

The Proposed Development

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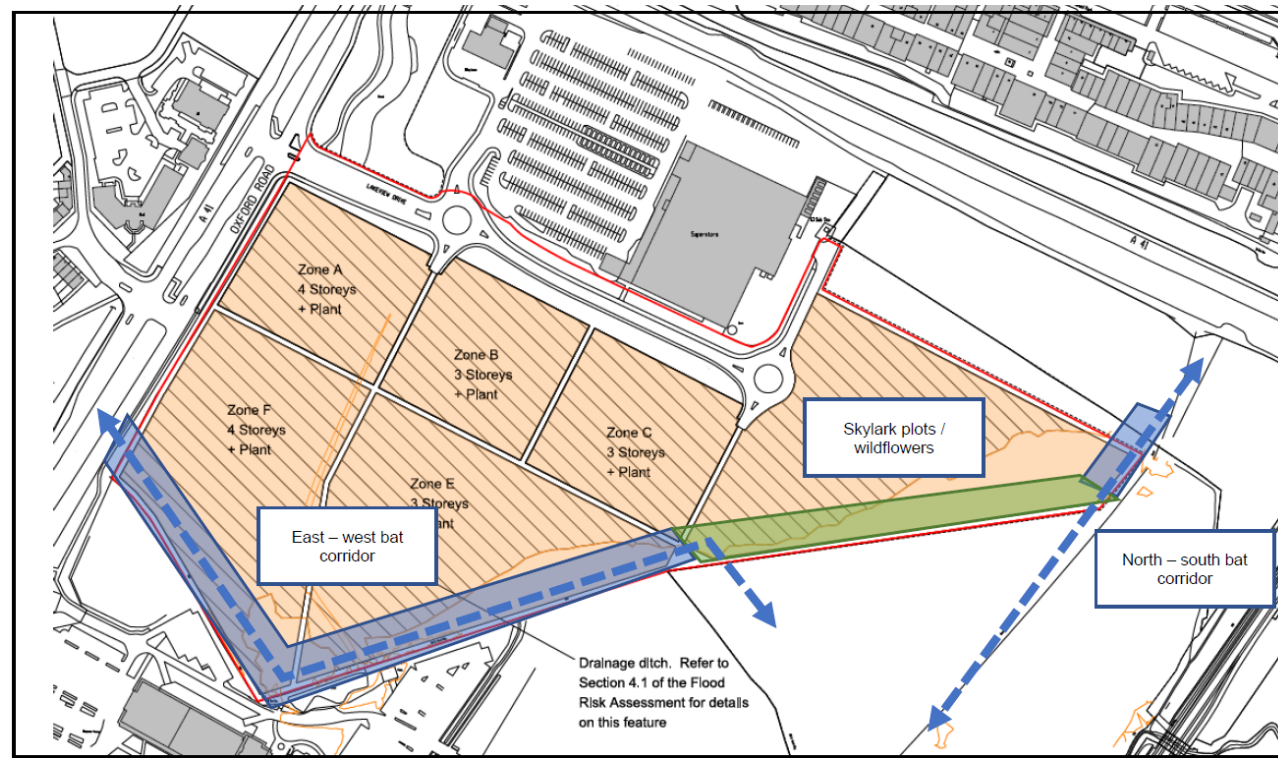


Figure 4.3: Landscaping Ecological Measures

Indicative Masterplan

4.25 The indicative masterplan comprises 60,000m² GEA of commercial office space in a variety of stand-alone buildings in order to demonstrate a potential layout which is in accordance with the parameters. Figure 4.4 illustrates an indicative Masterplan for illustrative purposes only.



Figure 4.4: Final Indicative Masterplan

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Introduction

- 5.1** This chapter of the ES describes the proposed construction programme and key activities for construction works. Potential impacts are identified and, where necessary, appropriate mitigation measures are described.
- 5.2** Planning for construction is necessarily broad at this stage and may be subject to modification during the reserved matters application stage, and/or during detailed construction planning. For this reason, the following assessment is based on reasonable assumptions in the construction programme and the collective experience of the consultant team.
- 5.3** Although the detailed construction method statements and specifications have not yet been prepared and lead/main construction contractor, sub-contractors and trade contractors not yet appointed to undertake the works required, it is possible to establish the potential broad environmental impacts associated with the works and to determine a framework for the management of these impacts to ensure there are no significant environmental effects. The framework would form the basis for a Construction Environmental Management Plan (CEMP) to be implemented during the construction works. A detailed CEMP would be secured by means of an appropriately worded planning condition, requiring this.
- 5.4** The CEMP would define relevant policies, legislative requirements, thresholds/limits, procedures, roles and responsibilities for the implementation of environmental and management controls throughout the duration of the works. The CEMP would be discussed and agreed with CDC in advance of works commencing on-site.
- 5.5** An outline of all the anticipated environmental issues and necessary management controls that would be covered within the CEMP is provided within this chapter.
- 5.6** It is important to note that this chapter does not assess the magnitude of potential impacts, nor the significance of likely effects during the construction works, as this is addressed within individual technical assessments within ES Volume 1 (Chapters 6 - 13). The principle of the CEMP set out in this chapter are considered within each technical assessment to enable the assessment of construction effects within a particular technical assessment.

Programme of Works

- 5.7** As the site is predominantly greenfield there is no requirement for the demolition of any buildings on site.
- 5.8** The construction programme would be phased over an 8 to 9 year period. The outline construction programme assume that the buildings are built sequentially and in accordance with the phasing scenario outlined below and in Figure 5.1: Combined Parameter Plan:
- Phase 1 – Zones B and C;
 - Phase 2 – Zone A;
 - Phase 3 – Zone D; and
 - Phase 4 - Zones E and F.

Development Zones and Phasing

- 5.9** The Proposed Development comprises a total of six Development Zones (A-F) as shown in Figure 5.1. It is anticipated that the development programme will span 8 – 9 years with construction occurring in phases and completing in 2026.
- 5.10** The first phase of development will take place on the northern extent of the site adjacent to the Tesco Superstore, with Zones B and C being developed. This will use the established main access to the site from the north-western corner.

- 5.11** Prior to construction, a number of investigations and surveys will need to be undertaken to further define the ground conditions for construction (see the Phase 1 Environmental Risk Assessment in Appendix 2.1) and will include intrusive archaeological investigation to fully define the archaeological resource across the site.
- 5.12** Following the development of Zone B and C, development of Zone A will occur, this would complete the development of the north-western section of the site and the areas closest to the main access road. Zone D will be the next zone to be developed, located in the north-eastern corner of the site, completing the full northern development of the site. The last zones to be developed will be Zones E and F, located at the south of the site, adjacent to Zones A, B and C.

Description of Works

- 5.13** The construction programme will be designed to minimise disruption to local residents, the general public, and the environment. Works will include:
- Initial site preparation, including setting up of designated construction areas and contractors parking;
 - Installation of site hoarding, security measures, signage of entrance and exit;
 - Construction of internal road system and speed restriction signage;
 - Earthworks;
 - Onsite infrastructure works, including foul and storm sewers, maintenance and inspection chambers;
 - Construction of new buildings including piling, laying foundations, connection to services and addition of superstructure;
 - Land profiling, landscaping and public realm works; and
 - Site completion, including removal of construction compounds.

Substructure & Superstructure Construction

- 5.14** The first phase of development will take place on the north-western section of the site. This will connect to the existing main access to the site, and comprise a number of office buildings. The busy A41 main road is screened by existing planting.
- 5.15** In most cases, pile formation would be augured and cast in reinforced concrete. This would employ mobile piling rigs, craneage and trucks to remove pile arisings, either for reuse on site or removal from site.
- 5.16** While it is generally to be avoided, limited percussive piling may be required. A rotary bored piling rig and attendant plant will be employed.
- 5.17** Groundwater beneath the site is designated as a non-aquifer to minor aquifer, with low soil permeability. As such, it is likely that de-watering will be required for deep excavations. Where ground water is encountered, it will be pumped and disposed of in an appropriate manner in line with legislative requirements.
- 5.18** Each Development Zone will incorporate one or more building(s). The sequence for the superstructure construction for each building would be as follows:
- Erection of concrete columns;
 - laying of concrete floors floor slabs would typically be concrete placed in situ on either profiled metal decking (steel frame) or formwork tables (concrete frame) though some pre-cast slabs may also be used; In all cases this would involve placing concrete at high level, which would typically be done using skips or concrete pumps; and
 - External cladding will be installed from the ground floor up. As with the substructure, emphasis will be on pre-assembly and prefabrication wherever practical. This will include toilet modules, electrical and mechanical riders and prefabricated plant rooms.

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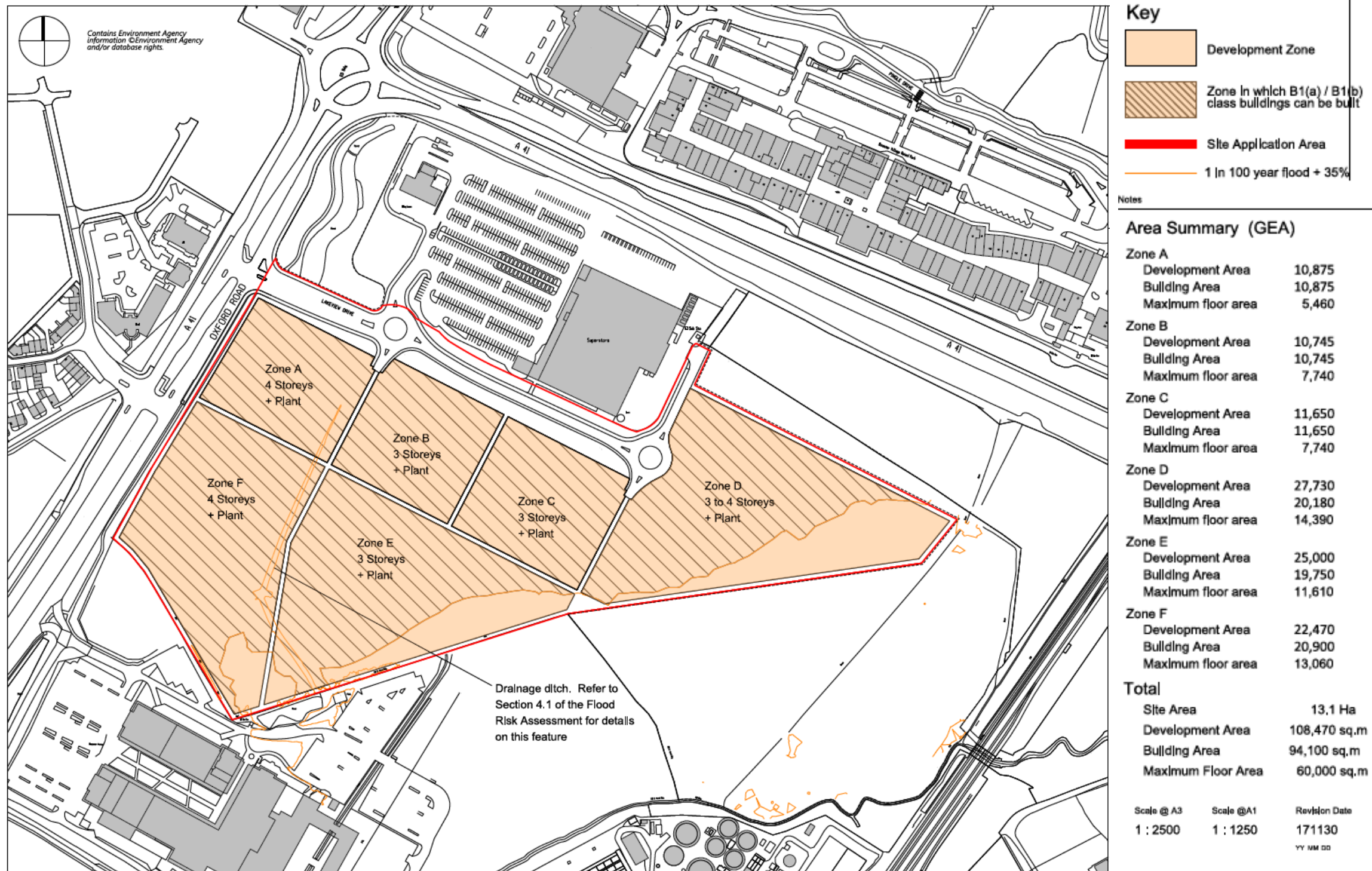


Figure 5.1: Combined Parameter (with Phasing)

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Fit Out

5.19 All fit-out activities will be undertaken inside the buildings, with access via external hoists and goods lifts within the buildings.

Landscaping

5.20 Landscape works (planting and seeding) will be implemented in the first planting season following completion of the relevant phase of development.

5.21 All the external landscape works, including planting, seeding and turfing will be undertaken in the first planting season following completion of the relevant phase of development or occupation of the building whichever is the sooner.

Material and Resource Use

Earthworks

5.22 The site is generally flat, with a slight drop from +68.0m AOD in the north down to +65.0m AOD to the south and east. As a result the Proposed Development will work with the natural contours of the land so avoiding the requirements for significant earth working. It is estimated that a maximum of 21,000 m³ material would need excavating across the site.

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5.23 Throughout the project, prefabrication techniques will be used wherever feasible to reduce the number of vehicle movements required for the project. Vehicle movements associated with the construction phase are detailed in the Traffic Management, Site Access and Egress section below.

5.24 Wherever possible, materials will be recycled and re-used. Measures outlined in Waste Management section below will also be implemented to minimise the quantity of materials used and maximise recycling.

Plant and Equipment

5.25 Consideration has been given to the types of plant that are likely to be used during the construction works. The plant and equipment associated with the construction process is set out in Table 5.1 below.

Hours of Works

5.26 It is anticipated that the core working hours for construction works will be as set out below:

- 07:00 – 18:00 hours weekdays;
- 07:30 – 14:00 hours Saturday; and
- Working on Sunday will be subject to reasonable notice.

5.27 All work outside these hours would be subject to prior agreement, and/or reasonable notice given to CDC. It is understood that CDC may impose certain restrictions on working hours to avoid public nuisance. Although Sunday and night-time working will not normally be undertaken, it is expected that some deliveries and heavy lifts may take place at these times and that certain works may have to be done during this period for safety reasons.

Plant	Site Preparation	Substructure	Superstructure	Fit-out
Tracked / Wheeled 360 Degree Excavators	✓	✓	✓	
Breakers	✓	✓	✓	
Crushers	✓	✓		
Dumpers	✓	✓	✓	
Concrete Crushing Plant	✓	✓		
Mobile Craneage / Tower Cranes	✓	✓	✓	
Muck Away Trucks	✓	✓		
Air Compressors	✓	✓	✓	✓
Diamond Tipped Cutting Tools / Saws	✓	✓	✓	
Power Tools	✓	✓	✓	✓
Hand / Power Tools	✓	✓	✓	✓
Wheel Washing Plant	✓	✓		
Piling Rigs	✓	✓		
Scaffold	✓	✓	✓	✓
Mobile Access Platforms	✓	✓	✓	✓
Delivery Trucks	✓	✓	✓	✓
Skips and Skip Trucks	✓	✓	✓	✓
Forklift Trucks	✓	✓	✓	✓

✓ Indicates plant will be used during this stage of works

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5.28 A review has been undertaken of the potential sources of adverse impacts associated with construction works. The results of this are presented in Table 5.2.

Table 5.2: Potential Impacts during Construction	
Noise	Increased road noise levels from vehicles. Increased noise levels from plant during site preparation, piling and general construction works e.g. from the use of all compressors and diamond cutters.
Vibration	Increased vibration levels from vehicles. Increased vibration levels from plant during site preparation, piling and general construction works e.g. from piling rigs attached to cranes.
Dust / Air Quality	Windblown dust from ground surfaces, stockpiles, vehicles, work faces and cutting and ground of materials. Exhaust emissions from lorries and plant delivering and removing materials including dust and particulates.
Waste	Waste generation and its disposal.
Water	Increased sediment loadings to stormwater system. Potentially contaminated stormwater runoff.
Traffic	Traffic congestion caused by site traffic and traffic associated with road diversions and deliveries. Increased vehicle movements mainly consisting of HGVs. Transfer of mud and material from vehicles onto the public highway. Disruption from abnormal or hazardous loads. Exhaust emissions. Construction impacts on severance, delay, amenity, fear and intimidation and accidents and safety.
Storage of fuels and construction materials	Accidental spills, discharges, to drains/stormwater systems, contamination to ground.
Pedestrian access	Restrictions on pedestrian access to walkways, footpaths and road.
Hazardous materials and contaminated land	Exposure of the workforce to deleterious / hazardous materials and contaminated land, mobilisation of any source contaminants and creation of pathway from source to ground water.
Ecology	Water / mud runoff into the drains. Loss of habitats during site works such as log pile habitats on site. Disturbance to some species of bat through lighting, and reduced foraging habitat over fields.
Energy usage	Indirect impacts associated with energy consumption such as CO2 emissions, depletion of natural resources, air pollution etc.
Water usage	Natural resources depletion and associated indirect impacts on aquatic ecology and resource availability etc.
Landscape and Visual, Views	Impacts to the landscape character comprising impacts on: topography and drainage; vegetation; and visual effects. Views impacted and / or impeded from construction equipment, particularly cranes.
Archaeology	Disturbance to buried archaeology sites and artefacts within the site.

Mitigation

Construction Environmental Management Plan

- 5.29** A Principal Contractor will be appointed by the Applicant to develop and implement a CEMP, through which mitigation and compliance with the requirements of the Building Control department at CDC will be achieved.
- 5.30** The CEMP will be a contractual document outlining the different procedures to be undertaken in order to complete the various works. Individual trade contracts will incorporate requirements for environmental control, based on good working practice, such as careful programming, resource conservation, adhering to health and safety regulations and quality procedures. In this way those involved with construction works, including trade contractors and site management, will be committed to adopt the agreed best practice and environmentally sound methods.
- 5.31** The CEMP will be prepared in consultation with CDC and will be presented to the Council at least 28 days prior to the commencement of works on site for approval.
- 5.32** The trade contractors will be required to demonstrate how they will meet the targets of the CEMP and how the potential impacts will be offset, reduced or minimised.
- 5.33** The CEMP will include the following main items:
- The construction programme;
 - A broad plan of the construction works, highlighting the various stages and their context within the project, including a full schedule of materials and manpower resources, as well as plant and equipment schedules;
 - Detailed site layout arrangements (including requirements for temporary works), plans for storage, accommodation, vehicular movements, delivery and access;
 - Prohibited or restricted operations (locations, hours, etc);
 - Details of operations that are likely to result in disturbance, with an indication of the expected duration of each phase with key dates, including a procedure for prior notification of CDC and relevant statutory and non-statutory (including neighbours) parties so that local arrangements can be agreed;
 - Site working hours;
 - Responsibilities under any CDC codes of practice for deconstruction and construction sites/ Considerate Contractors Scheme (or equivalent);
 - A procedure to ensure communication is maintained with CDC and the local community to provide information on any operations likely to cause disturbance (through, for example, meetings and newsletters);
 - Provisions for affected parties to register complaints and the procedures for responding to complaints,
 - Provisions for reporting to the Applicant and CDC;
 - Details of access to the site and proposed routes for HGVs travelling to and from the site;
 - Details of all works involving interference with the public highway, including temporary carriageway closures, realignment and diversions and movement of wide loads where relevant, and
 - Housekeeping procedures.
- 5.34** Matters concerning site activities during site preparation and construction that relate to environmental issues will be discussed and agreed with CDC in advance of works commencing and the site will be managed in accordance with best practice. The CEMP will include:
- A commitment to environmental protection (all Consultants and Trade Contractors will be invited to declare their support for this at the tender stage);

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- Document planning provisions. This section would provide background information and considerations on impact types to help the project team plan both their activities in relation to environmental issues and their control measures. References of any planning conditions with environmental elements that need to be complied with will also be included;
- Detail on control measures and activities to be undertaken to minimise environmental impacts;
- Monitoring and record-keeping requirements;
- Establishment of baseline levels for noise, vibration and dust;
- Details of a dedicated point of contact during both normal working hours and after hours, with responsibility to deal with environmental issues if they arise; and
- Commitment to a periodic review of the CEMP and regular environmental audits of its implementation.

Considerate Contractor's Scheme

5.35 The site would be registered with a "Considerate Contractors Scheme", a scheme that aims to encourage contractors to carry out their operations in a safe and considerate manner, with due regard to passing pedestrians and road users.

Neighbour and Public Relations

5.36 A key aspect of the successful management of the project will be the maintenance of good relations with site neighbours and the general public. To successfully develop and implement a 'Neighbour and Public Relations Strategy', the following actions will be undertaken:

- Initial contact once planning consent has been obtained, formal contact will be established with nearest neighbours and those who would be affected by the scheme; and
- Contact during works period - A single point of contact will be established, with a senior member of the project staff nominated for the role. This person would usually be the Construction or Logistics Manager. Outside normal working hours, site security will act as the main point of contact via a dedicated phone number. Security will alert the Construction or Logistics Manager if necessary (available 24 hours). Any complaints will be logged, fully investigated and reported to the relevant department of CDC as soon as possible. The complainant will be informed as to what action has been taken.

5.37 Contact with neighbours and the general public throughout the construction period will be pro-actively maintained with regular update meetings, on a quarterly basis and the issuing of a brief newsheet on progress.

Site Staff and Contractors

5.38 Table 5.3 identifies the approximate number of on-site staff and subcontractors for the first 18 month period (Phase 1). The approximate number of on-site staff and contractors required for this Phase is representative of the further phases of development.

5.39 Individual contractors (for example for waste removal will incorporate relevant requirements in respect of environmental control, based largely on the standard of 'good working practice' as outlined in the CEMP as well as statutory requirements. Potential Trade Contractors will be required to demonstrate how they will achieve the provisions of the CEMP, how targets will be met and how potential effects will be minimised.

Traffic Management, Site Access and Egress

5.40 Estimated numbers of construction related vehicles for Phase I are shown in Table 5.4 across the estimated 18-month construction period. For the purposes of outline planning, all deliveries are assumed to be HGVs. The approximate number of construction related vehicles required for this Phase is representative of further Phases of development.

5.41 As part of the procurement process, successful contractors will be issued with a project route map and delivery schedule that they must pass on to their delivery drivers. This will help to ensure that deliveries have the minimum impact on the locality and are made smoothly and on time. Specific time slots will be allocated to contractors for the use of cranes and hoists, to ensure that the main plant will be utilised efficiently. Deliveries will need to be planned to match their allocated access slots.

5.42 It is anticipated that access to the site will use the existing site access from the A41 Oxford Road. All vehicles above 7.5 tonnes will be restricted to the primary road network and full details of the routes to be taken and access arrangements will be agreed with CDC.

5.43 It is proposed that during the piling, substructure and superstructure works, a circular one-way system on-site will be implemented to ensure ease of traffic flow and avoidance of congestion. Loading and unloading during these stages will take place within the site, further minimising the likelihood of congestion. Strict monitoring and control of all vehicles entering, exiting and travelling across the site will also be maintained including:

- The setting of specific delivery and collection times;
- Consolidation of deliveries wherever possible;
- The requirement for prior authorisation when visiting the site via vehicle. This will be managed by the Logistics Manager; and
- Pedestrian access will be maintained adjacent the works at all times.

Table 5.3: First 18 Month Site Staff, Subcontractors, Daily Visitors and Daily Deliveries

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18
Site Staff	8	9	11	12	15	15	15	15	15	15	15	15	15	15	15	15	15	12
Subcontractors	15	23	30	60	90	120	120	120	120	120	120	135	135	150	150	105	75	75
Total	23	32	41	72	105	135	135	135	135	135	135	150	150	165	165	120	90	87
Daily Visitors	8	8	8	15	15	15	15	23	23	23	23	30	30	30	30	23	15	15
Daily Deliveries	8	15	23	30	45	45	45	45	45	45	45	60	60	60	45	30	23	15
Total	16	23	31	45	60	60	60	68	68	68	68	90	90	90	75	53	38	30

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Road Closures and Conversions

- 5.44 Whilst no long-term road closures are envisaged, weekend closures of local roads may potentially be required in order to deliver large items of building plant. This will be agreed with CDC prior to commencement.
- 5.45 Notices regarding any planned closures and diversions of either roads or footpaths shall be given by the principal contractor to CDC, police, fire brigade and other emergency services sufficiently in advance of the required closure or diversion.

Car Parking and Travel to Site

- 5.46 There will be a general policy of restricting on-site car parking to a minimum and the site labour force will be encouraged to use public transport. Unapproved parking on public roads will not be allowed. Provisions will be made within the site for essential on-site parking only. Any local traffic management measures for site access will be agreed with CDC.

Off-Site Facilities

- 5.47 It is the intention to maintain sufficient space on site for portable cabins/site offices, material and waste stock piling and toilet/welfare facilities etc. However, should there be a requirement for off-site facilities, the locations of these will be agreed prior to their installation with CDC.

Road Cleanliness

- 5.48 To minimise mud on roads, the CEMP will prescribe measures to include the provision of suitable facilities for wheel wash at site exits. This will include the use of a suitable means to clean all highways in the vicinity of the site. Collected debris will be disposed of as controlled waste at a waste disposal facility.

Management of Noise, Vibration and Dust

- 5.49 Full assessments of activities with the potential to generate high levels of dust or noise and vibration are presented in Chapter 8: Noise and Chapter 9: Air Quality respectively. Best practicable means of preventing, reducing and minimising noise and air quality pollution will be adopted in agreement with CDC.
- 5.50 Good practice procedures will be followed in order to mitigate noise, vibration and air pollution (e.g. through dust and fume-generation) impacts. Measures currently planned include:
- Use of hoarding around the entire perimeter of the site to assist in the screening of noise and dust generation from low-level sources;
 - Hydraulic construction to be used in preference to percussive techniques where practical;
 - All plant and equipment to be used for the works will be properly maintained, silenced where appropriate, and operated to prevent excessive noise and switched off when not in use and where practicable;
 - Plant will be certified to meet relevant current legislation and Noise and Vibration Control on Construction and Open Sites (BS 5228) Standards¹;
 - All Trade Contractors will be made familiar with current noise legislation and the guidance in BS 5228 which will form a prerequisite of their appointment;
 - Threshold vibration limits will be set and monitoring equipment established at locations outside the site which are deemed sensitive;

- Loading and unloading of vehicles, dismantling of equipment such as scaffolding or moving equipment or materials around site will be conducted in such a manner as to minimise noise generation and where practical will be conducted away from noise sensitive areas;
- Deviation from approved method statements will be permitted only with prior approval from the Principal Contractor and other relevant parties. This will be facilitated by formal review before any deviation is undertaken;
- Noise complaints, or exceedances of action levels will be reported to the Contractor and immediately investigated;
- Brushing and water spraying of heavily-used site hard surfaces and access points as required;
- Wherever possible, plant and equipment will be switched off when not in use;
- Vehicles transporting materials, capable of generating dust, to and from site will be suitably sheeted on each journey to prevent the release of materials and particulate matter; and
- Effective wheel/body washing facilities will be provided and used as necessary.

- 5.51 A programme for noise and dust monitoring will be prepared as part of the CEMP and agreed with CDC prior to the commencement of works on site.

Waste Management

- 5.52 The disposal of all waste or other materials removed from the site will be in accordance with current requirements and legislation.
- 5.53 A principal aim during construction will be to reduce the amount of waste generated and exported from site. This approach complies with the waste hierarchy whereby the intention is first to minimise, then to treat at source or compact and, finally, to dispose of off-site as necessary.
- 5.54 All relevant contractors will be required to investigate opportunities to minimise and reduce waste generation, such as:
- Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme;
 - Implementation of a just in time material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste;
 - Attention to material quantity requirements to avoid over-ordering and generation of waste materials;
 - Re-use of materials wherever feasible, e.g. re-use of excavated soil for landscaping, re-use of internal equipment and plant from existing buildings. Concrete will be taken off site for crushing and re-use. The Government has set broad targets of the use of reclaimed aggregate, and in keeping with best practice, contractors will be required to maximise the proportion of materials recycled;
 - Segregation of waste at source where practical; and
 - Re-use and recycling of materials off-site where re-use on-site is not practical (e.g. through use of an off-site waste segregation facility and re-sale for direct re-use or re-processing).
- 5.55 Skips will be covered to prevent dust and debris blowing around the site and will be cleared on a regular basis.
- 5.56 Burning of wastes or unwanted materials will not be permitted on-site.

¹ British Standards Institution, BS 5228, 'Code of Practice for Noise and Vibration Control on Construction and Open Sites Standards. BSI.

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- 5.57** All hazardous materials including chemicals, cleaning agents, solvents and solvent containing products will be properly sealed in containers at the end of each day prior to storage in appropriately protected and bunded storage areas.
- 5.58** As the new buildings become enclosed, the rubbish will be collected in lightweight floor-based wheeled skips that can manoeuvre around the configuration of the units. The skips will then be taken to ground floor level by hoist, and either decanted into larger skips, or if suitable, placed into a compactor to reduce the volume of the waste before it is taken off-site.

Protection of Archaeological Resources

- 5.59** A programme of strip, map and record will be undertaken to establish the extent of any surviving archaeological remains that might be damaged during construction of the site. Further to that an archaeological watching brief will take place on areas not included in the strip, map and record. This will be secured as a condition of planning.
- 5.60** With the mitigation outlined above being undertaken, this would ensure preservation by record of the known heritage assets within the site and would enable identification and preservation by record of any hitherto unrecorded archaeological remains. The exact scope of any further investigations and / or mitigation would need to be agreed with Oxfordshire County Archaeological Services on behalf of the planning authority.

Protection of Water Resources

- 5.61** The protection of water resources is detailed in Chapter 13 Water Resources and Flood Risk and includes measures to ensure the appropriate storage of oils, and prevention of the leakage of contaminants into the existing drainage network. The CEMP will ensure that construction activities will be undertaken in accordance with good practice guidance, including the Pollution Prevention Guidelines (PPG) formerly published by the EA, particularly 'PPG1 General guide to the prevention of water pollution', 'PPG2 Above ground oil storage tanks', 'PPG 5 Works in, near or liable to affect watercourses', and 'PPG 6 Working at construction and demolition sites', and other good construction guidance such as CIRIA 'Guidance C532 control of water pollution from construction sites'.

Ecological Protection

- 5.62** All retained trees and hedgerows will be protected in accordance with BS 5837:2012. If works are required to trees for health and safety or to clear overhanging branches, these will be subject to individual bat tree assessments to ensure that bat roosts are not directly affected. Fencing in accordance with BS 5837: 2012 will also protect, at least initially, arable margins and most habitat suitable to support reptiles.
- 5.63** Before any works in areas that may support reptiles begin (arable margins, log piles, any other ruderal, scrub or tall grassland habitats other than arable crop) the area will be cleared of vegetation in a staged manner. The vegetation will be cut to 200mm, left over night, then cut to ground level. Movement of operators with brush cutters will be from west to east so that any animals disturbed will move away from the site into the flood plain area (which will not be developed).
- 5.64** The large mammal hole will be monitored for 21 days prior to construction. Monitoring may be using a camera trap, or with hair traps and sand (to capture paw prints). If no badger activity is observed, the hole can be soft closed (filled with loose soil) without a licence. If badgers are recorded a Natural England licence will be obtained to lawfully close the sett with a staged closure.

Protection of Ground Conditions

- 5.65** A Phase 1 Environmental Risk Assessment (Technical Appendix 2.3) was prepared to support the EIA Scoping Report and has defined the risks in relation to the redevelopment of the site on human health and the environment, including controlled waters.

- 5.66** The risks can however be adequately managed (through industry recognised standards and best practice measures) controlled through adherence to the CEMP and so the redevelopment of the site is unlikely to generate any significant ground conditions (including groundwater) related environmental effects. Furthermore, several planning conditions attached to the planning permission are envisaged to cater for the further reporting, site investigation works and (if required) remediation prior to the start of works on site are anticipated.

Energy and Water Usage

- 5.67** All relevant contractors will be required to investigate opportunities to minimise and reduce the use of energy and water, such as:
- Use of alternatives to diesel / petrol powered equipment where possible;
 - The incorporation of sources of renewable energy to offset the use of main utilities;
 - Selection and specification of energy efficient plant and equipment;
 - Implementation of staff-based initiatives such as turning off taps, plant and equipment when not in use both on-site and within site offices encouraging a paper-reduced office and encouraging double-sided printing and photocopying;
 - Use of recycling water systems such as wheel washes; and
 - Use of a rainwater harvesting system for use in equipment and vehicle washing.

- 5.68** The energy and water consumption of the project will be monitored, either through sub-metering or utility bills, to allow comparison against best practice benchmarks.
- 5.69** There is a possibility that vermin and other wildlife may visit the site in search of food. To minimise this problem, workers will avoid consuming food outside of designated areas, which will be kept clean and free of food waste.

Cumulative Impact Assessment

- 5.70** There are a number of proposed developments within the nearby area, some of which have received planning permission or are already under construction and some of which are likely to be granted planning permission subject to Section 106 agreements, in addition to areas which have site allocations from the CDC.
- 5.71** It is considered that the construction phase of the Proposed Development will have the greatest potential to contribute to impact interactions. It is not unusual for construction to take place on more than one site in close proximity to each other and the contractor will undertake regular liaison meetings and reviews with neighbouring sites to plan works so that they do not cause unnecessary disruption.
- 5.72** During construction phase, potential impacts exist for the sensitive receptors, as detailed in Chapter 2 EIA Methodology. The receptors considered to be most sensitive to cumulative impacts during construction phase are pedestrians on the surrounding rights of way, users of the A41 Oxford Road and Kings End road and visitors to the neighbouring Bicester Village. The criteria for identifying those receptors that are considered to be potentially sensitive include the nature of the receptor, proximity to the works, and extent of exposure to impacts and impact interactions.
- 5.73** Potential impact interactions are largely related to noise, dust and traffic. Interactions will take place during the construction phase, and noise and traffic impacts will predominantly occur during piling. The introduction of site hoardings and compliance with the mitigation measures detailed above will reduce as far as possible these impact interactions.
- 5.74** Should the construction programme of any of the cumulative schemes identified in Chapter 2: EIA Methodology, Table 2.1 overlap, a detailed strategy will be developed to mitigate against any particular issues which may arise.

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Demolition of the Proposed Development

- 5.75** The main structure of the Proposed Development has been designed with a minimum design life of 50 years, with shorter design life periods for minor elements.
- 5.76** At the end of its life it is anticipated that the demolition of the Bicester Office Park will use similar methods to those used during construction. Safe working practice's will be devised and implemented during the demolition period. The stages of demolition of the development are:
- Erect hoardings and tower cranes;
 - Soft strip of internal finishes;
 - Remove plant including major service risers;
 - Dismantle the facade glazing. This will be undertaken from either within the building or from external 'mast' climbers/cranes; and
 - Dismantling of the superstructure.

Introduction

- 6.1 This chapter of the ES assesses the anticipated significant socio-economic effects resulting from the construction and operation of the Proposed Development. An assessment of the permanent socio-economic effects of two different potential schemes has been undertaken (Option A and Option B), the details of which are outlined in the Assessment of Likely Significant Effects.
- 6.2 This chapter sets out the relevant socio-economic planning policy context; the methods used to assess potential effects; the baseline conditions and potential effects on the defined impact areas as a result of the Proposed Development. Where appropriate, mitigation measures required to prevent, reduce or offset any potentially significant adverse effects are identified, alongside a summary of the expected residual effects.
- 6.3 The potential for cumulative effects associated with the Proposed Development and with other relevant development schemes are discussed later in this chapter. The potential for effect interactions with other identified likely significant effects arising as a result of the Proposed Development are discussed in *Chapter 13: Effect Interactions of this ES (Volume I)*.
- 6.4 This chapter is supported by **Appendix 6** which is provided in ES Volume II and broken down into two parts: **Appendix 6A** (policy review) and **Appendix 6B** (full list of references).

EIA Scoping

- 6.5 An EIA Scoping Report was submitted to Cherwell District Council (CDC) in May 2017. CDC issued their EIA Scoping Opinion on 8 August 2017 which is provided in **Technical Appendix 2.2, ES Volume 2**. The Scoping Opinion stated that the socio-economic assessment should include all the main elements included in the outline scope, as follows:
- Temporary employment created during the construction phase of the redevelopment;
 - Gross value added to the local economy by the temporary construction employment;
 - Construction training opportunities;
 - Employment generation, including direct jobs created on site and associated indirect/induced employment created through multiplier effects;
 - Gross value added to the local economy by the net additional employment created;
 - Training and skills development opportunities;
 - Additional local spending by office workers;
 - The provision of amenity space for office users;
 - The legislative and planning policy context; and
 - Assessment of apprenticeship opportunities for both the temporary and permanent socio-economic effects.

Legislative and Planning Policy Context

- 6.6 A review of planning policy has been undertaken, which considers the relevant local, sub-regional and national planning policies, helping to form a clear understanding of the strategic regeneration aspiration for Cherwell and the wider sub-regional area.

- 6.7 The full policy review is included in the supporting **Appendix 6A** and includes:

- **Planning Policy** - National Planning Policy Framework (NPPF), paragraphs 14 and 17;
- **Planning Policy** - Local Planning Policy: Cherwell Local Plan Part 1 (2015), Strategic Objective 1 and 3, Policy SLE1-5;
- **Planning Policy** - Local Plan Saved Policies (2007); and
- **Planning Policy** - South East Midlands Local Enterprise Partnership Strategic Economic Plan (2014).

Assessment Methodology

- 6.8 This section of the chapter sets out the methodologies used in the assessment of the baseline socio-economic conditions and the socio-economic effects of the Proposed Development.

Methodology for Determining Construction Effects

- 6.9 The temporary construction employment benefits have been assessed based on the anticipated build cost for the Proposed Development.
- 6.10 Data from the Annual Business Survey published in November 2016¹ reveals that total turnover in the construction sector during 2015 was £242,148 million. The average number of people employed in the construction sector during 2015 was 1.361 million, suggesting that average turnover per full time equivalent construction job in 2014 was £177,919.
- 6.11 Using the build cost estimate and the average turnover per full time equivalent construction job in 2015 of £177,919, the number of person years of temporary construction employment has been estimated.
- 6.12 The widely accepted convention in economic impact assessment is that ten person years of construction employment equate to one full-time equivalent, permanent job in the construction sector. This means that the estimated number of person years of temporary construction employment must be divided by 10 to estimate the number of permanent construction jobs generated.

Methodology for Determining Completed Development Effects

Gross, On Site Employment

- 6.13 The direct employment generated by the completed (and operational) Development at full occupancy is calculated by applying standard employment density ratios to the commercial floor space figures provided for the Proposed Development, using the methodology set out within the Homes and Communities Agency's (HCA)'s Employment Density Guide, 3rd Edition, 2015².
- 6.14 It is assumed that employees would be drawn from a catchment area beyond the Local Area and that while many of the benefits of the Proposed Development would remain in Cherwell, some indirect and induced benefits would accrue across the wider surrounding region.

Net Additional Permanent Employment

- 6.15 To calculate the net additional employment of the Proposed Development once operational, adjustments have been made for several factors which, when considered together, allow an assessment of the net additional jobs that will be generated on the site.

¹ Office for National Statistics (2015) Annual Business Survey

² Homes and Communities Agency (2015) Employment Density Guide (Third Edition)

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6.16 The following adjustment factors have been allowed for:

- **Displacement effects** – will occur if some firms simply switch jobs from one location to another for example by moving staff from an existing operation in Bicester to the Proposed Development;
- **Leakage effects** – will occur if some of the jobs created by the Proposed Development are taken up by people living outside the regional impact area;
- **Substitution effects** – occur when firms substitute one activity or input for a similar one to take advantage of public funding. In this case there will be no substitution effects;
- **An indirect multiplier effect** – is likely to create supply chain effects which will benefit local firms such as cleaning and maintenance contractors, training agencies and other suppliers of goods and services to the occupiers of the Proposed Development. This effect is also known as a **supply linkage multiplier**; and
- **An induced multiplier effect** – is associated with increased expenditure in the local area by people deriving incomes from the direct and indirect effects of the Proposed Development. The induced effects of the Proposed Development will bring benefits to local shops and other service providers. This effect is also known as a **consumption multiplier**.

6.17 In estimating the size of these effects advice provided by the Additionality Guide (Fourth Edition 2014)³ has been drawn on in this assessment. This guidance provides ready reckoner values which can be used to model the scale of these adjustment factors in the absence of empirical evidence on their value. Table 6.1 below shows the ready reckoner values used.

Table 6.1 – Adjustment Factors used in Estimating Net Additional Employment

Adjustment factor	Scale of adjustment	Adjustment value
Displacement effects	Low	25%
Leakage effects	Low	10%
Substitution effects	None	0%
Combined multiplier effects	Medium supply linkages	1.3

Gross Value Added to the Local Economy

6.18 To estimate the annual GVA created by the completed Development information from the ONS (2017) Sub-regional Productivity tables has been used.

Understanding gross value added

6.19 The Office for National Statistics defines Gross Value Added (GVA) as “the contribution of each individual producer, industry or sector to the economy.” GVA can be estimated at either an aggregate (or macro) level or at an individual producer (or micro) level, as follows:

- **At macro level** – GVA measures the value of output (goods and services) produced in the economy minus the cost of raw materials and other inputs used to produce them; and
- **At micro level** – GVA measures the value of output generated by a producer minus the costs associated

with the production of the output.

Assessing Baseline Socio-economic Conditions

6.20 In assessing the socio-economic effects of the Proposed Development, baseline information on a variety of socio-economic indicators has been identified and interpreted. The indicators have been grouped into several thematic areas. Taken together, these thematic areas provide a picture of the socio-economic strengths and weaknesses of a local area.

6.21 Data on baseline socio-economic conditions from a variety of sources has been obtained. The sources include: the 2011 Census, the Office for National Statistics (ONS), the National Online Manpower Information Service (NOMIS), Public Health England and the English Indices of Deprivation 2015 which allow consideration of socio-economic conditions at very small local areas known as lower layer super output areas (SOAs).

6.22 The GeoInsight service provided by Pitney Bowes has also been used. GeoInsight is a GIS-based mapping tool which enables socio-economic data to be collated and analysed at a range of different geographies.

Assessing the Significance of Socio-economic effects

6.23 The socio-economic effects identified in this assessment have been categorised as **adverse** or **beneficial** depending on their expected effect. The identified effects have then been evaluated against four main criteria, drawing on the evaluation criteria typically used in environmental impact assessment which

are as follows:

- **Scale of the effect** – this includes the magnitude and likely severity of the impact;
 - **Duration of the effect** – this distinguishes between temporary impacts (those effects associated with the demolition, refurbishment and construction period) and those that will continue to have an effect in the long-term (those effects associated with the completed and operational Development);
 - **Importance of the effect** – to the affected communities in the impact area; and
 - **Compatibility of the effect** – with the outcomes sought by relevant regeneration and economic development policies.
- 6.24 The significance of the identified socio-economic effects has been assessed by considering both the magnitude of the effect and the sensitivity of the receptor. Table 6.2 below shows the range of potential assessments for the significance of socio-economic effects.

Table 6.2 – Assessing the Significance of Socio-Economic Effects

Magnitude	Sensitivity			
	Very High	High	Moderate	Low
Major/Substantial	Major – Adverse or Beneficial	Major – Adverse or Beneficial	Major to Moderate – Adverse or Beneficial	Moderate to Minor – Adverse or Beneficial
Moderate	Major to Moderate – Adverse or Beneficial	Major to Moderate – Adverse or Beneficial	Moderate to Minor – Adverse or Beneficial	Minor – Adverse or Beneficial
Minor/Slight	Moderate – Adverse or Beneficial	Moderate to Minor – Adverse or Beneficial	Minor – Adverse or Beneficial	Minor to Negligible – Adverse or Beneficial
Negligible	Minor – Adverse or Beneficial	Negligible	Negligible	Negligible

³ Homes and Communities Agency (2014) Additionality Guide

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6.25 The assessment of significance reflects the following definitions:

- **Adverse Effect of Major/substantial Significance** – A detrimental or negative effect resulting in a geographically extensive, or substantial change to a socio-economic resource or receptor. The change would be an important factor in the decision-making process.
- **Adverse Effect of Moderate Significance** – A detrimental or negative effect resulting in a moderate demonstrable change to a socio-economic resource or receptor. The change would typically be experienced beyond the local scale, and could be considered a factor in the decision-making process.
- **Adverse Effect of Minor/slight Significance** – A detrimental or negative effect resulting in a short, small or highly localised change to a socio-economic resource or receptor.
- **Beneficial Effect of Minor/slight Significance** – An advantageous or positive effect resulting in a short term, small or highly localised change to a socio-economic resource or receptor.
- **Beneficial Effect of Moderate Significance** – An advantageous or positive effect resulting in a moderate demonstrable change to a socio-economic resource or receptor. The change would typically be experienced beyond the local scale, and could be considered a factor in the decision-making process.
- **Beneficial Effect of Major/substantial Significance** – An advantageous or positive effect resulting in a geographically extensive, or substantial change to a socio-economic resource or receptor. The change would be an important factor in the decision-making process; and
- **Negligible effect** – An adverse or beneficial effect which is too small to be assessed or measured.

6.26 There is no formalised technical guidance or criteria available to assess the significance of socio-economic effects. Potential effects are assessed by applying the criteria outlined in Table 6.2 using professional judgement. Where possible, the likely socio-economic effects are quantified. However, some impacts by their nature can only be evaluated on a qualitative basis.

6.27 The duration of the activity that affects a given resource or receptor is considered either as short term (typically those effects associated with the demolition, refurbishment and construction period) or long-term (typically those associated with the Proposed Development during operation).

6.28 The geographical extent considers the appropriate administrative boundary or geographical area of influence within which an effect occurs and is assessed at the following spatial scales:

- **Local** – the five Bicester electoral wards as of 2015 in and around which the Proposed Development is located. The wards are: Bicester Town, Bicester South, Bicester North, Bicester East and Bicester West;
- **District** – the Cherwell District Council local authority area; and
- **Regional** – the South East Midlands Local Enterprise Partnership (SEMLEP) area, comprising the following 11 local authorities: Aylesbury Vale District, Bedford Borough, Central Bedfordshire, Cherwell District, Corby Borough, Daventry District, Kettering Borough, Luton Borough, Milton Keynes, Northampton Borough and South Northants.

Baseline Conditions

6.29 The baseline assessment has been prepared through a desktop analysis of economic and social conditions, using a wide range of socio-economic indicators. The main thematic areas considered within the baseline assessment are as follows:

- Population and demographic change;
- Economic activity;
- Education and skills;
- Housing;
- Health conditions;
- Deprivation and poverty; and
- Crime.

Key Messages

6.30 The key messages from the assessment of baseline conditions are as follows:

- **Population** – There is a higher proportion of working age people and a lower proportion of people of retirement age within the local impact area compared to the national average. However, the same figures for Cherwell are more comparable to the national average;
- **Housing** – Average house prices are significantly higher within Cherwell compared to the national average, yet more people still own their own home either outright or with a mortgage than the national average;
- **Employment** – A high proportion of the working age population in Cherwell are economically active, with good levels of job density and lower levels of unemployment and benefit claimants compared to the national average;
- **Health conditions** – Although health indicators for Cherwell are generally better than the national averages, there is a large gap between the life expectancy of people living in the most deprived and the least deprived parts of the local authority; and
- **Deprivation** – The local impact area is mixed regarding deprivation, with a predominately better than average picture for employment and income deprivation but worse than average representation for education and skills deprivation.

6.31 A full review of baseline conditions is included in **Appendix 6B**.

Assessment of Likely Significant Effects

6.32 This section identifies and assesses the significance of the socio-economic effects associated with the Proposed Development.

Construction Phase

6.33 This section considers the following **temporary socio-economic effects** arising during the construction phase of the Proposed Development:

- Construction employment;
- Gross valued added by the construction employment; and
- Construction training opportunities.

Construction Employment

6.34 The Proposed Development will include a significant construction phase which will generate turnover and

temporary employment for construction firms and related trades.

- 6.35** The UK construction sector is characterised by an extensive network of supply chains and contracting relationships covering a very wide range of trades and skills. As a result, the spin off benefits from new construction projects are greater than for many other economic sectors in the UK.
- 6.36** The temporary construction employment benefits have been assessed based on the anticipated build cost for the Proposed Development. The total construction cost for the Proposed Development is estimated to be £111 million.
- 6.37** Using the build cost estimate of £111 million and the average turnover per full time equivalent construction job in 2015 of £177,919 (as noted in the Methodology for Determining Construction Effects), the development proposals will generate 624 person years of temporary construction employment. This is equivalent to 624 construction workers being employed on a full-time basis for twelve months.
- 6.38** The standard convention in economic impact assessment is that ten person years of construction employment equate to one full-time equivalent, permanent job in the construction sector. This means that the construction of the scheme will support the equivalent of around 62.4 permanent construction jobs.
- 6.39** The significance of the temporary employment generated by the construction phase of the Proposed Development has been assessed based on the criteria outlined earlier in this chapter.
- 6.40** The construction employment has been assessed as a **short-term, beneficial impact of moderate significance** at the **district** level.

Gross Value Added by Temporary Construction Employment

- 6.41** Gross value added (GVA) is a conventional measure of economic well-being. GVA measures the value of output generated by a producer minus the costs associated with the production of the output. The commentary on operational effects later in this chapter provides further details on the definition and measurement of GVA.
- 6.42** The Annual Business Survey 2015 also provides estimates of the approximate gross value added by different sectors of the UK economy. During 2015 the approximate gross value added by the construction sector was £92.122 billion.
- 6.43** With an average number of people employed in the construction sector during 2015 of 1.361 million, this suggests that the gross value added per full time equivalent construction job in 2014 was £67,687.
- 6.44** It is estimated that 624 person years of temporary construction employment generated by the Proposed Development will create gross value added to the economy of around £42.2 million.
- 6.45** The significance of the gross value added by the employment generated by the construction phase of the Proposed Development has been assessed based on the criteria outlined earlier in this chapter.
- 6.46** The GVA from construction employment been assessed as a **short-term, beneficial impact of moderate significance** at the **district** level.

Construction Training Opportunities

- 6.47** The Proposed Development will involve a phased construction programme. Given the scale of building activity,

there is considerable scope to provide training, apprenticeships and work experience in a range of construction trades. These opportunities will be available during the construction phases for the commercial space at the Proposed Development.

- 6.48** For example, there will be opportunities for local young people to gain NVQ Level 2 and Level 3 training and practical experience in a range of different construction and engineering trades. Initiatives of this sort are typically run by a training provider in partnership with the main contractor for the construction programme.
- 6.49** The Applicant is committed to working with its suppliers and contractors to maximise the opportunities for Bicester residents to take advantage of the construction training opportunities created by the Proposed Development.
- 6.50** The significance of the training opportunities that will be created by the construction phase of the Proposed Development has been assessed based on the criteria outlined earlier in this chapter.
- 6.51** The construction training opportunities have been assessed as a **short-term beneficial impact of minor to moderate significance** at the **district** level.
- 6.52** The precise significance of this effect will depend on the quality and effectiveness of the training programmes established and the mechanisms put in place for their delivery.

Completed Development

- 6.53** This section considers the following **permanent socio-economic effects** arising once the Proposed Development becomes operational:
- **Employment effects** – the permanent employment that will be generated by the Proposed Development;
 - **Economic effects** – the gross valued added to the local economy by the Proposed Development and additional spending by officer workers at the Proposed Development;
 - **Training and skills development opportunities** – once the commercial space at the Proposed Development becomes operational; and
 - **Amenity space** – the amount of amenity space provided for future occupiers of the Proposed Development.

Permanent Employment – Gross, On Site Employment

- 6.54** The Proposed Development will create a major new employment hub, providing permanent jobs in a range of sectors. An assessment of the permanent socio-economic effects of two different potential schemes has been undertaken (Option A and Option B), as follows:
- 6.55 Option A:** The Proposed Development provides a total of 49,000m² (NIA) of B1a Use floorspace.
- 6.56 Option B:** The Proposed Development provides a total of 36,750m² (NIA) of B1a Use floorspace and 12,250m² of B1b Use floorspace.
- 6.57** Table 6.3 below outlines the assumptions used when estimating the gross, on site employment that will be created by Option A and Option B.

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Table 6.3 – Gross, On Site Permanent Employment (Option A and Option B)

Use class	Use	Floor space (m ²)	FTE jobs	Comments and assumptions
Option A				
B1a	Office	49,000 NIA	3,769 to 4,900	Employment density of 10 to 13 based on net internal area (NIA)
Option A Total		49,000 NIA	3,769 to 4,900	
Option B				
B1a	Office	36,750 NIA	2,826 to 3,675	Employment density of 10 to 13 based on net internal area (NIA)
B1b	R&D* Space	12,250 NIA	204 to 306	Employment density of 40 to 60 based on net internal area (NIA)
Option B Total		49,000 NIA	3,030 to 3,981	

* Research and Development

6.58 Table 6.3 assumes the following:

- **Employment density** – evidence provided by the *Employment Density Guide* (Third Edition 2015) has been used. Employment density refers to the average floor space in sqm per full-time equivalent (FTE). Employment density describes the intensity of use within a building and is an indicator of the amount of space typically occupied by one person in a commercial building; and
- **B1a office** – the employment density range of 10 to 13 provided by the Employment Density Guide under the B1a general office category has been adopted. This employment density would accommodate a range of potential office users, including corporate, professional services, public sector and finance occupiers. The employment density range has been applied to the net internal area of the B1a office space in the Proposed Development.
- **B1b research and development space** – the employment density range of 40 to 60 provided by the Employment Density Guide under the B1b Use Class has been adopted. The employment density range has been applied to the net internal area of the B1b office space in the Proposed Development.

6.59 Based on the above assumptions, it is estimated that **Option A** will create gross, on site employment of **3,769 to 4,900 full-time equivalent (FTE) permanent jobs**.

6.60 Based on the above assumptions, it is estimated that **Option B** will create gross, on site employment of **3,030 to 3,981 full-time equivalent (FTE) permanent jobs**.

Gross, On Site Employment – Contribution to the District Impact Area Employment Base

6.61 The Proposed Development (Option A and Option B) will create an employment hub which will make a significant contribution to the employment base of the district impact area.

6.62 Data from the National Online Manpower Information Service (NOMIS) reveals that there were 50,000 full-time and 22,000 part-time employee jobs in Cherwell during 2015. This means that the gross, on site employment created by **Option A** represents an increase of between 7.5% and 9.8%, and **Option B** represents an increase of between 6% and 8%, in the number of full-time jobs throughout Cherwell.

6.63 The significance of the gross on site employment that will be generated by the Proposed Development has been assessed based on the criteria outlined earlier in this chapter.

6.64 The gross, on site permanent employment created by **Option A** has been assessed as a **long-term, beneficial impact of major significance** at the **regional** level.

6.65 The gross, on site permanent employment created by **Option B** has been assessed as a **long-term, beneficial impact of major significance** at the **regional** level.

Net Additional Permanent Employment

6.66 The 3,769 to 4,900 FTE jobs that will be created by Option A and the 3,030 to 3,981 FTE jobs that will be created by Option B represent a gross employment figure. In order to understand the real employment effects of the Proposed Development, adjustments have been made for several factors which, when considered together, allow an assessment of the net additional jobs that will be generated on this site.

6.67 Based on the assumptions outlined in the Methodology for Determining completed Development Effects, the net additional jobs that will be created by the Proposed Development has been calculated using the following formula:

Gross on site jobs x (1 – displacement) x (1 – leakage) x combined multiplier effects = net additional jobs

Option A: 3,769 to 4,900 x (1 – 0.25) x (1 – 0.10) x 1.3 = **3,307 to 4,300 net additional jobs**

Option B: 3,030 to 3,981 x (1 – 0.25) x (1 – 0.10) x 1.3 = **2,658 to 3,493 net additional jobs**

6.68 After allowing for displacement, leakage and multiplier effects, it is estimated that **Option A** will create **3,307 to 4,300 net additional jobs**.

6.69 After allowing for displacement, leakage and multiplier effects, it is estimated that **Option B** will create **2,658 to 3,493 net additional jobs**.

6.70 The net additional permanent employment created by **Option A** has been assessed as a **long-term, beneficial impact of major significance** at the **regional** level.

6.71 The net additional permanent employment created by **Option B** has been assessed as a **long-term, beneficial impact of major significance** at the **regional** level.

Gross Value Added (GVA) to the Local Economy

6.72 The net additional employment created by the Proposed Development will have wider economic effects by generating gross value added to the local economy.

6.73 In estimating the GVA that would be generated by the Proposed Development, data provided by the Office for National Statistics has been used. Detailed information on GVA per filled job is provided by the Regional

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Economic Analysis Sub Regional Productivity Tables published in January 2017⁴. Table B3 reveals that GVA per filled job for Oxfordshire was £53,879 in 2015, the most recent year for which data is currently available.

- 6.74** Based on the above evidence, it is estimated that the 3,307 to 4,300 net additional jobs created by **Option A** would create a gross value added to the local economy of **£178.2 million to £231.7 million** annually in perpetuity.
- 6.75** Based on the above evidence, it is estimated that the 2,658 to 3,493 net additional jobs created by **Option B** would create a gross value added to the local economy of **£143.2 million to £188.2 million** annually in perpetuity.
- 6.76** This analysis does not provide GVA per filled job by industry sector. The GVA per filled job for Oxfordshire of £53,879 in 2015 covers all sectors. This means that it will slightly overstate the GVA for office uses which will typically be lower than the values for manufacturing industries. Nevertheless, the Proposed Development (Option A and Option B) will still make a very significant contribution to the gross value added in the local, district and regional impact areas defined for the assessment.
- 6.77** The significance of the gross value added that will be created by Option A and Option B has been assessed based on the criteria outlined earlier in this chapter.
- 6.78** The gross value added by **Option A** has been assessed as a **long-term, beneficial impact of major significance** at the **regional** level.
- 6.79** The gross value added by **Option B** has been assessed as a **long-term, beneficial impact of major significance** at the **regional** level.

Training and Skills Opportunities

- 6.80** On completion of the Proposed Development (Option A and Option B) there will be a range of job brokerage and other Cherwell District Council supported recruitment initiatives that could be tailored to meet the needs of local people and prospective employers. Typically these initiatives provide help for local people with confidence-building, interview skills and skills for life development, as well as support for employers in identifying dedicated staff with real potential.
- 6.81** The training and skills development opportunities for **Option A** and **Option B** have been assessed as a **long-term, beneficial impact of moderate significance** at the **district** level.

Additional local spending by office workers at the Proposed Development

- 6.82** In the absence of empirical evidence on the scale of spending by future employees at the site, a modest local spend assumption of £5 per working day per directly employed FTE member of staff has been used.
- 6.83** Assuming £5 daily spending for 222 working days per year, the 3,307 to 4,300 net additional jobs created by **Option A** would generate an estimated spend of **£3.7 million to £4.8 million per annum**.
- 6.84** Assuming £5 daily spending for 222 working days per year, the 2,658 to 3,493 net additional jobs created by **Option B** would generate an estimated spend of **£3 million to £3.9 million per annum**.

- 6.85** The additional local spending by office workers at the Proposed Development (**Option A**) has been assessed as a **long term, beneficial impact of moderate significance** at the **district** level.

- 6.86** The additional local spending by office workers at the Proposed Development (**Option B**) has been assessed as a **long term, beneficial impact of moderate significance** at the **district** level.

Amenity Space Provision

- 6.87** The Proposed Development (Option A and Option B) includes 9,800m² of amenity space which will include the provision of hard and soft landscaping such as benches and planting for the benefit of future occupiers. Furthermore, the lake to the north of the site as well as the land to the east of the site within the Applicant's ownership boundary is publicly accessible and provides further amenity area.
- 6.88** The provided amenity space and the existing nearby open space will together provide a high quality setting for the new office park.

Mitigation and Monitoring

Construction

- 6.89** No adverse socio-economic effects that require mitigation are predicted during the construction phase of the Proposed Development (Option A and Option B).
- 6.90** The delivery of training opportunities will be monitored during the construction phase. This monitoring could take the form of an Employment and Skills Plan agreed between Cherwell District Council and the main contractor for the building project.

Operation

- 6.91** All of the permanent socio-economic effects identified in this chapter for Option A and Option B will be beneficial and so no mitigation measures are proposed.
- 6.92** The delivery of training opportunities will be monitored during the operational phase. This monitoring could take the form of an Employment and Skills Plan agreed between Cherwell District Council and key employers at the office park.

Residual Effects

Construction

- 6.93** There will be no adverse effects during the construction phase of the Proposed Development (Option A and Option B).
- 6.94** There will be no residual effects arising from the temporary construction employment, gross value added and training opportunities provided by the Proposed Development. However, there will be some long-term benefits for those people who have gained employment experience and skills whilst working during the construction phase of the Proposed Development.

⁴ Office for National Statistics (2017) Regional Economic Analysis sub-regional productivity tables

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Operation

- 6.95 There will be no adverse effects during the operation of the Proposed Development (Option A and Option B).
- 6.96 The employment and economic effects of the Proposed Development (**Option A** and **Option B**) are considered to be a **beneficial effect of major significance**.

Table 6.5: Summary of Residual Effects (Option A and Option B)

Intended End Use	Likely Effect, Geographic Scale and Duration (Pre-Mitigation)	Residual Effect, Geographic Scale and Duration (Post Mitigation)	Residual Effect Significance
Option A			
Construction			
Construction employment	Short-term, beneficial impact of moderate significance at the district level	None	N/a
Gross value added	Short-term, beneficial impact of moderate significance at the district level	None	N/a
Construction training	Short-term, beneficial impact of minor to moderate significance at the district level	None	N/a
Completed Development			
Employment effects			
Gross on site permanent jobs	Long-term, beneficial impact of major significance at the regional level	Long-term, beneficial impact of major significance at the regional level	Major
Net additional permanent jobs	Long-term, beneficial impact of major significance at the regional level	Long-term, beneficial impact of major significance at the regional level	Major
Economic effects			
Gross value added	Long-term, beneficial impact of major significance at the regional level	Long-term, beneficial impact of major significance at the regional level	Major
Additional local spending	Long-term, beneficial impact of moderate significance at the district level	Long-term, beneficial impact of moderate significance at the district level	Moderate
Training opportunities			
Training and skills development opportunities	Long-term, beneficial impact of moderate significance at the district level	Long-term, beneficial impact of moderate significance at the district level	Moderate
Option B			

Intended End Use	Likely Effect, Geographic Scale and Duration (Pre-Mitigation)	Residual Effect, Geographic Scale and Duration (Post Mitigation)	Residual Effect Significance
Construction			
Construction employment	Short-term, beneficial impact of moderate significance at the district level	None	N/a
Gross value added	Short-term, beneficial impact of moderate significance at the district level	None	N/a
Construction training	Short-term, beneficial impact of minor to moderate significance at the district level	None	N/a
Completed Development			
Employment effects			
Gross on site permanent jobs	Long-term, beneficial impact of major significance at the regional level	Long-term, beneficial impact of major significance at the regional level	Major
Net additional permanent jobs	Long-term, beneficial impact of major significance at the regional level	Long-term, beneficial impact of major significance at the regional level	Major
Economic effects			
Gross value added	Long-term, beneficial impact of major significance at the regional level	Long-term, beneficial impact of major significance at the regional level	Major
Additional local spending	Long-term, beneficial impact of moderate significance at the district level	Long-term, beneficial impact of moderate significance at the district level	Moderate
Training opportunities			
Training and skills development opportunities	Long-term, beneficial impact of moderate significance at the district level	Long-term, beneficial impact of moderate significance at the district level	Moderate

Cumulative Effects Assessment

6.97 The following cumulative effects of the Proposed Development have been considered:

- **Intra Cumulative Effects** – the combined effect of individual impacts arising from the Proposed Development (see Chapter 14: Effect Interactions); and
- **Inter Cumulative Effects** – the combined effect of impacts arising from the Proposed Development in conjunction with other relevant developments.

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Intra Cumulative Effects

- 6.98** Intra cumulative effects will arise during the construction period of the Proposed Development (Option and Option B) through the combination of additional construction jobs created by, and the construction training opportunities arising from, the Proposed Development. The result of these combined effects would be a better skilled construction workforce within the local area. The scale of these intra cumulative effects will depend on the extent to which the construction training opportunities are delivered in practice.
- 6.99** Intra cumulative effects would arise once the Proposed Development (Option A and Option B) is occupied, through the interaction between the permanent jobs created and the skills and training opportunities generated by the completed Development. The combination of these effects will result in a better skilled workforce in the local area. The scale of these intra cumulative effects will depend on the extent to which training opportunities are delivered in practice during the operational phase.
- 6.100** In addition to the intra cumulative effects described above, there is a direct relationship between the estimated employment generation (of both the construction period and completed development) and GVA. As indicated in the Methodology, the GVA for both the construction and operational periods is calculated using the estimated employment generation figure and, as such, the two effects are interrelated.

Inter Cumulative Effects

- 6.101** Table 6.6 below outlines the schemes which have been included in the cumulative effects assessment, as agreed with Cherwell District Council, comprising both site allocations and recent planning permissions.

Table 6.6 Schemes Included in Cumulative Effects Assessment

Site	Proposal/Description	Status	Approximate distance from site	Estimated number of jobs generated by completed development
SE Bicester Extension	Site Allocation – Bicester 12: A mixed use site for employment and residential development to the east of the ring road to the south east of Bicester for 1,500 homes	Site Allocation	5km	3,000
NW Bicester Extension	Site Allocation – Bicester 1: A new zero carbon(i) mixed use development including 6,000 homes will be developed on land identified at North West Bicester	Site Allocation	2.9km	3,000
Kingsmere Residential Estate	Site Allocation – Bicester 3: A development of 726 homes with associated services, facilities and other infrastructure with contributions toward community facilities, education, health, and open space. The development area is 29ha.	Site Allocation	700m	N/a
Bicester Village Phase 4	5,181m ² GIA of retail floorspace and 147 car parking spaces	Permission granted November 2016	200m	200*

Site	Proposal/Description	Status	Approximate distance from site	Estimated number of jobs generated by completed development
Bicester Gateway Retail	Outline application for 4 no. Class A1 units (7,840m ² GIA); 1 Class A3 unit (435m ² GIA); and 1 Class D2 unit (967m ² GIA) with car parking area (345 spaces)	Resolution to grant at 13 April 2017 Planning Committee (LPA Ref. 16/02505/OUT)	0.8km	300*
Graven Hill	Future phases in relation to approval of reserved matters in relation to LPA Ref. 15/02159/OUT (2,100 homes)	RMA approved, NMA to increase GIA (LPA Ref. 17/00022/NMA) was approved on 8 March 2017	3.7km	N/a
Bicester Gateway	Site Allocation – Bicester 10: Knowledge economy employment development to the south of the existing retail area (Wyvale Garden Centre), adjacent to the A41. Approximately 3,500 jobs in B1 uses (high tech knowledge industries)	Site allocation	0.8km	3,500
Bicester Business Park (Proposed Development)	Full planning application for the construction of a business park comprising between 55,000 and 60,000 sqm office use (B1), parking for approximately 2,000 cars, associated highway, infrastructure and earthworks.	Proposed Development	N/a	Option A: 3,769 to 4,900 Option B: 2,658 to 3,493
TOTAL				Option A: 13,769 to 14,900 Option B: 12,658 to 13,493

*A high-level estimate of the number of jobs these proposals would generate has been undertaken.

- 6.102** Table 6.6 identifies that cumulatively the site allocations, planning permissions and **Option A** of the Proposed Development would generate an estimated 13,769 to 14,900 jobs. Table 6.6 also identifies that cumulatively the site allocations, planning permission and **Option B** of the Proposed Development would generate an estimated 12,658 to 13,493 jobs.
- 6.103** The time period over which these jobs would come forward cannot accurately be predicted, due to the inclusion of site allocations in the assessment for which there is not a current planning application. However, the inclusion of the site allocations within the local plan suggests that the Council consider them deliverable within the plan period (2011 to 2031).
- 6.104** As identified earlier in the chapter, in 2015 there were 50,000 full-time employees in Cherwell. As such, the cumulative employment generated by the schemes included in the assessment would increase the 2015 Cherwell full-time employment base by 26% to 30% (**Option A**) and 25% to 27% (**Option B**).

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Conclusions

Construction phase

6.105 The construction phase will generate three different temporary socio-economic effects. All three of these temporary socio-economic effects will be beneficial for Option A and Option B.

Table 6.7 – Construction Phase – Temporary Socio-Economic Effects for the Proposed Development (Option A and Option B)

Temporary effect	Scale of the effect	Significance	Mitigation measures	Residual effects
Construction employment	624 person years	Moderate – beneficial	Not required	None
Gross value added	£42.2 million	Moderate - beneficial	Not required	None
Construction training	Not quantified	Minor to moderate - beneficial	Not required	None

Completed Development

6.106 Once it is operational and fully occupied, the Proposed Development (Option A and Option B) will generate five different permanent socio-economic effects. All five will be beneficial effects which will be enjoyed in perpetuity.

6.107 The Proposed Development (Option A and Option B) will create a major new employment hub which will make a very significant contribution to the delivery of jobs and economic growth for the local, district and regional impact areas for the assessment.

6.108 The gross, on site employment of 3,769 to 4,900 full-time equivalent permanent jobs created by **Option A** represents an increase of between 7.5% and 9.8% in the number of full-time jobs throughout Cherwell District Council.

6.109 The gross, on site employment of 3,030 to 3,981 full-time equivalent permanent jobs created by **Option B** represents an increase of between 6% and 8% in the number of full-time jobs throughout Cherwell District Council.

Table 6.8 – Operational Phase – Permanent Socio-Economic Effects for the Proposed Development (Option A and Option B)

Temporary effect	Scale of the effect	Significance	Mitigation measures	Residual effects
Option A				
Employment effects				
Permanent jobs	3,769 to 4,900 full-time equivalent permanent jobs	Major – beneficial	Not required	Major – beneficial
Net additional permanent jobs	3,307 to 4,300 full-time equivalent net additional jobs	Major - beneficial	Not required	Major – beneficial
Economic effects				

Temporary effect	Scale of the effect	Significance	Mitigation measures	Residual effects
Gross value added	£178.2 million to £231.7 million	Major – beneficial	Not required	Major – beneficial
Additional local spending	£3.67 million to £4.77 million	Moderate – beneficial	Not required	Moderate – beneficial
Training opportunities				
Training and skills development opportunities	Not quantified	Moderate – beneficial	Not required	Moderate – beneficial
Option B				
Employment effects				
Permanent jobs	3,030 to 3,981 full-time equivalent permanent jobs	Major – beneficial	Not required	Major – beneficial
Net additional permanent jobs	2,658 to 3,493 full-time equivalent net additional jobs	Major - beneficial	Not required	Major – beneficial
Economic effects				
Gross value added	£143.2 million to £188.2 million	Major – beneficial	Not required	Major – beneficial
Additional local spending	£3 million to £3.9 million	Moderate – beneficial	Not required	Moderate – beneficial
Training opportunities				
Training and skills development opportunities	Not quantified	Moderate – beneficial	Not required	Moderate – beneficial

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Introduction

- 7.1 This chapter of the ES reports the findings of an assessment of the likely significant environmental effects of the Proposed Development with respect to traffic and transport.
- 7.2 This chapter sets out the relevant planning policy framework upon which the Application will be determined, the methods used to assess potential effects of the Proposed Development, the baseline conditions and potential effects on the local highway network as a result of the Proposed Development. Where appropriate, mitigation measures required to prevent, reduce or offset any potentially significant adverse effects are identified, alongside a summary of the expected residual effects.
- 7.3 The potential for cumulative effects associated with the Proposed Development and with other relevant development schemes are discussed later in this chapter. The potential for effect interactions with other identified likely significant effects arising as a result of the Proposed Development are discussed in Chapter 14: Effect Interactions of this ES (Volume 1).
- 7.4 This chapter is supported by a Transport Assessment (TA) prepared by Motion, provided as ES Volume 2: Appendix 7.1.

Legislative and Planning Policy Context

- 7.5 A summary of the relevant planning policies is found below while full details are provided in the Transport Assessment attached at Appendix 7.1:
 - National Planning Policy Framework (March 2012)¹; and
 - Cherwell Local Plan 2011-2031 (July 2015)².

Assessment Methodology

- 7.6 This section of the chapter sets out the assessment methodology used to determine the effects of the Proposed Development, both during the construction phase and during the operation of the Proposed Development.
- 7.7 The scope of assessment and the significance criteria identified have been developed based on guidance set out in the following documents:
 - 'Guidelines for Environmental Impact Assessment, IEMA, 2004'³; and
 - 'Guidelines for the Environmental Assessment of Road Traffic, IEMA, 1993'⁴.
- 7.8 A separate TA has been prepared in relation to the Proposed Development. This ES chapter has been prepared based on the findings of the TA and summarises the likely significant effects of the Proposed Development in relation to traffic and transport.
- 7.9 The completion year of 2026 forms the future baseline scenario as agreed with Oxfordshire County Council (OCC), with a current baseline year of 2017. Potential effects were considered for the morning (0800 - 0900) and evening (1700 – 1800) peak hours and throughout the day.
- 7.10 An EIA Scoping Report was submitted to Cherwell District Council in May 2017. CDC issued their EIA Scoping Opinion on 8 August 2017 which is provided in Technical Appendix 2.2. This chapter has been prepared with consideration of the Scoping Opinion provided by CDC and addresses the matters raised within the Scoping Opinion including effect of the vehicle trips associated with the development on junctions in the vicinity of the site including consideration of allocated and committed developments in the vicinity of the site. In addition, the

effect of the development proposals on walkers, cyclists, equestrians and those with disabilities has been assessed.

- 7.11 Operational effects of committed developments, as detailed during EIA scoping, have been accounted for as part of the future baseline scenario. In this way, cumulative effects associated with traffic and transport have been considered in this chapter of the ES within the assessment of the Proposed Development, which is consistent with the advice set out in section 10.3 of IEMA (2004) Guidelines for Environmental Impact Assessment.
- 7.12 The 'Guidelines for the Environmental Assessment of Road Traffic, IEMA, 1993' set out a number of potential environmental effects which may require assessment. Those of which are relevant to the Proposed Development and are therefore covered in this assessment include:
 - Severance;
 - Delay;
 - Amenity;
 - Fear and intimidation; and
 - Accidents and safety.
- 7.13 With this chapter the effect of the Proposed Development on amenity, fear and intimidation can be considered together as they are considered to be strongly interrelated.

Methodology for Determining Construction Effects

- 7.14 The expected number of construction staff on site and construction vehicle movements to the site are detailed at Chapter 5: Construction of this Volume of this ES. Construction vehicle movements to the site have been distributed on the local road network utilising the most direct routes to the strategic and trunk road networks.
- 7.15 The effect of construction vehicle movements on the local highway network have been assessed with reference to the environmental effects identified above and the significant criteria set out below.

Methodology for Determining Completed Development Effects

- 7.16 In order to determine the likely effects of the Proposed Development once completed, vehicle trip rates have been extracted from the TRICS database and agreed with OCC. These have been applied to the proposed 60,000m² GEA office floorspace (comprising the maximum possible floorspace within the outline parameters) to determine the likely vehicle trips associated with the Proposed Development during the morning and evening peak hours and throughout the day.
- 7.17 The resulting vehicle trips have been distributed on the local highway network with reference to journey to work data from the 2011 Census data. The effect of the Proposed Development on the highway network local to the site has been assessed based on the following study area, as agreed with OCC:
 - Oxford Road / Middleton Stoney / King's End roundabout;
 - Oxford Road / Pingle Drive roundabout;
 - Oxford Road / A41 / Esso signalised roundabout;
 - Rodney House roundabout;
 - A41 / Lakeview Drive signalised junction;

¹ Department for Communities and Local Government. 2012. The National Planning Policy Framework. HMSO.

² Cherwell District Council, 2016. Cherwell Local Plan, 2016. Adopted Cherwell Local Plan 2011-2031 Part 1 (incorporating Policy Bicester 13 re-adopted on 19 December 2016).

³ IEMA. 2004. Guidelines for Environmental Impact Assessment,

⁴ IEMA. 1993. Guidelines for the Environmental Assessment of Road Traffic

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- A41 / Kingsmere signalised junction; and
- A41 / Bicester Park & Ride / Vendee Drive Roundabout.

7.18 Junction capacity modelling has been undertaken at the agreed scope of junctions using the industry standard junction modelling package for each junction type, namely ARCADY for roundabout junctions and LinSig for signal controlled junctions. Where relevant, consideration has been given to committed and ongoing junction improvement works at the junctions listed above.

7.19 The effect of vehicle movements associated with the operation of the Proposed Development have been assessed with reference to the likely effects identified above and the significance criteria set out below.

Significance Criteria

7.20 The following criteria have used to assess how far a potential impact deviates from the baseline condition, i.e. the magnitude of change, which results in the likely effect, and these are set out in Table 7.1 below.

Table 7.1 Magnitude of Impact

Magnitude	Criteria
Large	Changes which are likely to be perceptible and which would significantly change conditions which would otherwise prevail to the extent that it would significantly affect travel behaviour
Medium	Changes which are likely to be perceptible and which would materially change conditions which would otherwise prevail to the extent that it may affect travel behaviour to a measurable degree
Small	Changes which are likely to be perceptible but not the extent that it would materially change conditions which would otherwise prevail
Negligible	Changes which are unlikely to be perceptible

7.21 The significance of a likely effect is derived by considering both the sensitivity of the feature and the magnitude of change, as demonstrated in Table 7.2 below which considers the magnitude of an effect against the sensitivity of the receptor in order to identified the overall significance of the effect.

Table 7.2 - Effect of Significance

		Magnitude of change / impact			
		Large	Medium	Small	Negligible
Receptor sensitivity	High	Major	Major	Moderate/Minor	Negligible
	Moderate	Major	Moderate	Minor	Negligible
	Low	Moderate/Minor	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

7.22 It is noted that moderate and major effects are considered to be 'significant'. Where an effect is assessed as being within the "moderate-minor" category professional judgment has been used to determine if it is considered a significant effect or not.

Baseline Conditions

2017 Baseline – Existing Situation

7.23 The following provides an overview of the current baseline transport and accessibility conditions within the study area, having regard to pedestrian and cycle facilities, public transport and the operation of the existing

local highway network. This analysis provides the baseline context against which the Proposed Development is assessed.

Existing Highway Network

- 7.24 Lakeview Drive forms the northern boundary of the site and the site would be accessed from Lakeview Drive via two existing roundabout junctions. The two existing roundabouts on Lakeview Drive, at the eastern end of Lakeview Drive and centrally on Lakeview Drive, currently include a southern arm on each roundabout which would form the vehicle access to the site,
- 7.25 The roundabout at the eastern end of Lakeview Drive also provides access to the existing Tesco service yard while the central roundabout on Lakeview Drive also provides customer access to the existing Tesco store. At its western end, Lakeview Drive connects with the A41 Oxford Road via a signal controlled junction. The A41 Oxford Road runs on a broadly north-south alignment and connects north to Bicester town and south to the M40.
- 7.26 North of the application site, the A41 Oxford Road connects with the A41 at a junction known as the Esso roundabout. The A41 connects east from The Esso roundabout towards Aylesbury. North of the A41 junction, Oxford Road forms a junction with Pingle Drive which provides access to Bicester Village.
- 7.27 The consented development proposals for Bicester Village Phase 4 and the constructed Tesco foodstore included a package of highway works which are currently under construction and are expected to be completed by September 2017. The highway works include improvements to the Oxford Road junctions with Pingle Drive, Esso roundabout, Lakeview Drive and Kingsmere junctions.
- 7.28 Furthermore, recently consented development proposals at Bicester Gateway Retail Park include further improvements to the A41 junctions with Lakeview Drive, the Esso Roundabout and Kingsmere signal controlled junctions.
- 7.29 East of the site, the A41 forms a conventional roundabout with the A4421 and London Road, known as the Rodney House roundabout. As part of consented development proposals at Graven Hill, improvement works are proposed to the Rodney House roundabout including signalisation of the roundabout and it is understood that these works are expected to commence in late 2017.
- 7.30 More detail on the existing traffic conditions and consented highway works are set out within the Transport Assessment provided at Appendix 7.1.
- 7.31 Baseline traffic data for 2017 has been gathered through traffic surveys undertaken on 11 May 2017. Table 7.3 provides a summary of the two-way peak hour traffic flows on roads in the immediate vicinity of the site and the location of the links and data points are indicated on Figure 7.1.

Table 7.3 Peak Hour Traffic Flows

Ref	Location	AM Peak Hour Flows	PM Peak Hour Flows
1	King's End	1,652	1,830
2	Pingle Drive	412	763
3	A41 (e)	1,604	1,935
4	Oxford Road (A41)	1,705	2,568
5	Lakeview Drive	530	1,053
6	Saxon Fields	157	194

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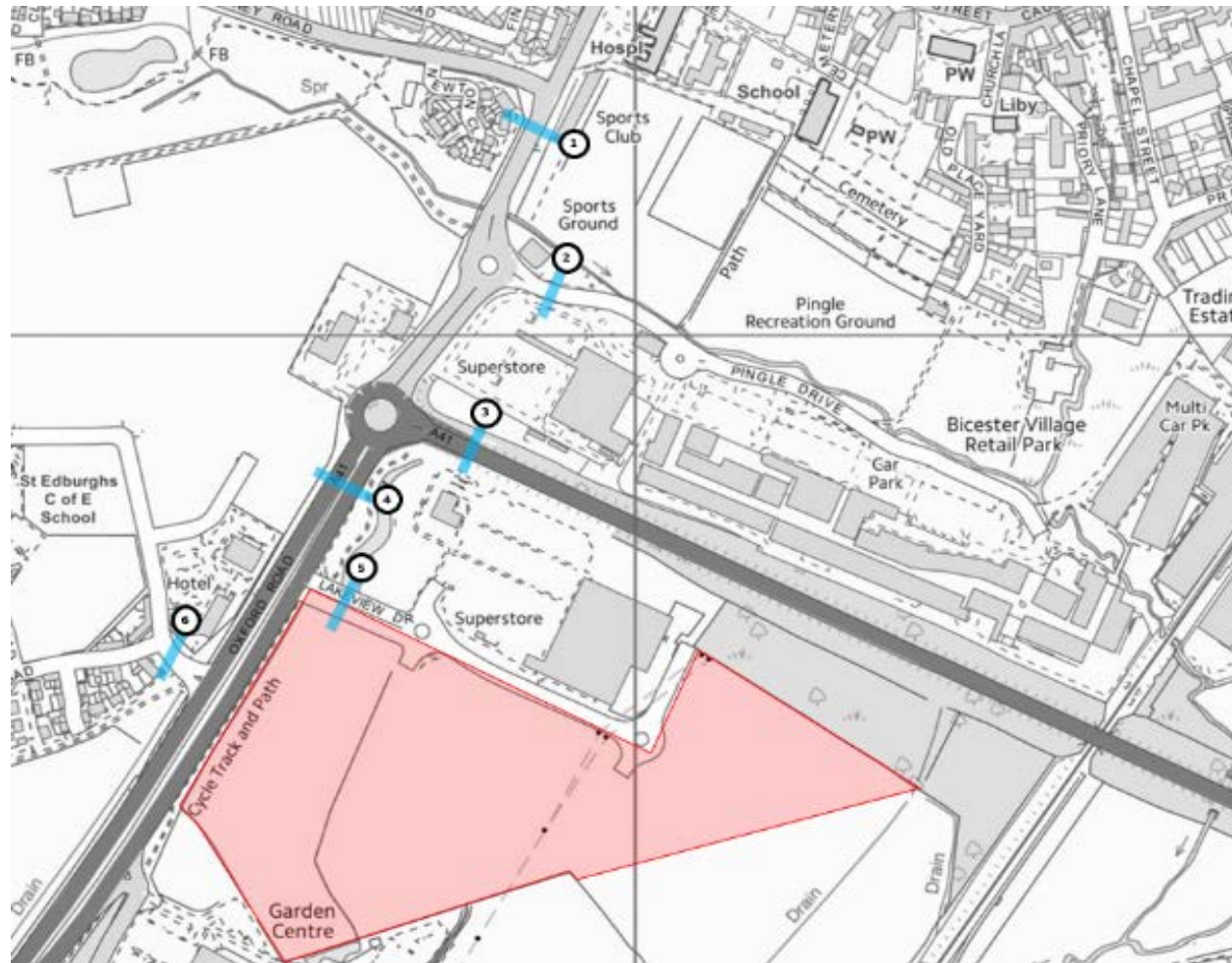


Figure 7.1 Link/ Data Point Locations

Existing Pedestrian and Cycle Transport Network

- 7.32 Footways are provided along both sides of Lakeview Drive adjacent to the site and these connect with further footways on both sides of the A41 Oxford Road. These connect with the wider existing pedestrian network on Oxford Road and Pingle Drive offering access to the residential developments to the north as well as Bicester Village to the north east.
- 7.33 Signal controlled pedestrian crossing facilities are provided at the junction between Lakeview Drive and the A41 Oxford Road. Further signal controlled pedestrian crossing facilities are provided at the junction between the A41 Oxford Road and Kingsmere, a short distance south of the site.
- 7.34 Further signal controlled pedestrian crossing facilities are provided at the A41 Esso roundabout junction and the Oxford Road junction with Pingle Drive.
- 7.35 The pedestrian footway network and pedestrian crossing facilities in the vicinity of the site provide convenient connections towards local services and facilities as well as local retail opportunities and residential areas. The pedestrian facilities also provide walking routes towards local public transport infrastructure, in particular both northbound and southbound bus stops on the A41.

- 7.36 National Cycle Network Route 51 (NCN 51) runs directly past the site and this section of the route offers a traffic-free cycle path running along the side of the A41. NCN 51 links south from the site and connects to on-road traffic cycle routes on Wendlebury Road which continue south towards Wendlebury, Kidlington and Oxford. From the site, NCN 51 connects north on traffic-free cycle routes towards Bicester Village and then links with on-road signed cycle routes which continue towards Bicester town centre.
- 7.37 It is evident that the cycle facilities in the vicinity of the site provide the opportunity for future users of the Proposed Development to undertake journeys by cycle and provide connections to local services and facilities as well as local retail opportunities and residential areas.

Existing Public Transport Network

- 7.38 The nearest bus stop to the site is situated on the A41 Oxford Road northbound, just north of the junction between Lakeview Drive and the A41 Oxford Road. The northbound bus stop is an approximate 120m walk from the north-western corner of the site and is accessible via the existing signal controlled pedestrian crossing facilities at the junction between A41 Oxford Road and Lakeview Drive, The bus stop is served by the S5 and X5 services. The S5 operates every 15 minutes Monday to Friday and every 30 minutes on Saturdays and Sundays between Oxford City Centre and Launton, as well as the Bicester Park & Ride facility. The X5 operates twice an hour on weekdays and hourly on weekend between Cambridge Parkside bus station and Oxford City Centre via Milton Keynes Railway Station.
- 7.39 There is not currently a southbound bus stop directly adjacent to the site on the A41 Oxford Road, however, as part of highways works associated with the consented development proposals at Bicester Gateway Retail Park, a new southbound bus stop and lay-by on A41 Oxford Road would be provided. The new bus stop would be directly adjacent to the application site on the eastern side of the A41 Oxford Road and it is envisaged that the additional southbound bus stop would also be served by the S5 and X5 services.
- 7.40 Additional bus stops are located on Oxford Road, north of the Pingle Drive roundabout, an approximate 500m walk from the north-west corner of the site. The stops are served by the S5 and X5 services, as well as the No. 26 bus service which operates a circular route between Bicester Town Centre, Kingsmere and Oxford Road. A further bus stop is located on Pingle Drive approximately 800m to the north east and is served by the Bicester Village Shuttle operating towards Bicester North Railway Station.
- 7.41 The nearest railway station is Bicester Village Railway Station located approximately 1.4km to the north east of the site. Bicester Village Station is located on the Oxford to London Marylebone line with services operating in each direction every 30 minutes.
- 7.42 Bicester North Railway Station is located approximately 1.8km to the north of the site and offers connections to London Marylebone, Banbury and Birmingham Moor Street and Snow Hill. Services run up to twice per hour.
- 7.43 Public transport facilities in the vicinity of the site provide the opportunity for future users of the Proposed Development to undertake journeys by public transport and provide connections to local services and facilities as well as local retail opportunities and residential areas.

2026 Baseline – Future Year without Development

- 7.44 Future baseline conditions have been established within inclusion of traffic associated with expected committed developments, as agreed with CDC, consented highway works and background growth extracted from TEMPRO.
- 7.45 The following committed developments have been included in the 2026 baseline scenario:
 - Bicester Gateway;
 - Bicester Gateway Office Park;

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- Bicester Village Phase 4;
- Land north east of Skimmingdish Lane;
- North West Bicester Extension;
- Rentwick Green; and
- Graven Hill.

7.46 Further information regarding the detail and location of the schemes can be found in Chapter 2 EIA Methodology.

Assessment of Effects

Construction

7.47 Construction works would be undertaken within the curtilage of the site with vehicle access taken from Lakeview Drive which is accessed from the A41 Oxford Road. The construction programme detailed in Chapter 5 and is based on a construction period of between 8 to 9 years. The programme sets out expected daily construction HGV movements and site staff and visitors during the first 18 months of construction which is considered to be the peak period of construction. Table 7.4 summarises the expected construction vehicles and staff associated with the site during that period.

7.4 Changes in traffic flows during the construction period

Receptor	Site Staff	Subcontractors	Total	Daily Visitors	Daily Deliveries	Total
Month 1	8	15	23	8	8	16
Month 2	9	23	32	8	15	23
Month 3	11	30	41	8	23	31
Month 4	12	60	72	15	30	45
Month 5	15	90	105	15	45	60
Month 6	15	120	135	15	45	60
Month 7	15	120	135	15	45	60
Month 8	15	120	135	23	45	68
Month 9	15	120	135	23	45	68
Month 10	15	120	135	23	45	68
Month 11	15	120	135	23	45	68
Month 12	15	135	150	30	60	90
Month 13	15	135	150	30	60	90
Month 14	15	150	165	30	60	90
Month 15	15	150	165	30	45	75
Month 16	15	105	120	23	30	53
Month 17	15	75	90	15	23	38
Month 18	12	75	87	15	15	30

7.48 Construction sets out that during the peak of construction activity up to 165 staff and subcontractors would be expected on site with a further 30 additional visitors per day. In addition, up to 60 daily HGV deliveries per day associated with the construction works are expected during the peak in construction activity.

7.49 It is envisaged that the majority of construction traffic associated with the site would route between the site and the strategic highway network of the M40, south of the site. As such it is envisaged that the majority of

construction traffic associated with the site would route south to/from the site to connect to the M40. In order to provide a robust assessment, it has been assumed that each of the staff and visitors drives to the site separately. Table 7.5 below summarises the change in vehicle trips on the A41 during the construction phase.

Table 7.5 Changes in traffic flows during the construction period

Receptor	2017 Base Year Flows	Change in Flow	% Change in Flow	2017 Baseline HGV	Increase in HGV movements	% Change in HGV
A41 South of site	36,804	390	1.1%	1,849	120	6.5%

7.50 It is highlighted that traffic flows generated during the construction phase of the Proposed Development are likely to be significantly lower than those generated during the operation of the Proposed Development. As such any anticipated traffic-related environmental impacts will be significantly lower during the construction phase.

7.51 In order to mitigate any effects during the construction phase a Construction Environmental Management Plan (CEMP) will be prepared and agreed with CDC prior to commencement of the construction phase. The CEMP will include measures to minimise the effect of construction activity and seek to ensure that any nuisance and disruption is minimised throughout the construction phase. Further detail of the CEMP is provided at Chapter 5: Construction. The CEMP is likely to include measures such as:

- Restrictions on Construction Delivery Hours;
- Restrictions on Daily Construction Vehicle Movements;
- Restriction on Construction Delivery Routes; and
- Construction Vehicle Wheel Washing

Severance

7.52 Table 7.5 demonstrates that the construction vehicle movements associated with the Proposed Development are not considered to be significant relative to existing traffic movements on the A41. Table 7.6 below considers the significance of the effect of construction vehicle movements (both total vehicle movements and HGV movements) in relation to severance on the A41. As set out above it is considered that the vast majority of construction movements associated with the site would route between the site and the M40 via the A41 only.

7.53 There is footway provided on both sides of Lakeview Drive and the A41 Oxford Road in the vicinity of the site and there are signal controlled pedestrian crossing facilities at the junction between Lakeview Drive and the A41 Oxford Road which provide segregated crossing facilities for pedestrians to cross both Lakeview Drive and Oxford Road. In addition, there are further signal controlled pedestrian crossing facilities at the junction of the A41 and Oxford Road, north of the site, and at the junction of the A41/ Kingsmere junction south of the site. All the signal controlled pedestrian crossing facilities in the vicinity of the site include dropped kerbs with tactile paving to assist crossing for people with disabilities. The footway provision and signal controlled crossing facilities in the vicinity of the site provide convenient and safe connection from the site to the wider network,

7.54 The nearest bridleway to the site, usable by equestrians, is approximately 2 kilometres south-east of the site. Construction traffic associated with the site would not route in the vicinity of the bridleway and, as such, equestrians using the bridleway would not be affected by construction traffic.

Table 7.6 Significance of Effect on Severance

Location	Sensitivity	Description of effect	Magnitude of change / impact	Effect significance
A41 (Traffic Flow)	Low	Proposed Development Construction Traffic	Negligible	Negligible

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Location	Sensitivity	Description of effect	Magnitude of change / impact	Effect significance
A41 (HGV Movements)	Low	Proposed Development Construction Traffic	Small	Minor Adverse

7.55 Table 7.6 demonstrates that construction vehicle movements associated with the Proposed Development would result in a negligible effect on severance in the study area during the construction phase.

Delay

7.56 During construction, the Proposed Development is not expected to result in material changes to traffic movements on the local highway network which would affect perceptions of driver delay. The change in traffic flow on the A41 during the construction phase would be negligible relative to existing flows. To this extent, the overall effect of construction traffic flows on the operation of local junctions, and therefore vehicle delay, would be negligible.

7.57 All construction works are to be undertaken within the curtilage of the site where currently there is minimal access for pedestrians, cyclists and buses and therefore it is anticipated that the delay to buses, pedestrians and cyclists will be negligible. As set out above there are signal controlled pedestrian crossing facilities at junctions in the vicinity of the site and no changes are proposed to the operation of the crossings facilities that would result in changes to delay for crossing users.

7.58 As previously highlighted the nearest bridleway to the site, usable by equestrians, is approximately 2 kilometres south-east of the site. Construction traffic associated with the site would not route in the vicinity of the bridleway and, as such, equestrians using the bridleway would not be affected by construction traffic.

7.59 As set out above, construction traffic associated with the site will be managed through a CEMP. The CEMP will include measures to minimise any disruption on the local highway network associated with construction vehicles and this would include limiting construction vehicle movements associated with the site during peak periods on the local highway network.

Amenity, Fear and Intimidation

7.60 Table 7.6 demonstrates that the construction vehicle movements associated with the Proposed Development are not considered to be significant relative to existing traffic movements on the A41.

7.61 With reference to guidance provided by the IEMA, the expected change in HGV movements on Oxford Road relative to the baseline is not considered to be significant. As such, it is expected that the construction phase associated with the Proposed Development will result in a negligible change in the perception of amenity, fear and intimidation in the vicinity of the site.

7.62 It is highlighted that there are signal controlled pedestrian crossing facilities at the junction between Lakeview Drive and the A41 Oxford Road which provide segregated crossing facilities for pedestrians to cross both Lakeview Drive and Oxford Road. For cyclists, there is a traffic free cycle route along the eastern side of Oxford Road which provides a north-south cycle connection, segregated from vehicular traffic on the A41 Oxford Road.

7.63 It is evident that pedestrian and cyclists in the vicinity of the site benefit from footway and cycle route facilities along with signal controlled pedestrian crossings. This provides users with segregated facilities from vehicular traffic such that the change in traffic flow during the operational phase would have a negligible effect on the safety of pedestrians, cyclists and other users. The nearest bridleway to the site, usable by equestrians, is approximately 2 kilometres south-east of the site. Construction traffic associated with the site would not route in the vicinity of the bridleway and, as such, equestrians using the bridleway would not be affected by construction traffic.

7.64 On that basis it is concluded that, during the construction phase, the Proposed Development would have a negligible effect on amenity, fear and intimidation in the vicinity of the site.

Accidents and Safety

7.65 Table 7.6 demonstrates that the construction vehicle movements associated with the Proposed Development are not considered to be significant relative to existing traffic movements on the A41. With reference to guidance provided by the IEMA, given that the expected change in both traffic and HGV movements on Oxford Road relative to the baseline is not considered to be significant, it is evident that there will be a negligible effect on accident risk and highway safety, in the vicinity of the site.

7.66 The safety of highway users will also be managed through the CEMP which will include measures to ensure that construction activity associated and vehicle movements associated with the site are undertaken in a safe and sustainable manner. It is envisaged that the CEMP will identify appropriate routes for construction traffic and measures requiring that construction HGV drivers associated with the site will hold appropriate driver training.

7.67 On that basis it is concluded that, during the construction phase, the Proposed Development would have a negligible effect on accident risk and highway safety, in the vicinity of the site.

Completed Development

7.68 The effects of the Proposed Development once it is operational have been assessed against the operation of the future baseline network.

7.69 In order to determine the anticipated effects of the Proposed Development once completed, vehicle trip rates have been extracted from the TRICS database and agreed with OCC. These have been applied to the proposed 60,000m² GEA B1(a)/B1(b) floorspace to determine the likely vehicle trips associated with the Proposed Development during the morning and evening peak hours. Table 7.6 below summarises the change in traffic flow as a result of the Proposed Development.

Table 7.7 Summary of Impact of Operational Development Traffic

	Receptor	2026 Baseline Flow	Absolute Change in Flow	2026 Baseline Flow + Development	% Change in Flow
AM	King's End	1,900	352	2252	19%
	Pingle Drive	501	0	501	0%
	A41 (e)	2,402	231	2633	10%
	Oxford Road (n)	3,381	583	3964	17%
	Lakeview Drive	730	1,005	1735	138%
	Oxford Road (s)	3,175	422	3597	13%
	Saxon Fields	175	31	206	18%
PM	King's End	2,485	360	2845	14%
	Pingle Drive	1,831	0	1831	0%
	A41 (e)	3,927	236	4163	6%
	Oxford Road (n)	5,329	596	5925	11%
	Lakeview Drive	1,328	1,028	2356	77%
	Oxford Road (s)	4,715	432	5147	9%
	Saxon Fields	538	31	569	6%

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7.70 As outlined above the effect of traffic associated with the operation of the Proposed Development has been considered with reference to the following impacts:

- Severance;
- Delay;
- Amenity, fear and intimidation; and
- Accidents and safety.

Severance

7.71 Guidance provided by IEMA state that changes in traffic flow of 30%, 60% and 90% can be considered to have a slight, moderate adverse and substantial effect on severance respectively. It is evident from Table 7.6 that all links on the network, with the expectation of Lakeview Drive will experience less than a 30% change in traffic flows as a result of the Proposed Development, with the majority of links experiencing changes in traffic flow substantially less than 30%.

7.72 It is highlighted that Lakeview Drive, was designed to accommodate traffic associated with both the existing Tesco foodstore and the Consented Business Park Scheme. This was assessed and approved as part of a previous planning application on the site. Chapter 1: Introduction provides for further information of the planning history.

7.73 As Lakeview Drive currently serves only the existing Tesco foodstore, the existing baseline traffic flows on Lakeview Drive are significantly below the level of traffic it has been designed, and previously assessed, to accommodate the Consented Business Park Scheme and hence why the proportional increase in traffic on Lakeview Drive presented in this assessment is moderate adverse.

7.74 IEMA guidance states that consideration of severance should consider specific local conditions including pedestrian facilities and the provision of pedestrian crossings. To this extent it is highlighted that a pedestrian footway is provided along both sides of Lakeview Drive and there are signal controlled pedestrian crossing facilities at the junction between Lakeview Drive and the A41 Oxford Road which provide segregated crossing facilities for pedestrians to cross both Lakeview Drive and Oxford Road. In addition, there are further signal controlled pedestrian crossing facilities at the junction of the A41 and Oxford Road, north of the site, and at the junction of the A41/ Kingsmere junction south of the site. All the signal controlled pedestrian crossing facilities in the vicinity of the site include dropped kerbs with tactile paving to assist crossing for people with disabilities. The footway provision and signal controlled crossing facilities in the vicinity of the site provide convenient and safe connection from the site to the wider network,

7.75 The nearest bridleway to the site, usable by equestrians, is approximately 2 kilometres south-east of the site. Given the distance between the site the bridleway it is evident, that the development proposals would have negligible effect on severance of equestrians using the bridleway.

7.76 On that basis, whilst the magnitude of change in traffic movements on Lakeview Drive is considered moderate adverse, relative to existing baseline traffic flow, the overall significance of the effect in this location is considered negligible given the pedestrian infrastructure available in this location.

Table 7.8 Significance of Effect on Severance

Location	Sensitivity	Description of effect	Magnitude of change / impact	Effect significance
Lakeview Drive	Low	Proposed Development Operational Traffic	Negligible	Negligible
Wider Highway Network	Low	Proposed Development Operational Traffic	Negligible	Negligible

7.77 Table 7.8 demonstrates that operational traffic associated with the Proposed Development is expected to result in a negligible effect on severance in the vicinity of the site during the operation of the Proposed Development.

Delay

7.78 The effect of traffic associated with the Proposed Development on the highway network adjacent to the site has been assessed through junction capacity modelling utilising the industry standard software package for each junction type.

7.79 The Proposed Development will be accessed from Lakeview Drive, which connects with the A41 Oxford Road via a signal controlled junction. Whilst this junction currently serves the existing Tesco foodstore only, Lakeview Drive was designed to accommodate the Tesco foodstore and Consented Business Park Scheme.

7.80 The Transport Assessment submitted alongside the planning application includes full details of the effect of the Proposed Development on the highway network local to the site and results of junction capacity modelling. The scope of junctions considered as part of the Transport Assessment has been agreed with Officers at OCC.

7.81 Table 7.9 summarises the result of the highway capacity on the highway network local to the site and effect of the Proposed Development on the scope of junctions assessed. Full details of the junction capacity assessments included within the Transport Assessment and this details of the overall expected operation of the local highway network including anticipated delay.

Table 7.9 Summary of Development Traffic Impact on Delay

Junction/ Receptor	Sensitivity	Description of Effect	Magnitude of Effect	Effect Significance
A41/ Lakeview Drive	Moderate	Increase in traffic	Medium	Moderate Adverse
A41/ Saxon Fields	Moderate	Increase in traffic	Negligible	Negligible
A41/ Vendee Drive	Moderate	Increase in traffic	Negligible	Negligible
A41/ Oxford Road	Moderate	Increase in traffic	Negligible	Negligible
Oxford Road/ Pingle Drive	Moderate	Increase in traffic	Negligible	Negligible
Oxford Road/ Middleton Stoney Road	Moderate	Increase in traffic	Small	Minor Adverse
A41 / A4421	Moderate	Increase in traffic	Negligible	Negligible

7.82 The results of the analysis demonstrate that the Proposed Development will result in an increase in traffic on the local road network, in particular at the junction between Lakeview Drive and A41 Oxford Road.

7.83 At the majority of junctions on the local road network the change in traffic flow as a result of the Proposed Development will result in a negligible effect on the operation of the junction and on driver delay at the junctions.

7.84 At the junction between the A41/ Lakeview Drive and at the junction between Oxford Road, Middleton Stoney Road and Kings Road it is considered that the effect of the change in traffic movements as a result of the Proposed Development will be moderate adverse. The Transport Assessment details mitigation measures that would be implemented at each of these junctions to mitigate the effect of the Proposed Development proposals. Table 7.10 below summarises the mitigation measures at the identified junctions and the residual effect following mitigation.

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Table 7.10 Mitigation and Residual Effect

Location	Effect Significance	Mitigation	Residual Effect
A41/ Lakeview Drive	Moderate Adverse	Capacity Improvement Works	Negligible
Oxford Road/ Middleton Stoney Road	Minor Adverse	Capacity Improvement Works	Negligible

- 7.85 Table 7.10 demonstrates that with the implementation of the proposed mitigation works the residual effect of the development will be negligible.
- 7.86 As set out above there are signal controlled pedestrian crossing facilities at junctions in the vicinity of the site and no changes are proposed to the operation of the crossings facilities that would result in changes to delay for crossing users including pedestrians, cyclists and users with disabilities.
- 7.87 The nearest bridleway to the site, usable by equestrians, is approximately 2 kilometres south-east of the site. Given the distance between the site the bridleway it is evident, that the development proposals would have negligible effect on delay of equestrians using the bridleway.
- 7.88 In addition to the mitigation identified, a Framework Workplace Travel Plan has been prepared and submitted alongside the planning application and it is envisaged that a final Workplace Travel Plan would be secured by Condition. The Travel Plan would seek to encourage travel to the site by sustainable mode of travel and reduce reliance on the private car. To this extent the Travel Plan would seek to reduce the overall vehicle trip attraction of the site.

Amenity, Fear and Intimidation

- 7.89 Guidance provided by IEMA advises a threshold of a doubling of traffic movements, or its HGV component, can be considered to have a significant effect on pedestrian amenity. The IEMA guidance advises that there are no commonly agreed thresholds for assessment of the impact of traffic flows on fear and intimidation. Given that fear and intimidation can be closely linked to overall pedestrian amenity it is considered that a comparable threshold of a doubling of traffic movements, or its HGV component, can be considered to have a significant effect on fear and intimidation.
- 7.90 It is evident from Table 7.7 that all links on the network, with the expectation of Lakeview Drive, will experience less than a 50% change in traffic flows as a result of the operation of the Proposed Development, with the majority of links experiencing changes in traffic flow substantially less than 50%.
- 7.91 As previously highlighted, Lakeview Drive was designed to accommodate traffic associated with both the existing Tesco foodstore and the Consented Business Park Scheme. This was assessed and approved as part of a previous planning application on the site. As Lakeview Drive currently serves only the existing Tesco foodstore, the existing baseline traffic flows on Lakeview Drive are significantly below the level of traffic it has been designed, and previously assessed, to accommodate and hence why the proportional increase in traffic on Lakeview Drive is moderate adverse.
- 7.92 IEMA guidance highlights that, in addition to traffic flow, perceived amenity, fear and intimidation will be dependent on features such as pedestrian facilities including pavement width and protection and segregation from traffic. A pedestrian footway is provided along both sides of Lakeview Drive and there are signal controlled pedestrian crossing facilities at the junction between Lakeview Drive and the A41 Oxford Road which provide segregated crossing facilities for pedestrians to cross both Lakeview Drive and Oxford Road.
- 7.93 Therefore, whilst the magnitude of change in traffic movements on Lakeview Drive is considered moderate adverse, relative to existing baseline traffic flow, the overall significance of the effect in this location is considered negligible given the pedestrian infrastructure available in this location.

- 7.94 The nearest bridleway to the site, usable by equestrians, is approximately 2 kilometres south-east of the site. Given the distance between the site the bridleway it is evident, that the development proposals would have negligible effect on amenity, fear or intimidation of equestrians using the bridleway.

Table 7.9 Significance of Effect on Amenity, Fear and Intimidation

Location	Sensitivity	Description of effect	Magnitude of change / impact	Effect significance
Lakeview Drive	Low	Proposed Development Operational Traffic	Moderate adverse	Negligible
Wider Highway Network	Low	Proposed Development Operational Traffic	Negligible	Negligible

- 7.95 Table 7.7 demonstrates that operational traffic associated with the Proposed Development is expected to result in a negligible effect on severance in the vicinity of the site during the operational phase.

Accidents and Safety

- 7.96 A full analysis of existing traffic incident records on the highway network local to the site is included within the Transport Assessment. The analysis reviewed traffic incident records, obtained from OCC, for the most recent 5-year period available.
- 7.97 The analysis indicated that the most predominant causation factors for incidents were driver error and poor driver behaviour, unrelated to the design and operation of the existing highway network and infrastructure. As such it is considered that there are no inherent safety issues associated with the highway layout which result in a higher than expected number of incidents or any concerns with regard road safety.
- 7.98 On the basis that no inherent safety issues have been identified on the highway network local to the site, it is concluded that the change in traffic movements as a result of the operation of the Proposed Development would have a negligible effect on accident patterns and highway safety in the vicinity of the site.
- 7.99 It is evident that pedestrian and cyclists in the vicinity of the site benefit from footway and cycle route facilities along with signal controlled pedestrian crossings. This provides user with segregated facilities from vehicular traffic such that the change in traffic flow during the operational phase would have a negligible effect on the safety of pedestrians, cyclists and other users.

Mitigation and Monitoring

Construction

- 7.100 No material adverse effects have been identified in the assessment of the construction stage and therefore no further mitigation is identified or considered necessary.
- 7.101 However, a CEMP will be prepared and agreed with CDC in advance of commencement of the Proposed Development. This will include measures to monitor and management of any potential effects of construction traffic associated with the Proposed Development and seek to ensure that construction activity can occur in an efficient and sustainable manner.

Completed Development

- 7.102 No material adverse effects have been identified in the assessment of the operational stage, following the mitigation identified, and therefore no further mitigation is identified or considered necessary.
- 7.103 A Framework Workplace Travel Plan has been prepared and submitted alongside the planning application and it is envisaged that a final Workplace Travel Plan would be secured by Condition.

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7.104 The Travel Plan would seek to encourage travel to the site by sustainable mode of travel and reduce reliance on the private car. To this extent the Travel Plan would seek to reduce the overall vehicle trip attraction of the site.

Residual Effects

7.105 Table 7.10 below provides a summary of the residual effects of the Proposed Development on the highway network local to the site and mitigation measures to be implemented to address the likely effects.

Table 7.10 Summary of Residual Effects

Potential Effect	Magnitude of Impact (Pre-Mitigation)	Mitigation	Residual Effect Significance
Construction			
Severance (Lakeview Drive)	Minor Adverse	Construction Environmental Management Plan	Negligible
Delay	Negligible	Construction Environmental Management Plan	Negligible
Amenity	Negligible	Construction Environmental Management Plan	Negligible
Fear and Intimidation	Negligible	Construction Environmental Management Plan	Negligible
Accidents and Safety	Negligible	Construction Environmental Management Plan	Negligible
Completed Development			
Severance (Lakeview Drive)	Negligible	Travel Plan	Negligible
Delay	Moderate Adverse	Proposed Highway Works Travel Plan	Negligible
Amenity	Negligible	Not Required	Negligible
Fear and Intimidation	Negligible	Not Required	Negligible
Accidents and Safety	Negligible	Not Required	Negligible

7.106 The analysis confirms that the development proposals would result in a negligible residual effect on the highway network local to the site.

Cumulative Effects Assessment

7.107 The cumulative effects of the Proposed Development have been fully considered during its operation.

7.108 As this included the effect of the Proposed Development in conjunction with other developments in the area and also allowed for background traffic growth by applying TEMPRO growth rates to surveyed traffic, no further consideration of traffic and transport cumulative effects is considered appropriate.

Conclusions

7.109 This chapter has considered the potential environmental effects of the Proposed Development in relation to traffic and transportation.

7.110 Methodologies were determined for determining both the construction and operational traffic effects of the Proposed Development on highway network local to the site and significance factors were determined with regard to delay, severance, intimidation and safety.

7.111 It has been demonstrated that during the construction phase the Proposed Development would result in a negligible residual effect on the highway network local to the site. The construction works would be managed through a CEMP which would encourage construction activity to be undertaken in an efficient and sustainable manner and minimise any effect on the highway network local to the site.

7.112 With regard to the operation of the Proposed Development, it has been demonstrated that the Proposed Development is likely to result in a negligible residual effect on the highway network local to the site. Furthermore, the Proposed Development of a Travel Plan will promote sustainable travel choices at the site and reduce reliance on the private car, reducing the effect of the Proposed Development on the local highway network.

Introduction

- 8.1** This chapter of the ES reports the findings of an assessment of the likely significant effects on the noise environment as a result of the Proposed Development.
- 8.2** The site is not subject to any existing sources of vibration that could have amenity implications. Construction is unlikely to take place sufficiently close to residential properties or for a sufficient length of time, as to give rise to vibration that could have amenity or structural implications. The operational phase of the Proposed Development is unlikely to give rise to any vibration that would be measurable beyond the site boundary. Vibration, therefore, has not been assessed further.
- 8.3** This chapter sets out the relevant planning policy context in relation to noise; the methods used to assess potential effects; the baseline conditions and potential effects on the noise environment as a result of the Proposed Development. Where appropriate, mitigation measures required to prevent, reduce or offset any potentially significant adverse effects are identified, alongside a summary of the expected residual effects.
- 8.4** The potential for cumulative effects associated with the Proposed Development and with other relevant development schemes are discussed later in this chapter. The potential for effect interactions with other identified likely significant effects arising as a result of the Proposed Development are discussed in Chapter 14: Effect Interactions of this ES (Volume I).

Legislative and Planning Policy Context

- 8.5** Legislative and policy context are set out in the following documents. Full details are provided in Appendix 8.1.
- Environmental Protection Act 1990, Part III;
 - Cherwell Local Plan 2011-2031;
 - Noise Policy Statement for England (NPSE), May 2010;
 - National Planning Policy Framework (NPPF), March 2012; and
 - Planning Practice Guidance – Noise (PPG-N), December 2014.

Assessment Methodology

- 8.6** An EIA must be undertaken in a prescriptive way that is set out in various EIA guidance documents. This assessment approach requires that one clearly and succinctly displays the environmental effects in terms of their magnitude, duration, extent and significance.
- 8.7** It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source on existing receptors. These may be determined by several methods, listed below and described above and below:
- The effect may be determined by reference to guideline noise values, principally those contained in the WHO 'Guidelines for Community Noise' for operational noise; or BS5228:2009 for construction noise.
 - Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect; and
 - Another method is to compare the resultant noise level against the background noise level (LA90) of the area. This is the method employed by BS 4142:2014 to determine the significance of impacts from industrial and commercial sound.

- 8.8** An EIA Scoping Report was submitted to Cherwell District Council in May 2017. CDC issued their EIA Scoping Opinion on 8 August 2017 which is provided in Technical Appendix 2.2, ES Volume 2 which confirmed acceptability of the scope and method proposed for the noise assessment.

Methodology for Determining Construction Effects

Construction Site Activity – Fixed Thresholds

- 8.9** BS 5228 provides a method for predicting noise from construction activity or equipment. It is the accepted Standard employed for the assessment of construction noise and vibration. The Standard also provides a framework for good working practice and guidance on the mitigation of noise by, for example, the selection of plant or use of screens and enclosures.
- 8.10** Annex E of BS 5228 provides guidance on criteria for the assessment of significance of noise effects and outlines three approaches:
- That noise levels should not exceed 70 – 75 dB LAeq;
 - That noise levels should not exceed thresholds determined from existing ambient noise levels:
 - A – 65 dB LAeq (daytime) – where ambient noise levels (rounded to the nearest 5 dB) are less than this value;
 - B – 70 dB LAeq (daytime) if ambient noise levels (rounded to the nearest 5 dB) are the same as the threshold A value;
 - C – 75 dB LAeq (daytime) where ambient noise levels (rounded to the nearest 5 dB) are above the threshold A value; and
 - That noise levels are deemed to be significant if the total noise (ambient + construction noise) exceeds the pre-construction ambient noise level by 5 dB or more, subject to lower cut-off values of 65 dB (LAeq, Period).
- 8.11** The standard suggests evening limits 5 dB lower than daytime limits and a further reduction of 5 dB for night-time activity and that noise levels may need to be as low as LAeq1hr = 40 dB at night to avoid sleep disturbance and that noise limits during the evening may have to be as much as 10 dBA below the daytime limit.
- 8.12** BS 5228 explains the statutory control available to citizens and local authorities. In particular the BS 5228 notes that "Section 60 and 61 of the Control of Pollution Act 1974 gives local authorities powers for controlling noise and vibration arising from construction and demolition works on any building or engineering sites."
- 8.13** Using the above guidance, a reasonable Lowest Observed Adverse Effect Level (LOAEL) for construction noise is LAeq,day = 65 dB (this is the lower cut-off value in BS5228). A reasonable SOAEL for construction noise is LAeq,day = 75 dB (this is the level that, if exceeded for "significant" periods of time (either continuous or sporadic), could result in "widespread community disturbance, or interference with activities or sleep is likely to occur").

Construction Traffic – Change in Noise Levels

- 8.14** Design Manual for Roads and Bridges (DMRB) describes the assessment process for potential noise impacts arising out of road projects (or alterations). The assessment approach is based on risk of impacts, judged according to change in noise level. This assessment is appropriate for assessing the impact of noise increase resulting from the contribution of additional traffic to the existing network as a result of the Proposed Development.
- 8.15** This assessment is broadly appropriate for assessing the impact of noise increase resulting from the contribution of additional traffic to the existing network as a result of the Proposed Development. The noise changes during the construction phase have been calculated based on the effect of the change in overall traffic

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flow, and in the proportional HGV content, according to the following formulae, derived from “Calculation of Road Traffic Noise” (CRTN):

Overall traffic - $Change\ in\ noise\ level = 10\text{Log} \left(\frac{Predicted\ flow}{Existing\ flow} \right)$

HGV - the difference between the result of the formula for the future scenario against the existing situation (based on a speed of 50km/h):

$$10\text{Log} (1+(5 \times p/50)) - 68.8 \text{ (where } p = \%HGV)$$

- 8.16 The traffic flows are presented in Annual Average Daily Traffic (AADT), two-way flows. The road segments analysed are, from the Transport Assessment. These are road segments of existing roads.
- 8.17 Table 8.1 below shows the response to changes in noise, as set out in DMRB, for short-term impacts (i.e. Construction Phase).

Table 8.1 – Response to Change in Road Traffic Noise – Short-Term (Construction Phase)

Change in noise level (LA10, 18h dB)	Magnitude of Impact (Long Term)
0	No Change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 – 4.9	Moderate
5+	Major

Methodology for Determining Completed Development Effects

Car Parking and Development Operational Noise Emissions – Fixed Thresholds

- 8.18 The World Health Organisation document “Guidelines for Community Noise” (1999) contains a matrix of guideline values for effects from noise within different environments. These guideline values are set at the lowest level that produces an adverse effect, that is, the “critical health effect”. As such the guideline values suggested in the Guidelines are thresholds below which effects such as annoyance during the day can be assumed to be negligible. Therefore, they are aligned to the Government policy LOAEL values.
- 8.19 The guideline values are set out in a table in the Executive Summary of the document. The WHO guideline values for moderate and serious annoyance during the daytime and evening are LAeq16hrs = 50 and 55 dB, respectively.
- 8.20 The WHO daytime guideline values are all external levels and can be considered to be freefield or façade levels.
- 8.21 The National Physical Laboratory (NPL) report of 1998 which was commissioned by the Department of the Environment, Transport and the Regions, contains a section entitled: Guide to the Interpretation of the WHO Guidelines (the 1995 draft WHO Guidelines which were not materially different from the final 1999 Guidelines).
- 8.22 The summary of this section of the NPL report states:

“In essence, the WHO guidelines represent a consensus view of international expert opinion on the lowest threshold noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached.”

- 8.23 It can be seen that the WHO guideline values are aligned to the Government policy LOAEL values. Significant effects, i.e. SOAEL values would not be expected until much higher levels than LOAEL values.
 - 8.24 “Higher degrees of exposure” is not defined by NPL. However, in accordance with professional opinion, this would equate to 10 dB – around a doubling of the loudness. This relationship should apply to the setting of SOAEL values, i.e. they should be 10 dB higher than the LOAEL values or WHO guideline values.
- Operational Road Traffic - Changes in Noise Levels**
- 8.25 Design Manual for Roads and Bridges (DMRB) describes the assessment process for potential noise impacts arising out of road projects (or alterations). The assessment approach is based on risk of impacts, judged according to change in noise level. This assessment is appropriate for assessing the impact of noise increase resulting from the contribution of additional traffic to the existing network as a result of a proposal.
 - 8.26 This assessment is broadly appropriate for assessing the impact of noise increase resulting from the contribution of additional traffic to the existing network as a result of the proposal. The noise changes have been calculated again based on the effect of the change in overall traffic flow, and in the proportional HGV content, according to the following formulae, derived from “Calculation of Road Traffic Noise” (CRTN):

Overall traffic - $Change\ in\ noise\ level = 10\text{Log} \left(\frac{Predicted\ flow}{Existing\ flow} \right)$

HGV - the difference between the result of the formula for the future scenario against the existing situation (based on a speed of 50km/h):

$$10\text{Log} (1+(5 \times p/50)) - 68.8 \text{ (where } p = \%HGV)$$

- 8.27 The traffic flows are presented in Annual Average Daily Traffic (AADT), two-way flows. The road segments analysed are from the Chapter 7: Traffic and Transport of the Volume of the ES. These are road segments of existing roads.
- 8.28 Table 8.2 below shows the response to changes in noise, as set out in DMRB, for long-term impacts (i.e. Completed Development).

Table 8.2 – Response to Change in Road Traffic Noise – Long-Term

Change in noise level (LA10, 18h dB)	Magnitude of Impact (Long Term)
0	No Change
0.1 – 2.9	Negligible
3 – 4.9	Minor
5 – 9.9	Moderate
10+	Major

Mechanical Plant and Machinery - Comparison with Background Sound Levels

- 8.29** The relevant standard for this type of assessment – the fourth edition of BS 4142:2014 was published in October 2014. It is entitled “Methods for rating and assessing industrial and commercial sound”.
- 8.30** The Scope of the standard includes:
- “1.1 This British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes: a) sound from industrial and manufacturing processes; b) sound from fixed installations which comprise mechanical and electrical plant and equipment; c) sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.”*
- 8.31** It can be seen that this standard is appropriate in this case for the assessment of noise from the fixed mechanical services plant, being the potential plant and machinery associated with air conditioning and heating of buildings, for example.
- 8.32** The standard assesses the likely impact from a proposed scheme by considering the difference between the “rating level” of the sound being assessed with the “background sound level” of the area.
- 8.33** The noise source is assessed in terms of the LAeqT statistical index – in effect the average sound energy level. During the day (defined as 0700 to 2300 hours), the LAeqT level must be normalised to 1 hour (i.e. LAeq1hr) and at night (2300 to 0700 hours) the LAeq,T level must be normalised to 15 minutes. BS 4142 terms this level the “specific sound level”.
- 8.34** The specific sound level is then corrected by given decibel factors for any impulsiveness, tonality, intermittency or other character that may attract attention. These different character corrections are additive. BS 4142 calls the resultant, corrected level the “rating level.”
- 8.35** The background sound level is described by the LA90 statistical index – the level exceeded for 90% (i.e. almost all of) the time.
- 8.36** Section 11 of BS 4142 is important and warrants careful consideration and analysis. The following extracts are of note:
- “The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs;
 - An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context;
 - Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following:
 - a) Typically, the greater this difference, the greater the magnitude of the impact;
 - b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
 - c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and
 - d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level

does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”

- 8.37** BS 4142 employs assessment criteria in terms that are the same as those used within the NPPF and NPSE i.e. the degree of adverse impact (None, Low (LOAEL) and Significant (SOAEL)).
- 8.38** It is clear from the guidance set out above that a series of assessment methods exist which allow a thorough assessment of noise impacts based on both objective (quantitative) and subjective (qualitative) standards. These can be set into a matrix of significance of effects for the purposes of the Environmental Statement.
- 8.39** The approach taken is consistent with current Government Policy and Practice, which is applicable to all noise sources.

Significance Criteria

- 8.40** The assessment of overall, LAeqT, levels during the day has been undertaken on the basis that: noise impact in terms of serious annoyance can be assumed to be negligible at a level (LAeqT) below 55 dB (this is the LOAEL based on the WHO guideline value) and that “significant” impacts may not occur until a level (LAeqT) above 65 dB (this is the SOAEL based on the WHO guideline value +10dB).
- 8.41** For operational plant, a rating level of 0dB in relation to the background sound level represents a low impact levels (the LOAEL) and a rating level of 10 dB above the background sound level represents a significant impact (the SOAEL).
- 8.42** Whilst not strictly able to be defined as LOAEL and SOAEL because they are not absolute thresholds, for the purposes of this assessment, changes in traffic noise have been allocated a LOAEL and SOAEL according to the DMRB impact definitions. Long term changes of less than 3 dB equate to the LOAEL and (this is the negligible magnitude in DMRB), and changes of greater than 10 dB would equate to the SOAEL (this is the “major” magnitude in DMRB). For short term changes in traffic noise (i.e. during construction), those impact definition would apply at a change of 1 dB (LOAEL), and 5dB (SOAEL).
- 8.43** In determining whether an effect on a receptor is significant, reference is also made to the nature of the receptors, expected duration of exposure and the predicted noise level in relation to recommended noise values.

Sensitivity of Receiving Environment

- 8.44** The sensitivity of the receiving environment is classified as follows:
- High - receptors of greatest sensitivity to noise such as world heritage sites and tranquil areas;
 - Medium - noise sensitive receptors such as dwellings, hospitals, schools, places of quiet recreation;
 - Low - receptors with some sensitivity to noise such as offices, other workplaces and play areas; and
 - Very Low - receptors of very low sensitivity to noise or marginal to the zone of influence of the proposals.
- 8.45** In this case, all receptors are residential properties and are therefore of medium sensitivity.

Magnitude

- 8.46** The magnitude of noise effects can be classified as follows:
- High – change in sound sound produced in excess of 10 dBA above the recommended noise guideline values (this is the SOAEL);
 - Medium - sound produced between 5 and 10 dBA above the recommended noise guideline values;
 - Low - sound produced between 1 and 5 dBA above the recommended noise guideline values; and

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- Very Low – sound produced less than 1 dBA above the recommended noise guideline values (this is the LOAEL).

Duration

8.47 Noise effects can vary in duration and are classified as follows:

- Short term - the period over which the effect is experienced is temporary and lasts for the period of construction (if less than 5 years) or less;
- Medium term - the effect occurs for longer than the full period of construction, or if the construction period is over 5 years; and
- Long term - the effect remains for a substantial time, perhaps permanently, after construction.

8.48 In this case, effects during construction are short term and effects from operational noise are long-term.

Extent

8.49 Effects can also be classified according to the extent of the effect as follows:

- Local - the site and its immediate surroundings;
- District - the wider area of the borough;
- Regional -the region (i.e. the south east); and
- National - namely England and Wales.

8.50 In respect of noise impacts, they are confined to a local extent in this case.

Significance Matrix

8.51 The LOAEL and SOAEL levels are identified in Table 8.3 below for each activity and the significance matrix used in the assessment for medium sensitivity receptors (residential dwellings) is set out in Table 8.4.

Table 8.3 Lowest Observed Adverse Effect Levels (LOAEL) and Significant Observed Adverse Effect Levels (SOAEL) applied to assessment.

Activity	LOAEL	SOAEL
Construction Activity	65 dB LAeq,day	75 dB LAeq,day
Construction Traffic	Change of <3dB LA10,18Hr	Change of >5 dB LA10,18Hr
Operational Activity	55 dB LAeq,day	65 dB LAeq,day
Operational Traffic	Change of <5 dB LA10,18Hr	Change of >10dB LA10,18Hr
Operational Plant/Machinery	Rating level of 0dB above background sound	Rating level of 10 dB above background sound

Table 8.4 Significance matrix for Medium Sensitivity Receptors

Magnitude	Effect Significance
Very Low (the "LOAEL")	Negligible
Low	Minor
Medium	Moderate
High (the "SOAEL")	Major

Quantifying Baseline Conditions

8.52 The noise environment across the site, and in the vicinity, is dominated by road traffic noise from the A41. The nearest receptors are located some 65 metres to the west, fronting on to the A41, and some 20 metres from the carriageway. Noise surveys were undertaken, therefore, at a location on site to represent the noise environment at those properties (at a similar distance from the A41).

8.53 Noise survey measurements have been undertaken in accordance with BS 7455 'Description and measurement of environmental noise - Part 1: Guide to quantities and procedures', and the equipment used conformed to the requirements of BS EN 61672 'Electroacoustics – Sound level meters – Part 1: Specifications'.

8.54 Baseline conditions in respect of traffic noise have been informed by data contained in the Chapter 7: Traffic and Transport for the Proposed Development.

Establishing Operational Noise Levels

8.55 Modelling of noise emissions from the site has been undertaken using SoundPLAN computer software. This software takes account of source noise levels, local topography, screening attenuation uses the ISO 9613 algorithm to predict noise propagation over distance. The models are displayed as LAeq,1Hr. These assume a peak hour of activity in the Proposed Development, including car parking and access road traffic movements. They represent, therefore, a worst-case peak hour noise level.

Identification of Receptors

8.56 The receptors identified as the nearest and potentially most sensitive to noise from the Proposed Development are set out in table 8.5 and shown on the plan in Appendix 8.2

Table 8.5 – Receptor Locations

Receptor Name	Direction	Distance
New housing west of A41 ("Kingsmere Residential Estate")	NW	65 Metres
Isolated Farm Properties	E	450 Metres
Acorn PH/Middleton Stoney Road	N	365 Metres

Limitations and Assumptions

8.57 All noise predictions are, necessarily, limited by the extent of knowledge at any particular point in time. Computer modelling is based on a series of assumptions, albeit these are derived from expert knowledge and calibrated software, along with actual measurements on a wide variety of sites which are included in the SoundPLAN software database. A worst-case peak hour assumption has been made, so as to reflect a robust assessment position ensuring that the likely significant effects are assessed.

Baseline Conditions

8.58 A noise survey was undertaken over a 24-hour period from Monday 12th to Tuesday 13th June 2017. The measurements were undertaken at a location close to the west of the site, at a similar distance from the A41 to be representative of the nearest sensitive receptors to the west.

8.59 Noise measurements were taken in 15-minute samples using Norsonics sound level meter Type 140, which was calibrated at the start and at the end of the survey.

8.60 Weather conditions were warm and dry and within acceptable parameters for surveying. The following parameters were measured directly from the sound level meter:

- LAeqT: The A-weighted equivalent continuous sound level over a period of time, T. This is the average sound energy level and is used to describe the ambient sound level in the area.
- LAMAX: The A-weighted maximum level of noise during the measurement period.
- LA90: The A-weighted sound level exceeded for 90% of the time. This is usually referred to as the background sound level.

8.61 The noise levels were dominated by road traffic on the A41 Oxford Road.

8.62 The noise survey results are displayed in Appendix 8.2 and are summarised in Table 8.6.

Table 8.6– Existing Noise Climate Survey Results Summary

Period	LAeq,T, dB	LAMAX, dB	LA90, dB
Day (0700-1900)	62	85	50
Evening (1900-2300)	59	85	48
Night (2300-0700)	58	80	41
Peak Hour (0800-0900)	63	86	50

8.63 LAeq,T results are for the period given. LAMAX results are the levels exceeded in 10% of the samples in that period and LA90 results are the typical (median) values in the time period.

Assessment of Effects

Construction

Construction Site Activity

8.64 The construction of the Proposed Development is anticipated to be phased over a 8 to 9-year period. Details of the methods and plant likely to be used during the construction phase are necessarily indicative at this stage and would be likely to change during the site redevelopment. This makes it difficult to accurately predict the

noise levels for direct comparison with the noise criteria described previously. Therefore, a maximum reasonable worst case noise scenario has been estimated, assuming that construction plant would be operating at the closest point to the nearest noise sensitive receptor (Kingsmere Residential Estate) and in the absence of mitigation, representative of the phase of the Proposed Development involving construction activities in the western part of the site.

8.65 In practice, noise levels would tend to be lower particularly in later phases, owing to greater separation distances and screening effects, and a second scenario, which allows for greater separation distances and localised screening, has also been calculated.

8.66 Calculations were undertaken using the data and procedures set out in BS 5228-1:2009 for the noisiest construction phases, to derive indicative noise levels at the closest receptor. The highest noise levels tend to be associated with plant used during earthmoving, concreting and road pavement construction. During the fit-out of buildings etc., construction noise would be significantly lower. The calculated worst case noise levels for the daytime periods are presented in Appendix 8.3, summarised in Table 8.7.

Table 8.7 – Indicative Calculated Construction Noise Levels at Kingsmere Residential Estate

Activity Type	Closest Phase	Further Phases
	LAeq,Day,	LAeq,Day
Earthworks & enabling	66 dB	57 dB
Main construction	68 dB	58 dB
Internal road construction	68 dB	57 dB

8.67 The worst case predicted noise levels (without mitigation) suggest that the LOAEL threshold levels would marginally be exceeded at the nearest receptor during the daytime period as a result of all typical construction activities, but the SOAEL would not be exceeded. This is as would be expected with construction occurring in close proximity to residential properties. The exceedance is of low magnitude, indicative of a minor, medium-term, adverse effect.

Construction Traffic

8.68 The calculation for increases in noise from increased traffic flows during the construction phase is included in the calculation tables at Appendix 8.4. These include the peak construction phase construction traffic flows and these are added to the 2017 baseline traffic flows to assess a change in traffic flows (and HGV content) on the A41 and Oxford Road – the routes into and out of the site, on the worst-case assumption in each case that all construction traffic will either head south on Oxford Road, or north on Oxford Road, then east on the A41. Traffic flows are presented in 18-hour (i.e. daytime).

8.69 In relation to existing noise sensitive receptors adjacent to the road network, the calculated increases in road traffic noise during the construction phase have been calculated to be 0.1 dB. Such changes would be below the LOAEL, be less than a very low magnitude and, therefore, represent a negligible effect.

Completed Development

Site Activity (Car Parking and Access Road)

8.70 Modelling of noise emissions from the site has been undertaken using SoundPLAN computer software. This software takes account of source noise levels, local topography, screening attenuation uses the ISO 9613 algorithm to predict noise propagation over distance.

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- 8.71** The models include the effect of localised screening by the buildings themselves as appropriate (i.e. the models are 3-dimensional and take account of the presence of solid buildings and other structures).
- 8.72** Noise from the car park and access road has been modelled assuming the peak day activity outlined in Chapter 7: Traffic and Transport for the peak level of activity. The models, therefore, are displayed as LAeq,1 Hr (for a peak hour of activity at the business park). These assume the full completed Proposed Development.
- 8.73** The car parking areas are treated by the model as area sources, and activity has been allocated to each car parking area as a proportion of the total vehicle flows. A reasonable worst-case layout including parking areas around the perimeter of the site has been modelled. The internal roads are modelled as a line source dictated by passby noise levels of vehicles at slow speed (30 km/h) on the internal roads.
- 8.74** These models represent a very worst (and therefore robust) case. They assume the peak activity in the car parks and access road.
- 8.75** The model results for this worst-case are displayed in Appendix 8.5. The result at the receptor locations are shown in Table 8.8.

Table 8.8 – Predicted sound levels from site activity

Receptor Location	Predicted sound level, LAeq,1Hr
New housing west of A41 (“Kingsmere Residential Estate”) - W	54 dB
Isolated Farm Properties - E	<40 dB
Acorn PH/Middleton Stoney Road - N	<40 dB

- 8.76** These levels would be below the LOAEL, be less than a very low magnitude and, therefore, represent a **negligible effect**. This is especially the case in the context of the existing road-traffic dominated noise environment already being almost 10 dB above the predicted sound emission levels from the Proposed Development.

Mechanical Services Plant and Machinery

- 8.77** Full detail of other plant and machinery is not yet available. However, it is likely to consist of comfort cooling, heating and extraction equipment for the business park buildings.
- 8.78** The exact nature and location of each plant item, and the noise output from the equipment is unknown at this stage. However, experience at other large office park sites indicates that such plant has the potential to produce noise levels which may exceed the background sound levels by a medium magnitude, potentially leading to a moderate adverse effect if mitigation measures and plant noise limits are not inherent in the design of the installations.
- 8.79** The design target (for a low impact) should be that cumulative noise from such plant does not exceed the background noise level at the nearby receptors. General mitigation measures are discussed further in the mitigation section below.

Road Traffic

- 8.80** The calculation for increases in noise from increased traffic flows during the full operation of the Proposed Development operation is included in the calculation tables at Appendix 8.4.

- 8.81** Table 8.9 below shows the predicted change in noise level on the principal roads dictating the noise climate in the area, as a result of traffic generated by the Proposed Development, using the same calculation methodology as for construction traffic.
- 8.82** The traffic flows are presented in AADT, 18, hour, two-way flows. The road segments analysed are, from the Transport Assessment. The Proposed Development impacts are assessed using the future (2026) baseline and comparing with the 2026 “with development” traffic flows.

Table 8.9 – Changes in Road Traffic Noise – Operational Phase

Road Segment	Change in traffic noise Level, LA10,18Hr, dB
Kings End	+0.8
Pingle Drive	+0.4
A41 (e)	+0.8
Oxford Road (north of Lakeview Drive	+0.9
Lakeview Drive	+1.5
Oxford Road (south of Lakeview Drive	+0.7
Saxon Fields	0

- 8.83** Such changes would be below the LOAEL, be of very low magnitude and, therefore, represent a negligible effect.

Mitigation and Monitoring

Construction

- 8.84** In general, noise from construction activity would be best controlled by the following process:
- Determine the likely extent of construction works (where, when, duration);
 - Determine noise emission levels by reference to BS 5228;
 - Agree noise amelioration measures with the local authority (amelioration and management control) and/or noise limits;
 - Prepare a construction works method study and environmental management plan in agreement with the local authority, to include hours of working and agreed traffic routes; and
 - Obtain prior consent under the Control of Pollution Act 1974 where necessary and/or appropriate.
- 8.85** The contractors will take note of, and act on, the advice in BS 5228. Equipment such as breakers and compressors and mobile plant such as excavators and road works equipment, will be expected to conform with the appropriate EC directive noise limit. Best practice techniques and machinery will be employed at all times. Construction phase mitigation measures would be implemented through a Construction Environmental Management Plan (CEMP) to be secured through a planning condition.

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8.86 In day-to-day operations, it is assumed that no activity will be undertaken outside of daytime hours which could be expected to give rise to noise noticeably above current prevailing background noise levels at nearby properties. To allow for short term noisy operations, any one -hour period during the working day should not exceed 75dB LAeq,1hr on the site boundary.

8.87 Given the expected minor, medium-term effects only during the phases closes to the receptors in a 8 to 9 construction programme, it is not considered that mitigation measures beyond the general measures set out would be necessary.

Construction Traffic

8.88 Effects are assessed as negligible, so no mitigation is proposed.

Completed Development

Site Activity

8.89 Effects are assessed as negligible, so no mitigation is proposed.

Mechanical Services Plant and Machinery

8.90 It is a typical requirement that the noise level from commercial plant should not exceed the existing background sound level. This would represent a low impact, and therefore, a negligible effect. This will be imposed by way of a planning condition if necessary to limit the plant noise emissions from the Proposed Development as a whole.

8.91 Measures such as selection of intrinsically quiet plant, engineering noise control (attenuators to ventilation plant and louvred screening, for example) can easily be introduced as part of the design and roof top plant rooms can be screened as an integral part of the architectural approach during submission of any reserved matters application.

Road Traffic

8.92 Effects are assessed as negligible, so no mitigation is proposed.

Residual Effects

8.93 Table 8.10 shows the assessed residual effects.

Table 8.10 Summary of Residual Effects

Intended End Use	Likely Effect, Geographic Scale and Duration (Pre Mitigation)	Residual Effect, Geographic Scale and Duration (Post Mitigation)	Residual Effect Significance
Construction			
Construction Activity	Negligible – Minor	Negligible	Negligible
Construction Traffic	Negligible	Negligible	Negligible
Completed Development			
Site Activity	Negligible	Negligible	Negligible
Mechanical Services Plant	Moderate*	Negligible	Negligible
Road Traffic	Negligible	Negligible	Negligible

*This is an assumed risk, were all plant to be installed with no inherent mitigation of any kind.

Cumulative Effects Assessment

8.94 Cumulative effects in relation to the Proposed Development apply to traffic noise impacts, when the Proposed Development traffic interacts with other traffic from committed developments in the area. Chapter 7: Traffic and Transport has included the committed development traffic within the 2026 future flows, and for a robust assessment, these have been compared to the 2017 baseline flows (i.e. assessing impacts from all committed development, the Proposed Development itself and any assumed growth in traffic generally).

8.95 The calculation for increases in noise from increased traffic flows during the full Proposed Development operation (with committed development), compared to a 2017 baseline is included in the calculation tables at **Appendix 8.4**.

8.96 Table 8.11 below shows the predicted change in noise level on the principal roads dictating the noise climate in the area, as a result of traffic generated by the Proposed Development, and cumulative developments, using the same calculation methodology as previously.

Table 8.11 – Changes in Road Traffic Noise – Cumulative Effects

Road Segment	Change in traffic noise Level, LA10,18Hr, dB
Kings End	+1.5
Pingle Drive	+1.1
A41 (e)	+1.5
Oxford Road (north of Lakeview Drive)	+1.6
Lakeview Drive	+2.2
Oxford Road (south of Lakeview Drive)	+1.4
Saxon Fields	+0.7

8.97 Such changes would be below the LOAEL, be less than a very low magnitude and, therefore, represent a **negligible effect**.

Conclusions

8.98 With the exception of a minor short-term effect from early construction phases and an assumed worst-case risk of a moderate effect (pre-mitigation) from mechanical services noise the Proposed Development is predicted to have a generally **negligible** noise effect before mitigation.

8.99 Mitigation measures will reduce all effects to **negligible**.

8.100 Cumulative effects are assessed to be **negligible**.

8.101 The Proposed Development, therefore, will have a **negligible** residual and cumulative effect on the surrounding noise environment.

Introduction

- 9.1** This chapter of the ES reports the findings of an assessment of the likely significant effects on air quality as a result of the Proposed Development.
- 9.2** The Proposed Development will lead to an increase in traffic on the local roads, which may impact on air quality at existing residential properties. The main air pollutants of concern related to traffic emissions are nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀ and PM_{2.5}). There is also the potential for the construction activities to impact upon existing properties. The main pollutants of concern related to construction activities are dust and PM₁₀.
- 9.3** This chapter sets out the relevant national, regional and local planning policy context; the methods used to assess potential effects; the baseline conditions; and potential effects on air quality as a result of the Proposed Development. Where appropriate, mitigation measures required to prevent, reduce or offset any potentially significant adverse effects are identified, alongside a summary of the expected residual effects.
- 9.4** The potential for cumulative effects associated with the Proposed Development and with other relevant development schemes is discussed later in this chapter. The potential for effect interactions with other identified likely significant effects arising as a result of the Proposed Development are discussed in Chapter 13: Effect Interactions of this ES (Volume I).
- 9.5** This chapter is supported by Technical Appendices provided as ES Volume 2:
- Appendix 9.1: Glossary;
 - Appendix 9.2: Legislative and Planning Policy Context;
 - Appendix 9.3: Construction Dust Assessment Procedure;
 - Appendix 9.4: EPUK & IAQM Planning for Air Quality Guidance;
 - Appendix 9.5: Professional Experience;
 - Appendix 9.6: Modelling Methodology; and
 - Appendix 9.7: Construction Mitigation.

Legislative and Planning Policy Context

- 9.6** Legislation, guidance documents and planning policies which are of relevance to this assessment are listed below. Where relevant, further details are provided in Appendix 9.2.
- The Air Quality Strategy¹;
 - The National Planning Policy Framework (NPPF)² (Chapter 11: Conserving and Enhancing the Natural Environment);
 - Connecting Oxfordshire: Local transport plan 2015-2031³;

- The Cherwell Local Plan 2011-2031⁴ : The Local Plan includes Policy 'Bicester 4' which specifically considers the Bicester Business Park development. However, air quality is not specifically mentioned in this policy;
- National Air Quality Plans^{5, 6}; and
- Cherwell District Council Air Quality Action Plan⁷.

Assessment Methodology

- 9.7** This section of the chapter sets out the assessment criteria used, the methodology followed to predict the impacts, and the approach taken to determine the significance of the effects.

Consultation

- 9.8** An EIA Scoping Report was submitted to Cherwell District Council in May 2017. CDC issued their EIA Scoping Opinion on 8 August 2017 which is provided in Technical Appendix 2.2, ES Volume 2 which confirmed acceptability of the scope and method proposed for the air quality assessment.

Assessment Criteria

- 9.9** The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations 2000⁸ and the Air Quality (England) (Amendment) Regulations 2002⁹.
- 9.10** The objectives for nitrogen dioxide and PM₁₀ were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The PM_{2.5} objective is to be achieved by 2020. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 µg/m³¹⁰. Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level. Measurements have also shown that the 24-hour PM₁₀ objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m³¹⁰. The predicted annual mean PM₁₀ concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM₁₀ objective. Where predicted annual mean concentrations are below 32 µg/m³ it is unlikely that the 24-hour mean objective will be exceeded.
- 9.11** The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance¹⁰. The annual mean objectives for nitrogen dioxide and PM₁₀ are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM₁₀ is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for

¹ Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Defra.

² National Planning Policy Framework (2012), DCLG.

³ Oxfordshire County Council (2015) Connecting Oxfordshire: Local Transport Plan 2015-2031

⁴ Cherwell District Council (2015) The Cherwell Local Plan 2011-2031

⁵ Defra (2015) Air quality in the UK: plan to reduce nitrogen dioxide emissions, [Online], Available:

<https://www.gov.uk/government/publications/air-quality-in-the-uk-plan-to-reduce-nitrogen-dioxide-emissions>.

⁶ Defra (2017) Improving air quality in the UK: tackling nitrogen dioxide in our towns and cities. Draft UK Air Quality Plan for tackling nitrogen dioxide.

⁷ Cherwell District Council (2017) Air Quality Action Plan

⁸ The Air Quality (England) Regulations, 2000, Statutory Instrument 928 (2000), HMSO.

⁹ The Air Quality (England) (Amendment) Regulations, 2002, Statutory Instrument 3043 (2002), HMSO.

¹⁰ Defra (2016) Review & Assessment: Technical Guidance LAQM.TG16, Defra.

nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

9.12 The European Union has also set limit values for nitrogen dioxide, PM₁₀ and PM_{2.5}. The limit values for nitrogen dioxide are the same numerical concentrations as the UK objectives, but achievement of these values is a national obligation rather than a local one¹¹. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded.

9.13 The relevant air quality criteria for this assessment are provided in Table 9.1.

Table 9.1 Air Quality Criteria for Nitrogen Dioxide, PM₁₀ and PM_{2.5}

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 µg/m ³ not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m ³
Fine Particles (PM ₁₀)	24-hour Mean	50 µg/m ³ not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m ³ ^a
Fine Particles (PM _{2.5}) ^b	Annual Mean	25 µg/m ³

^a A proxy value of 32 µg/m³ as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM₁₀ objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM₁₀ objective are possible¹⁰

^b The PM_{2.5} objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Descriptors for Air Quality Impacts and Assessment of Significance

Construction Phase

9.14 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management (IAQM)¹² has been used. Full details of this approach are provided in Appendix 9.3.

9.15 Guidance from IAQM¹² is that, with appropriate mitigation in place, the effects of construction dust will be ‘not significant’. The assessment thus focuses on determining the appropriate level of mitigation so as to ensure that effects will normally be ‘not significant’.

Operational Phase

9.16 There is no official guidance in the UK in relation to development control on how to describe air quality impacts, or how to assess their significance. The approach developed jointly by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)¹³ has therefore been used. This includes defining descriptors of the impacts at individual receptors, which take account of the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective, as described in Table 9.2 below. The overall significance of

the air quality impacts is determined using professional judgement, taking account of the impact descriptors. Full details of the EPUK/IAQM approach are provided in Appendix 9.4. The approach includes elements of professional judgement, and the experience of the consultants preparing the chapter is set out in Appendix 9.5.

9.17 It is important to differentiate between the terms impact and effect with respect to the assessment of air quality. The term impact is used to describe a change in pollutant concentration at a specific location. The term effect is used to describe an environmental response resulting from an impact, or series of impacts. Within this chapter, the air quality assessment has used published guidance and criteria described in the following sections to determine the likely air quality impacts at a number of sensitive locations. The potential significance of effects has then been determined by professional judgement, based on the frequency, duration and magnitude of predicted impacts and their relationship to appropriate air quality objectives.

9.18 Judgement on the overall significance of the effect of the Proposed Development has taken into account factors such as:

- the existing and future air quality conditions without the Proposed Development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted in undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as minor individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a moderate or major impact may not have a significant effect if it is confined to a very small area and where it is obviously not the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

¹¹ Directive 2008/50/EC of the European Parliament and of the Council (2008).

¹² IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1.

¹³ Moorcroft and Barrowcliffe et al (2017) Land-Use Planning & Development Control: Planning For Air Quality v1.2, IAQM, London.

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Table 9.2 Air Quality Impact Descriptors for Individual Receptors for All Pollutants ^{a,d}

Long-term average concentration at receptor in assessment year ^b	Change in concentration relative to AQAL ^c				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Minor	Moderate
76-94% of AQAL	Negligible	Negligible	Minor	Moderate	Moderate
95-102% of AQAL	Negligible	Minor	Moderate	Moderate	Major
103-109% of AQAL	Negligible	Moderate	Moderate	Major	Major
110% or more of AQAL	Negligible	Moderate	Major	Major	Major

^a Values are rounded to the nearest whole number.

^b This is the 'without Proposed Development' concentration where there is a decrease in pollutant concentration and the 'with Proposed Development' concentration where there is an increase.

^c AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.
^d The terminology from the IAQM has been adapted for the purposes of this EIA, so that 'Slight' corresponds to 'Minor', and 'Substantial' to 'Major'.

Methodology for Determining Construction Effects

- 9.19** The transport consultant has indicated that during the construction of Phase 1 of the Proposed Development, there will be a maximum of 60 deliveries to the site per day over three months of the construction period, with lower numbers over the rest of Phase 1. On average, over the 18 months of Phase 1, there will be 38 deliveries to site per day. It has been assumed that the number of deliveries to the site will be within similar ranges for the other construction phases. The Design Manual for Roads and Bridges (DMRB)¹⁴ indicates that there are likely to be significant air quality impacts where "Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more". More recent guidance from IAQM and EPUK¹³ considers that significant air quality impacts could arise where "a development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere". Delivery vehicles will access the site from the A41 Oxford Road, and are not anticipated to cross Bicester town centre and pass through the Bicester AQMA. The increase in HDV movements during construction is therefore not considered to be capable of leading to significant air quality impacts, and construction traffic has not been considered further in this assessment.
- 9.20** The construction dust assessment considers the potential for impacts within 350m of the site boundary; or within 50m of roads used by construction vehicles. The assessment methodology is that provided by IAQM¹². This follows a sequence of steps. Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required. Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation. Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant impacts. Appendix 9.3 explains the approach in more detail.

Methodology for Determining Completed Development Effects

- 9.21** Once operational, the Proposed Development will lead to an increase in traffic on the local roads, which may impact on air quality at existing residential properties. The main air pollutants of concern related to traffic emissions are nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀ and PM_{2.5}). An assessment of the operational impacts that the Proposed Development will have on concentrations of these pollutants has been carried-out following the methodology presented below.

Sensitive Receptor Locations

- 9.22** Concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} have been predicted at a number of locations close to the Proposed Development. Receptors have been identified to represent worst-case exposure within these locations, being located on the façades of the residential properties closest to the sources. When selecting these receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, and where there is a combined effect of several road links.
- 9.23** Four existing residential properties have been identified as receptors for the assessment. These locations are described in Table 9.3 and shown in Figure 9.1. In addition, concentrations have been modelled at two diffusion tube monitoring sites located along Kings End in order to verify the model outputs (see Appendix 9.6 for verification method).

Table 9.3 Description of Receptor Locations

Receptor	Description
R1	Residential Property at 48 Kings End
R2	Residential Property at 43 Kings End
R3	Residential Property 'Fox Cottage'
R4	Residential Property 'Saxon fields'

¹⁴ Highways Agency (2007), Design Manual for Roads and Bridges

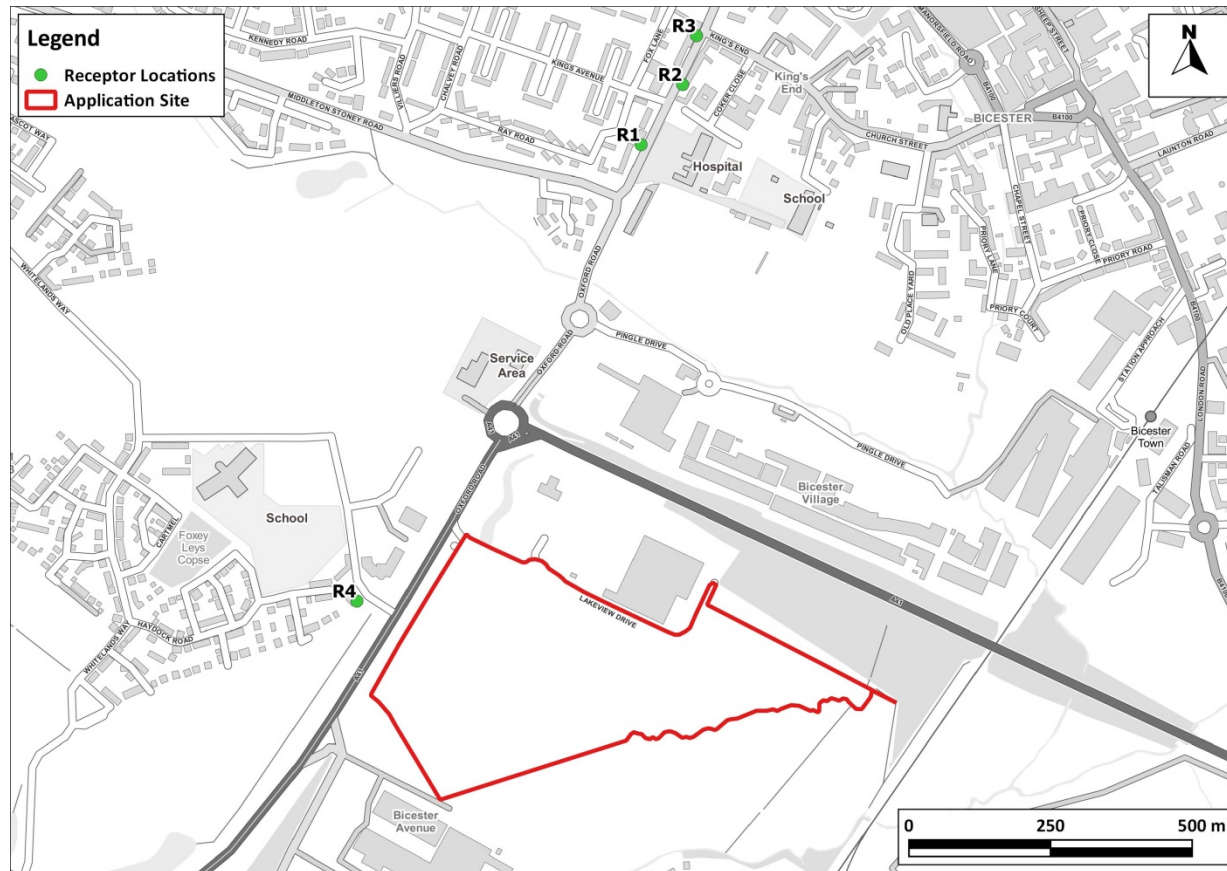


Figure 9.1 Receptor Locations

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Assessment Scenarios

- 9.24** Nitrogen dioxide, PM₁₀ and PM_{2.5} concentrations have been predicted for a base year (2015) and the proposed year of opening (2026). For 2026, predictions have been made assuming both that the Proposed Development does proceed (With Proposed Development), and does not proceed (Without Proposed Development). In addition to the set of 'official' predictions, a sensitivity test has been carried out for nitrogen dioxide that involves assuming much higher nitrogen oxides emissions from certain vehicles than have been predicted by Defra, using AQC's Calculator Using Realistic Emissions for Diesels (CURED V2A) tool¹⁵. This is to address the potential under-performance of emissions control technology on modern diesel vehicles¹⁶.

Modelling Methodology

- 9.25** Concentrations have been predicted using the ADMS-Roads dispersion model. Details of the model inputs, assumptions and the verification are provided in Appendix A6, together with the method used to derive base and future year background concentrations. Where assumptions have been made, a realistic worst-case approach has been adopted.

Traffic Data

- 9.26** Traffic data for the assessment have been provided by Motion, who have undertaken the Traffic and Transport Chapter (Chapter 7) and the Transport Assessment for the Proposed Development. Further details of the traffic data used in this assessment are provided in Appendix 9.6.

Uncertainty in Road Traffic Modelling Predictions

- 9.27** There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.
- 9.28** An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix 9.6). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2015) concentrations.
- 9.29** Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions.
- 9.30** Historically, large reductions in nitrogen oxides emissions have been projected, which has led to significant reductions in nitrogen dioxide concentrations from one year to the next being predicted. Over time, it was found that trends in measured concentrations did not reflect the rapid reductions that Defra and DfT had predicted¹⁷. This was evident across the UK, although the effect appeared to be greatest in inner London; there was also considerable inter-site variation. Emission projections over the 6 to 8 years prior to 2009 suggested that both annual mean nitrogen oxides and nitrogen dioxide concentrations should have fallen by around 15-25%, whereas monitoring data showed that concentrations remained relatively stable, or even showed a slight increase. Analysis of more recent data for 23 roadside sites in London covering the period 2003 to 2012 showed a weak downward trend of around 5% over the ten years¹⁸, but this still falls short of the improvements that had been predicted at the start of this period. This pattern of no clear, or limited, downward trend is mirrored in the monitoring data assembled for this study, as set out later in Paragraph 9.39.
- 9.31** The reason for the disparity between the expected concentrations and those measured relates to the on-road performance of modern diesel vehicles. New vehicles registered in the UK have had to meet progressively tighter European type approval emissions categories, referred to as "Euro" standards. While the nitrogen oxides emissions from newer vehicles should be lower than those from equivalent older vehicles, the on-road performance of some modern diesel vehicles has often been no better than that of earlier models. This has

¹⁵ AQC (2016) CURED V2A, [Online], Available: <http://www.aqconsultants.co.uk/getattachment/Resources/Download-Reports/CURED-V2A.zip.aspx>.

¹⁶ AQC (2016) Emissions of Nitrogen Oxides from Modern Diesel Vehicles, [Online], Available: <http://www.aqconsultants.co.uk/getattachment/Resources/Download-Reports/Emissions-of-Nitrogen-Oxides-from-Modern-Diesel-Vehicles-210116.pdf.aspx>.

¹⁷ Carslaw, D., Beevers, S., Westmoreland, E. and Williams, M. (2011) Trends in NO_x and NO₂ emissions and ambient measurements in the UK, [Online], Available: uk-air.defra.gov.uk/reports/cat05/1108251149_110718_AQ0724_Final_report.pdf.

¹⁸ Carslaw, D. and Rhys-Tyler, G. (2013) Remote sensing of NO₂ exhaust emissions from road vehicles, July, [Online], Available: http://uk-air.defra.gov.uk/assets/documents/reports/cat05/1307161149_130715_DefraRemoteSensingReport_Final.pdf.

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been compounded by an increasing proportion of nitrogen dioxide in the nitrogen oxides emissions, i.e. primary nitrogen dioxide, which has a significant effect on roadside concentrations^{17, 18}.

9.32 A detailed analysis of emissions from modern diesel vehicles has been carried out¹⁶. This shows that, where previous standards had limited on-road success, the 'Euro VI' and 'Euro 6' standards that new vehicles have had to comply with from 2013/16 are delivering real on-road improvements. A detailed comparison of the predictions in Defra's latest Emission Factor Toolkit (EFT) v7.0 against the results from on-road emissions tests has shown that Defra's latest predictions still have the potential to under-predict emissions from some vehicles, albeit by less than has historically been the case¹⁶. In order to account for this potential under-prediction, a sensitivity test has been carried out in which the emissions from Euro IV, Euro V, Euro VI, and Euro 6 vehicles have been uplifted as described in Appendix 9.6, using AQC's CURED (V2A) tool¹⁵. The results from this sensitivity test are likely to over-predict emissions from vehicles in the future¹⁶ and thus provide a reasonable worst-case upper-bound to the assessment.

Assumptions and Limitations

9.33 Where specific information was not available, assumptions have been made based on professional judgment:

- It has been assumed that most of the site will be subject to earthworks, which has led to the dust emissions magnitude associated with earthworks being considered as large; and
- At the time of assessment, there was no indication that a centralised energy plant or other plant would form part of the proposals. If a centralised energy plant was proposed, then further assessment would be required to determine the potential impacts and likely effects on air quality. This could be secured through planning condition.

Baseline Conditions

Industrial Sources

9.34 Bicester Sewage Treatment Works is located immediately to the south of the site. Such a facility is not anticipated to affect concentrations of NO₂, PM₁₀ and PM_{2.5} at the site. Odours could however be emitted by such a facility, and impact amenity at the site. Meteorological data from Benson meteorological station indicate that wind predominantly blows from the southwest. Under such conditions, the site is not located downwind from the plant. The Sewage Treatment Works are therefore unlikely to significantly impact the Proposed Development in terms of odour. A search of the UK Pollutant Release and Transfer Register¹⁹ and Environment Agency's 'what's in your backyard'²⁰ websites has also been undertaken, and has not identified any other significant industrial or waste management sources that are likely to affect the Proposed Development, in terms of air quality.

Air Quality Management Areas

9.35 CDC has investigated air quality within its area as part of its responsibilities under the LAQM regime. In January 2011 an AQMA was declared at three residential properties backing onto Hennef Way in Banbury, for exceedances of the annual mean and hourly mean nitrogen dioxide objectives. Two further AQMAs were declared in 2014 in Banbury town centre, and along a section of Bicester Road in Kidlington for exceedances of the annual mean nitrogen dioxide objective. In 2015, a fourth AQMA was declared in Bicester town centre

along Queens Avenue, also for exceedances of the annual mean nitrogen dioxide objective²¹. The closest AQMA is located 600m north of the site. This AQMA is shown in Figure 9.2.

9.36 In terms of PM₁₀, Cherwell District Council concluded that there are no exceedances of the objectives. It is, therefore, reasonable to assume that existing PM₁₀ levels will not exceed the objectives within the study area²².

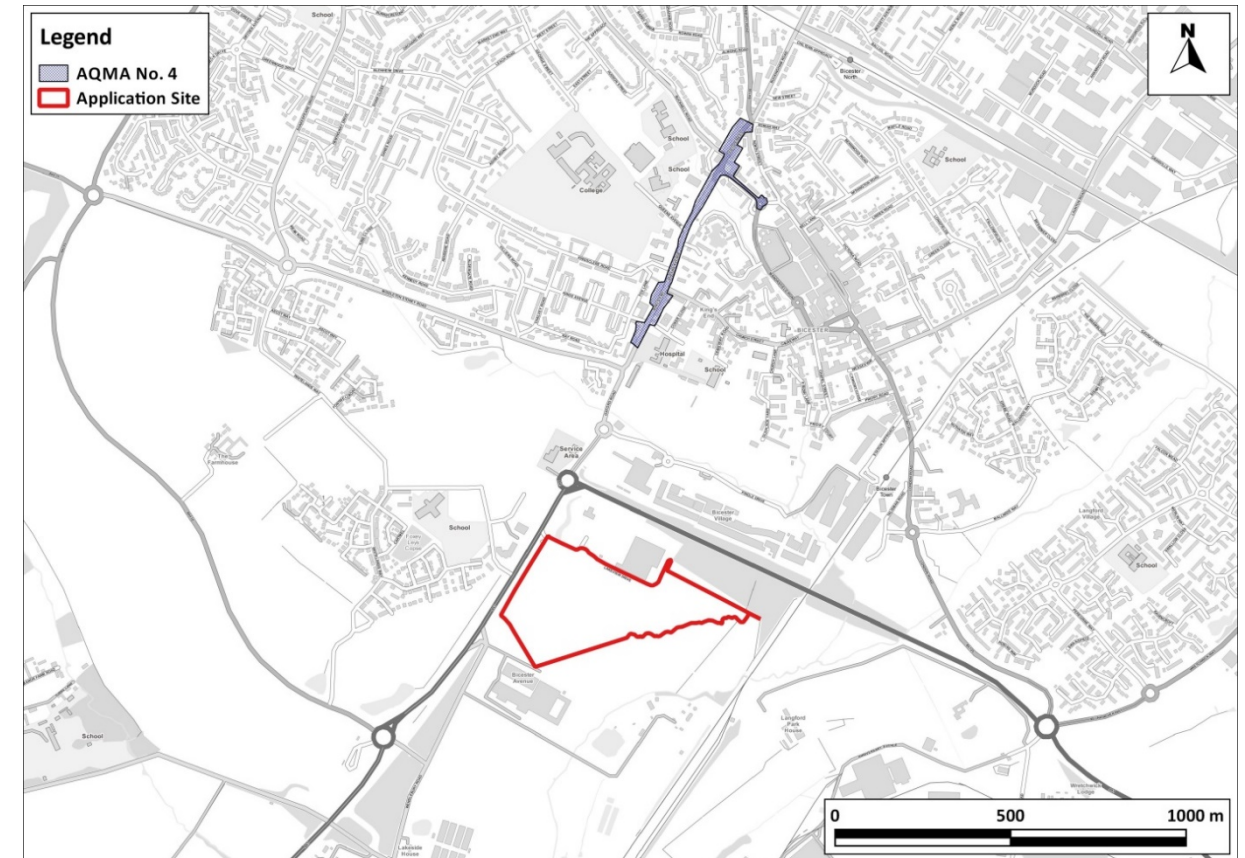


Figure 9.2 Declared AQMA

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Local Air Quality Monitoring

9.37 CDC does not operate any automatic monitoring station within its area. The Council, however, operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Environmental Scientifics Group (using the 50% TEA in acetone method). These include eleven deployed in the Bicester area. Results for the years 2011 to 2015 are summarised in 4 and the monitoring locations are shown in Figure 9.3 and Figure 9.4.

¹⁹ Defra (2017) UK Pollutant Release and Transfer Register, [Online], Available: prtr.defra.gov.uk.

²⁰ Environment Agency (2017) 'what's in your backyard', [Online], Available: <http://www.environment-agency.gov.uk/homeandleisure/37793.aspx>.

²¹ Cherwell District Council (2017) 2016 Air Quality Annual Status Report

²² Cherwell District Council (2015) 2015 Updating and Screening Assessment