X	X	X
Archaeology	X	X	X	X	X	X	✓-ve	X	X	X	X
Workforce (economic)	X	X	X	X	X	X	X	X	✓+ve	X	X
Ground Conditions / Human health	X	X	X	X	X	X	X	X	X	X	✓+ve
Ground Conditions / Controlled waters	X	X	X	X	X	X	X	?	X	X	✓+ve
Ground stability / soils	X	X	X	X	X	X	X	?	X	X	✓+ve
✓ = residual effect +ve = positive -ve = adverse X = negligible ? = consider potential interaction											

15.12.3 **Ground conditions** assessment in relation to human health, controlled waters and soils has identified minor beneficial effects. The Construction Environmental Management Plan will control the potential for pollutant effects from surface water drainage during site works and this would ensure negligible effects so that no additional interaction effects are predicted for soils on-site, or for controlled waters off-site.

Table 15.12 Operation

Receptor	Assessment topic										
	Transport	Air quality	Noise	Biodiversity	Landscape	Visual	Heritage	Drainage/ flood risk	Economy	Climate	Ground / soils
Pedestrians	✓-ve	X	X	X	X	?	X	X	X	X	X
Road safety	✓-ve	X	X	X	X	X	X	X	X	X	X
Road noise	X	X	✓-ve	X	X	X	X	X	X	X	X
Landscape Character /Features	X	X	X	X	✓-ve	X	X	X	X	X	X
Visual Receptors	?	X	X	X	X	✓-ve	X	X	X	X	X
Economy/Workforce	X	X	X	X	X	X	X	X	✓+ve	X	X
Climate (operational)	X	X	X	X	X	X	X	X	X	✓-ve	X
Ground Conditions / Human health	X	X	X	X	X	X	X	X	X	X	✓+ve
Ground Conditions / Controlled waters	X	X	X	X	X	X	X	?	X	X	✓+ve
✓ = residual effect +ve = positive -ve = adverse X = negligible ? = consider potential interaction											

15.12.4 **Pedestrians** are assessed as experiencing a minor adverse effect in relation to amenity and severance. The interaction of their perception of amenity can be considered in combination with the visual effect identified in the LVIA (Chapter 9), which is identified as a minor effect at locations in the wider context, but moderate adverse for users of minor roads or public rights of way in close proximity to the Site, where the residual visual effect is assessed as significant. However, pedestrians using minor roads or public rights of way would not experience simultaneous interaction effects from any increase in road traffic associated with the proposal. No change in the residual effect is therefore predicted.

15.12.5 **Road noise receptors** - Daytime sound levels at Locations 2, 3 (B4100), and 13 & 14 (M40 on-slip & off-slip) are predicted to increase by 1dB(A) or more. This amount of change is assessed as a potential low to medium impact. However, in these locations there are no noise sensitive receptors (pedestrians/residents) in proximity to the roads so there would be no potential for interaction with other impacts.

15.12.6 **Ground conditions** assessment in relation to controlled waters has identified minor beneficial effects. Whilst the implementation of sustainable drainage features to manage surface water runoff would reinforce the positive effects for the water environment, no additional interaction or change in the significance of the effects are predicted.

15.13 Summary of mitigation

15.13.1 Table 15.13 provides a summary of the additional mitigation measures.

Table 15.13 Mitigation Summary

Identified receptor	Additional mitigation measure	Mitigation secured by	To be delivered by	Auditable by
Transport				
Construction				
See Tables 5.4 & 5.5	Construction Traffic Management Plan	Planning condition	Developer	Local Planning Authority (LPA)
Operation				
See Tables 5.4 & 5.5	Travel Plan	Planning condition	Developer	LPA
Air quality				
Construction				
Human / ecological	Construction Environmental Management Plan (CEMP)	Planning condition	Developer / Contractor	LPA
Operation				
Human / ecological	Travel Plan (enhance)	Planning condition	Developer / Occupier	LPA
Noise				
Construction				
Human	Construction Environmental Management Plan (CEMP)	Planning condition	Developer / Contractor	LPA
Operation				
Human	None required	n/a	n/a	n/a
Biodiversity				
Construction				
Habitats and species	Construction Environmental Management Plan (CEMP) – prevention or reduction of pollution events (air, noise, water	Planning condition	Developer	LPA

Identified receptor	Additional mitigation measure	Mitigation secured by	To be delivered by	Auditable by
	environment)			
Habitats and species	Ecological Construction Method Statement (ECMS) - prevention or reduction of damage or harm	Planning condition	Developer	LPA
Operation				
Habitats and species	Soft Landscape Scheme – new habitat creation to offset the impacts of habitat losses	Planning condition	Developer	LPA
Habitats and species	Landscape and Ecological Management Plan (LEMP) – creation of new habitat features, and enhancement of existing habitats, to offset the impacts of habitat losses and achieve biodiversity net gain	Planning condition	Developer	LPA
Landscape and visual effects				
Construction				
Landscape / Human	Construction Environmental Management Plan (CEMP)	Planning condition	Developer	LPA
Operation				
Landscape / Human	Soft Landscaping Scheme	Planning condition	Developer	LPA
Heritage				
Construction				
Loss of significant archaeological features within the Site	Following the trial trench evaluation, after consultation with the Oxfordshire County Council Lead Archaeologist, it may be necessary to preserve by record archaeological features within the Site that cannot be preserved in situ. The scope and methodology of this mitigation would be agreed in advance via a WSI with the Lead Archaeologist. This measure would reduce the significance of the effect on these heritage assets.	Planning Condition	Archaeological Contractor	LPA
Operation				
None identified	n/a	n/a	n/a	n/a

Identified receptor	Additional mitigation measure	Mitigation secured by	To be delivered by	Auditable by
Hydrology, flood risk and drainage				
Construction				
Flood risk	CEMP, Site Drainage Plan	Planning Condition	Principal Contractor	LPA
Water quality	CEMP, Site Drainage Plan	Planning Condition	Principal Contractor	LPA
Operation				
Flood risk	Surface Water Drainage Strategy	Planning Condition	Principal Contractor	LPA
Water quality	Surface Water Drainage Strategy	Planning Condition	Principal Contractor	LPA
Socio-economic effects				
Construction				
Workforce	The provision of a construction stage apprenticeship scheme to help deliver increased skills and help those entering the workforce and to access jobs - thus retaining an increased proportion of benefits locally	S106 legal agreement	The developer	LPA
Operation				
	None required	n/a	n/a	n/a
Climate change effects				
Construction				
Global Climate	Achieve Net Zero Carbon in Construction	Planning Condition	Contractor	LPA
	Construction Environmental Management Plan	Planning Condition	Contractor	LPA
Operation				
Global Climate	Use of Energy Hierarchy	Planning Condition	Contractor	LPA
	Installation of renewable technology (e.g. PVs)	Planning Condition	Contractor	LPA
	Implementation of Travel Plan Measures	Planning Condition	Occupier	LPA
Buildings & Infrastructure	Flood Risk - 40% climate change allowance	Drainage strategy	Civil Engineer & Contractor	LPA
	Design of building and external fabric Roof and external walls guaranteed to perform for 25 years. Roofs designed for snow loads and to avoid ponding.	Planning Condition	Architect / Civil Engineer / Contractor	LPA

Identified receptor	Additional mitigation measure	Mitigation secured by	To be delivered by	Auditable by
	Intake and exhaust positions protected from direct wind/rain Plant selection based on projected temperatures. Use of waste heat on air based equipment to raise operating temperatures.	Planning Condition	Contractor / Fit Out Contractor	LPA
Building occupants	Cooling plant selection. Facility for cooling capacity increase to be included in infrastructure. Heating plant selection based on projected temperatures. Adequate preheating to limit thermal lag on occupation. Water supplies and storage allowance for more potable water. Low water use sanitary fittings specified. Pulsed output water meters installed on the water supply.	Planning Condition	Contractor / Fit Out Contractor	LPA
Planting	Planting to thrive across temperature and precipitation events.	Planning Condition	Landscape Architect / Contractor	LPA
Ground conditions and soils				
Construction				
Human Health	Detailed Ground Investigation, earthworks, methods of working and monitoring	Planning Condition(s)	Tier - GI Principal Contractor -	LPA
Controlled Waters	Detailed ground investigation, CEMP, methods of working	Planning Condition(s)	Tier - GI Principal Contractor – CEMP, Method Statements	LPA, Environment Agency
Ground Gas	Detailed Ground Investigation, earthworks, methods of working and monitoring	Planning Condition(s)	Tier - GI Principal Contractor - Method Statements	LPA
Ground Stability and Geotechnical Hazards	Slope stability analysis, ground investigation, safe methods of working and earthworks/stabilisation	Materials Management Plan (MMP) for the reuse of site won soils. Contractual.	Tier – GI, Earthworks Specification. Principal Contractor - Method Statements	CL:AIRE - Tier to review performance testing
Imported Soils (if required)	Methods of working and CEMP	Planning Condition	Principal Contractor	LPA
Operation				
Human Health	MMP, remediation (if required) and verification	Planning Condition	Tier - GI Principal Contractor -	LPA

Identified receptor	Additional mitigation measure	Mitigation secured by	To be delivered by	Auditable by
			Remediation/mitigation measures	
Controlled Waters	Assessment and potential source removal of soils/groundwaters of concern	Planning Condition	Tier - GI Principal Contractor - Remediation/mitigation measures	LPA
Ground Gas	Gas Protection Measures (if required)	Planning Condition	Tier - GI Principal Contractor - Mitigation measures	LPA
Ground Stability and Geotechnical Hazards	Stabilisation and ground improvement of areas affected by deep Made Ground and soft natural soils	Contractual	Principal Contractor	Tier
Imported Soils (if required)	Protocols and testing to confirm all imported soils are suitable for use	Planning Conditions	Principal Contractor	LPA

Glossary and abbreviations

µg	microgram = one millionth of a gram
µg/m ³	micrograms per cubic metre
AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekly Traffic
ACM	Asbestos Containing Materials
ADMS	Atmospheric dispersion modelling system
Ambient Concentration	The pollutant level in outdoor air in the immediate surroundings
AMR	Annual Monitoring Report
AMS	Arboricultural Method Statement
AOD	Above Ordnance Datum
APS	Annual Population Survey
AQ	Air Quality
AQAL	Air Quality Assessment Levels
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
ASNW	Area of Semi Natural Woodland
ASPE	Annual Survey of Pay and Earnings
ASR	Annual Status Report
Baseline	The existing (pre-development) landscape and visual context of a study area, including landscape fabric, landscape character and existing views. The landscape baseline is not static and may be changing for various reasons. The landscape baseline can also consider such factors and describe the likely future landscape character of the landscape, without the proposed development.
BBOWT	Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust
BGS	British Geological Survey
BIA	Biodiversity Impact Assessment
BNG	Biodiversity Net Gain
BNL	Basic Noise Level
BRES	ONS Business Register and Employment Survey
BTM	Bicester Transport Model
CAS	Clean Air Strategy
CDC	Cherwell District Council
CDWS	Cherwell District Wildlife Site
CEMP	Construction Environment Management Plan
CERC	Cambridge Environmental Research Consultants
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists

CIWEM	Chartered Institute of Water and Environmental Management
CLP	Cherwell Local Plan
CO ₂	Carbon Dioxide
Contamination	The planning system seeks to assess risk based on the new or intended use of the land. As a consequence, the planning system uses the term land affected by contamination – this being the case where the actual or suspected presence of substances in, on or under the land may cause risks to people, human activities or the environment (regardless of whether or not the land meets the criteria of the statutory definition in Part IIA)
CRTN	Calculation of Road Traffic Noise
CSM	Conceptual Site Model
CTMP	Construction Traffic Management Plan
Cumulative	An increase in an overall effect as a result of multiple additions/sources
Curtilage	The enclosed area of land adjacent to a dwelling
DCLG	Department for Communities and Local Government
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
Diffusion Tube	A tube, open at one end, for absorption of a specific pollutant from the surrounding air. Diffusion tubes are widely used for the indicative measurement of ambient concentrations of nitrogen dioxide (NO ₂) in the context of Local Air Quality Management
DMRB	The Design Manual for Roads and Bridges – a comprehensive manual system of current standards, advice notes and published documents relating to the design, assessment and operation of trunk roads and motorways
DoW CoP	Definition of Waste: Code of Practice
EA	Environment Agency
EcIA	Ecological Impact Assessment
ECMS	Ecological Construction Method Statement
ECoW	Ecological Clerk of Works
Effects	A predicted change in the environmental baseline as a result of the proposed development. Effects can be positive or negative.
EFT	Emissions Factors Toolkit
EH	English Heritage
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EIA Regulations	The Town and Country Planning (Environmental Impact Assessment) Regulations 2017
ELC	European Landscape Convention
EPA	Environmental Protection Act 1990
EPS	European Protected Site
EPZ	Ecological Protection Zone
ES	Environmental Statement. The document reporting the process and outcomes of the EIA. The ES reports the likely significant environmental effects of a project.
EU	European Union

EV	Electric Vehicle
FRA	Flood Risk Assessment
GCN	Great Crested Newt
GIS	Geographic Information System
GLVIA	The Guidelines for Landscape and Visual Impact Assessment
GVA	A measure of the contribution to the economy of each individual producer, industry or sector
ha	Hectare – 1 ha is an area equal to 10,000 square metres (2.47 acres)
Habitats Directive	Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora
Habitats Regulations	Conservation of Habitats and Species Regulations
HCA	Homes and Communities Agency
HDV / HGV	Heavy Duty Vehicle / Heavy Goods Vehicle
HE	Historic England
HER	Historic Environment Record
IAQM	Institute of Air Quality Management
IEF	Important Ecological Feature
IEMA	Institute of Environmental Management and Assessment
Impact/Effect	The term impact is used to describe a change in conditions. The term effect is used to describe an environmental response resulting from an impact, or series of impacts.
Intervisibility	Two points on the ground or two features are described as “intervisible” when they are visible from each other.
IRP	Incidence Response Plan
IRZ	Impact Risk Zone
JNCC	Joint Nature Conservation Committee
km	Kilometre = 1,000 metres / or imperial = 0.62 miles
Landscape Capacity	The degree to which a particular landscape character type or area is able to accommodate change without significant effects on its character. Capacity is likely to vary according to the type and nature of change being proposed.
Landscape Character	Landscape character arises from a distinct, recognisable and consistent pattern of physical and social elements, aesthetic factors and perceptual aspects in the landscape.
Landscape Element	A physical component (both natural and manmade) of the landscape.
Landscape Fabric	The elements and features that constitute the physical components of the landscape, including ground vegetation, hedgerows, trees, shrubs, walls, fences and vernacular structures.
Landscape Value	The importance or value of the landscape to society, usually based on landscape designations or policies as indicators of recognised value.
LAQM	Local Air Quality Management
LAQM PG	Policy guidance to support Local Air Quality Management
LAQM TG	Technical guidance to support Local Air Quality Management
LCA	Local Character Area
LCRM	Land Contamination Risk Management

LCT	Landscape Character Type
LCWIP	Local Cycling and Walking Infrastructure Plan
LDV	Light Duty Vehicle
LEMP	Landscape and Ecological Management Plan
LEP	Local Enterprise Partnership
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LOAEL	Lowest Observed Adverse Effect Level
LPA	Local Planning Authority
LVIA	Landscape and Visual Impact Assessment
m	Metre
m ²	square metre (area)
m ³	cubic metre (volume)
Magnitude	A combination of the nature, size, extent and duration of an effect
MIOA	Member of the Institute of Acoustics
MMP	Materials Management Plan
MRI	Magnetic Resonance Imaging
NCA	National Character Area
NCN	National Cycle Network
NE	Natural England
NERC	Natural Environment and Rural Communities Act 2006
ng/m ³	nanograms per cubic metre. 1 ng is one thousand millionth of a gram
NH	National Highways
NNR	National Nature Reserve
NO ₂	Nitrogen dioxide
NOEL	No Observed Effect Level
NOMIS	Nomis is a service provided by the Office for National Statistics, ONS, to give the most detailed and up-to-date UK labour market statistics from official sources
NOx	Oxides of Nitrogen
NPPF	National Planning Policy Framework
NSR	Noise Sensitive Receptors
NTS	Non-technical summary (of the ES)
OCC	Oxfordshire County Council
ONS	Office for National Statistics
OPI	Output Price Indices
OS	Ordnance Survey
OWLS	Oxfordshire Wildlife and Landscape Study
PAH's	Polycyclic Aromatic Hydrocarbons

Percentile	a value that establishes a particular threshold in a collection of data. For example, the 90 th percentile of yearly values is the value that 90% of all the data in the year fall below or equal.
pH	a numeric scale used to specify the acidity or alkalinity of a solution or soil. It is used to indicate whether there may be a potential corrosion risk to below-ground services or concrete foundations.
PM ₁₀	Particulate Matter – of a diameter 10 micrometres (0.00001 metre) or less
PM _{2.5}	Particulate Matter – of a diameter 2.5 micrometres (0.000025 metre) or less
Pollution	The contamination of air, water, or soil by substances that can occur naturally or as the result of human activities
ppb	Parts per billion (units of pollution in every billion (10 ⁹) units of air)
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
ppm	Parts per million (units of pollution in every million (10 ⁶) units of air)
PRA	Preliminary Risk Assessment
Public Rights of Way (PRoW)	A footpath, byway or bridleway over which the public have a right of access.
PV	Solar Photovoltaic
Qualitative	The subjective quality of something rather than its quantity
Quantitative	Can be measured and expressed as a quantity
Residual effects	The significant environmental effects remaining following mitigation
SAAR	Standard Average Annual Rainfall
SAC	Special Area of Conservation (see SSSI)
Scoping opinion	Defines what the LPA considers should be covered by an EIA
Section 278 Agreement	Under s278 of the Highways Act 1980, a local highways authority can enter into a legal agreement with a developer (in order to facilitate development) for the developer to either pay for or make alterations or improvements to the highway.
Section 106 Agreement	Mitigation may be secured in an agreement made pursuant to s106 of the Town and Country Planning Act 1990.
SEPR	South Eastern Perimeter Road
Site	Means the land within the planning application boundary
SLS	Soft Landscaping Scheme
SOAEL	Significant Observed Adverse Effect Level
SPA	Special Protection Area
SPD	Supplementary Planning Documents complement policies in the Local Plan
SPG	Supplementary Planning Guidance
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage System
TA	Transport Assessment
the Applicants	Tritax Symmetry
The Site	extent of the planning application

TPH	Total petroleum hydrocarbon
TRL	Transport Research Laboratory
TVERC	Thames Valley Environmental Records Centre
UKCIP	UK Climate Impacts Programme
Visual Receptor	An individual observer or group of observers who are capable of experiencing a change in the view.
WFD	Water Framework Directive
WSI	Written Scheme of Investigation
ZPV	Zone of Primary Visibility
ZTV	Zone of Theoretical Visibility