

# AIR QUALITY

**Table 9.4 Summary of Nitrogen Dioxide (NO<sub>2</sub>) Diffusion Tube Monitoring (2011-2015)<sup>a</sup>**

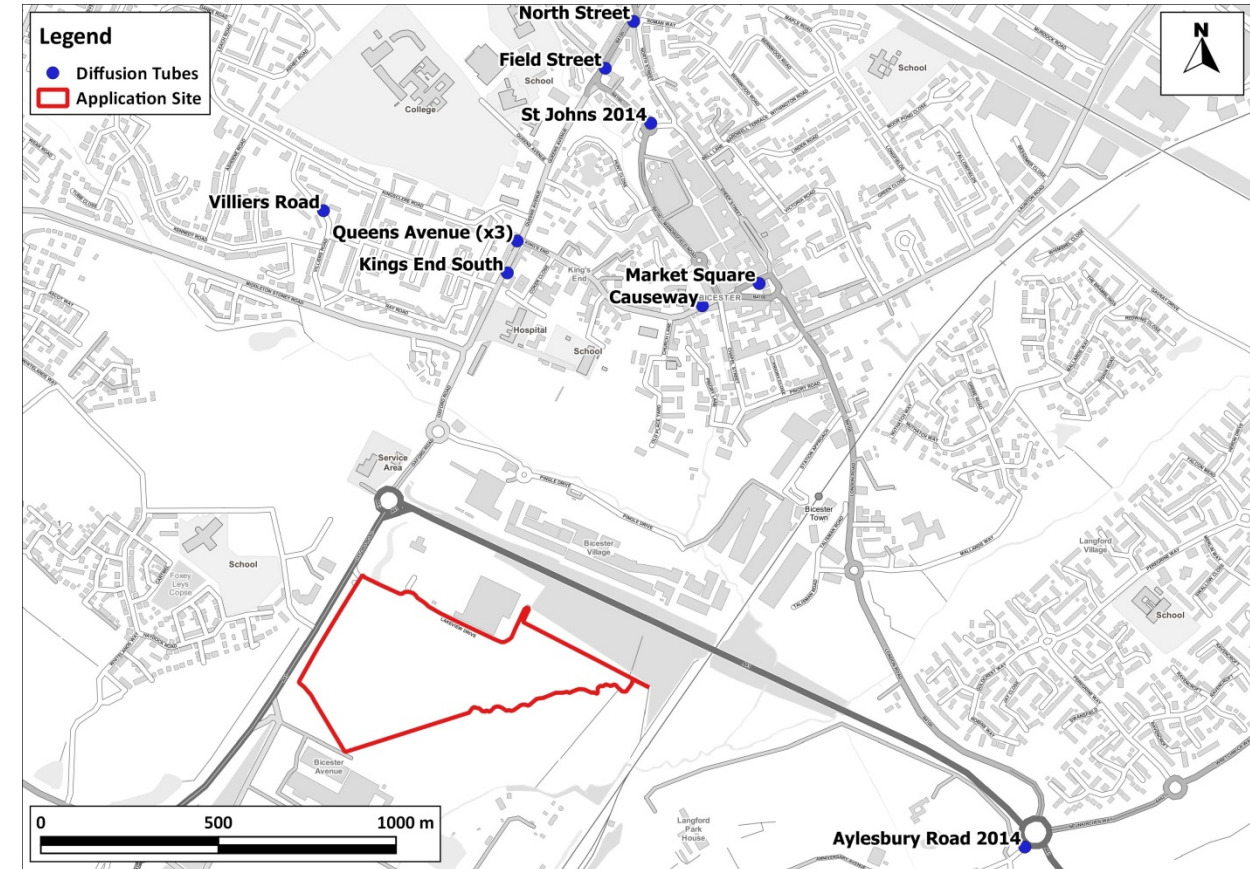
Site No.	Site Type	2011	2012	2013	2014	2015
Villiers Road	Urban Background	19.0	20.5	19.8	18.3	16.9
Causeway	Roadside	No data	No data	23.2	20.2	20.0
Kings End South	Roadside	<b>49.5</b>	<b>49.0</b>	<b>48.5</b>	<b>46.9</b>	<b>46.0</b>
St John 2014	Roadside	No data	No data	No data	36.3	38.3
Field Street	Kerbside	<b>42.9</b>	<b>41.6</b>	<b>40.3</b>	36.2	36.5
North Street	Kerbside	<b>46.1</b>	<b>45.6</b>	<b>44.7</b>	<b>41.9</b>	39.8
Queens Avenue (x3)	Kerbside	<b>42.9<sup>b</sup></b>	<b>45.0<sup>b</sup></b>	<b>41.0<sup>b</sup></b>	<b>40.3<sup>b</sup></b>	38.7 <sup>b</sup>
Market square 2014	Roadside	No data	No data	No data	23.5	23.7
Tamarisk Gardens	Urban Background	18.5	17.6	17.4	15.9	15.7
Howes lane 2014	Roadside	No data	No data	No data	23.4	23.9
Aylesbury Road 2014	Roadside	No data	No data	No data	32.7	30.5
<b>Objective</b>		<b>40</b>				

<sup>a</sup> Exceedances of the objectives are shown in bold.

<sup>b</sup> Average of triplicates diffusion tubes

**9.38** Data presented above indicates that annual mean concentrations of nitrogen dioxide are above or close to the objective along Kings End (within the declared AQMA), and below the objective along the A41 to the west of the Proposed Development site. This is consistent with conclusions made by CDC in their latest Annual Status report<sup>21</sup>. It appears that concentrations have been slightly decreasing over the past five years, indicating a limited downwards trend with regards to annual mean concentrations of nitrogen dioxide.

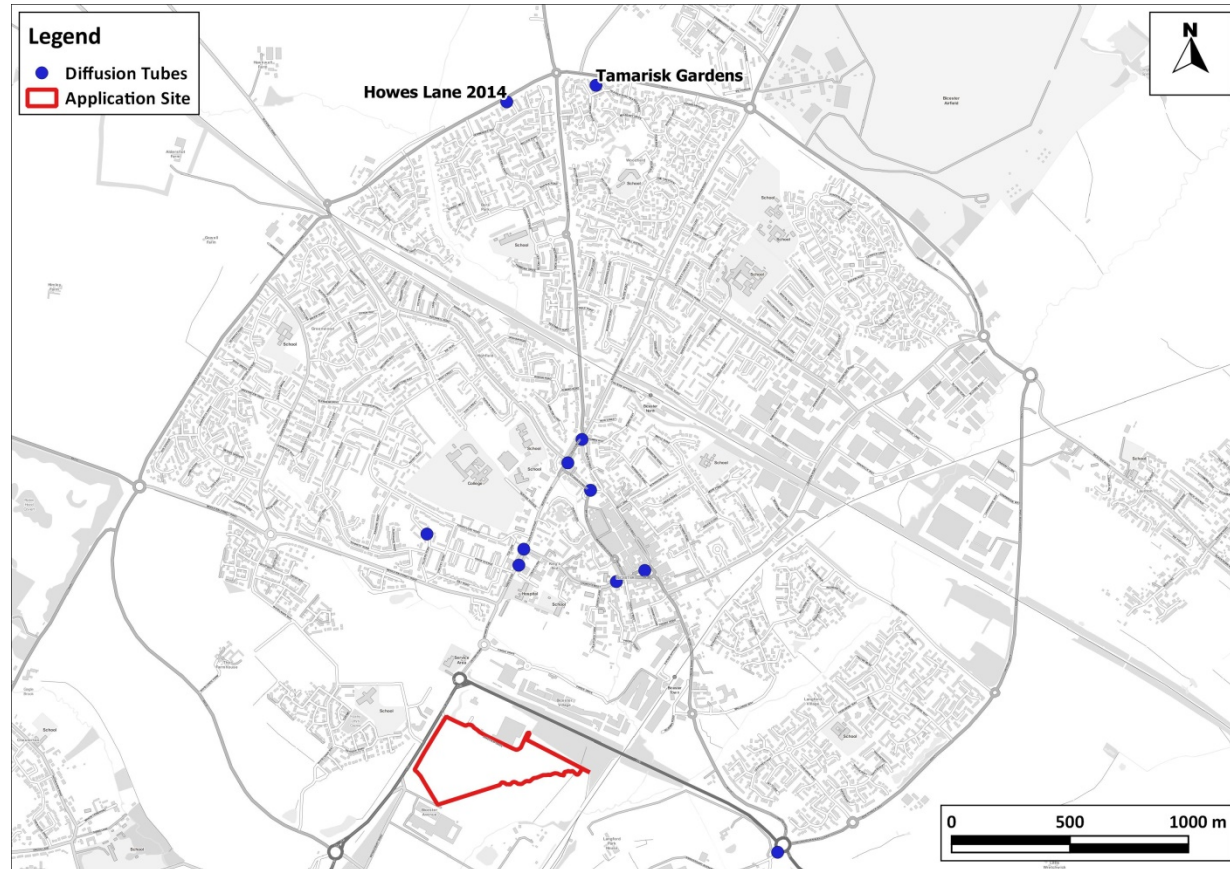
**9.39** No monitoring of PM<sub>10</sub> or PM<sub>2.5</sub> concentrations is undertaken in Cherwell District.



**Figure 9.3 Monitoring Locations – Near Site of Proposed Development**

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**Figure 9.4 Monitoring Locations – North Bicester**

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## Exceedances of EU Limit values

**9.40** There are no AURN monitoring sites within the study area with which to identify exceedances of the annual mean nitrogen dioxide limit value. The national maps of roadside annual mean nitrogen dioxide concentrations<sup>23</sup>, used to report exceedances of the limit value to the EU, do not identify any exceedances within the study area. Defra's mapping for 2025 which takes account of the measures contained in its 2015 Air Quality Plan<sup>24</sup>, also does not identify any exceedances within the study area. Defra is in the process of updating its air quality plan and associated modelling, but it has not yet published its revised maps.

## Background Concentrations

**9.41** In addition to these locally measured concentrations, estimated background concentrations in the study area have been determined for 2015 and the opening year 2026 using Defra's background maps<sup>25</sup>. The background

concentrations are set out in 5 and have been derived as described in Appendix 9.6. The background concentrations are all well below the objectives.

**Table 9.5 Estimated Annual Mean Background Pollutant Concentrations in 2015 and 2026 ( $\mu\text{g}/\text{m}^3$ )**

Year	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
2015	13.2 – 14.5	15.1 – 16.6	10.7 – 11.4
2026 <sup>a</sup>	8.8 – 9.9	14.1 – 15.6	9.9 – 10.6
2026 Worst-case Sensitivity Test <sup>b</sup>	9.8 – 11.1	N/A	N/A
Objectives	40	40	25 <sup>c</sup>

N/A = not applicable. The range of values is for the different 1x1 km grid squares covering the study area.

<sup>a</sup> In line with Defra's forecasts.

<sup>b</sup> Assuming higher emissions from modern diesel vehicles as described in Appendix A6.

<sup>c</sup> The PM<sub>2.5</sub> objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

## Baseline Dispersion Model Results

**9.42** Baseline concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> have been modelled at each of the existing receptor locations (see Figure 9.1 and Table 9.6 for receptor locations). The results, which cover both the existing (2015) and future year (2026) baseline (Without Proposed Development), are set out in Table 9.6 and Table 9.7. The predictions for nitrogen dioxide include a sensitivity test which accounts for the potential under-performance of emissions control technology on modern diesel vehicles. In addition, the modelled road components of nitrogen oxides, PM<sub>10</sub> and PM<sub>2.5</sub> have been increased from those predicted by the model based on a comparison with local measurements (see Appendix 9.6 for the verification methodology).

<sup>23</sup> Defra (2017) UK Ambient Air Quality Interactive Map, [Online], Available: <http://uk-air.defra.gov.uk/data/gis-mapping>.

<sup>24</sup> 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>.

<sup>25</sup> Defra (2017) Defra Air Quality Website, [Online], Available: <http://laqm.defra.gov.uk/>.

**Table 9.6 Modelled Annual Mean Baseline Concentrations of Nitrogen Dioxide ( $\mu\text{g}/\text{m}^3$ ) at Existing Receptors <sup>a</sup>**

Receptor	2015 <sup>b</sup>	2026 Without Proposed Development <sup>b</sup>	Worst-case Sensitivity Test <sup>c,d</sup>	
			2015	2026 Without Proposed Development
R1	36.2	21.9	36.3	30.6
R2	<b>41.7</b>	25.4	<b>41.7</b>	35.3
R3	<b>41.1</b>	25.1	<b>41.1</b>	34.9
R4	19.6	11.8	20.2	15.0
<b>Objective</b>	<b>40</b>			

<sup>a</sup> Exceedances of the objective are shown in bold.

<sup>b</sup> In line with Defra's forecasts.

<sup>c</sup> Assuming higher emissions from modern diesel vehicles as described in Appendix 9.6.

<sup>d</sup> The methodology for the sensitivity test uses different traffic emissions and required a separate verification (see Appendix 9.6), which leads to slightly different values.

**Table 9.7 Modelled Annual Mean Baseline Concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ ) at Existing Receptors**

Receptor	PM <sub>10</sub> <sup>a</sup>		PM <sub>2.5</sub>	
	2015	2026 Without Proposed Development	2015	2026 Without Proposed Development
R1	20.2	19.8	13.9	13.1
R2	20.7	20.2	14.3	13.4
R3	20.7	20.2	14.3	13.4
R4	17.7	16.9	12.1	11.3
<b>Objective/Criterion</b>	<b>32 <sup>a</sup></b>		<b>25 <sup>b</sup></b>	

<sup>a</sup> While the annual mean PM<sub>10</sub> objective is 40  $\mu\text{g}/\text{m}^3$ , 32  $\mu\text{g}/\text{m}^3$  is the annual mean concentration above which an exceedance of the 24-hour mean PM<sub>10</sub> objective is possible, as outlined in LAQM.TG16<sup>10</sup>. A value of 32  $\mu\text{g}/\text{m}^3$  is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM<sub>10</sub> objective, as recommended in EPUK & IAQM guidance<sup>13</sup>

<sup>b</sup> The PM<sub>2.5</sub> objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

### 2015 Baseline

**9.43** Predicted annual mean concentrations of nitrogen dioxide are below the objective at receptors R1 and R4 in 2015; at receptors R2 and R3, located on Kings End, exceedances of the objective are predicted.

**9.44** Annual mean concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> are well below the objectives in 2015 at all receptors. The annual mean PM<sub>10</sub> concentrations are below 32  $\mu\text{g}/\text{m}^3$  and it is, therefore, unlikely that the 24-hour mean PM<sub>10</sub> objective will be exceeded.

**9.45** These results are consistent with the conclusions of CDC in the outcome of its air quality review and assessment work.

### 2026 Baseline

**9.46** The predicted annual mean concentrations of nitrogen dioxide are well below the objective at all receptor locations. All of the predictions for PM<sub>10</sub> and PM<sub>2.5</sub> are also well below the objectives. The annual mean PM<sub>10</sub> concentrations are below 32  $\mu\text{g}/\text{m}^3$  and it is, therefore, unlikely that the 24-hour mean PM<sub>10</sub> objective will be exceeded.

### Worst-case Sensitivity Test for Nitrogen Dioxide

**9.47** The results from the sensitivity test show that for the 2015 scenario, annual mean concentrations of nitrogen dioxide are not materially different from those derived using the 'official' predictions.

**9.48** The worst-case sensitivity test shows that in 2026, annual mean nitrogen dioxide concentrations are predicted to be below the objective at all selected receptor locations, but are higher than shown for the "official reduction" in emissions.

## Assessment of Effects

### Construction

**9.49** The construction works will last between 8 and 9 years and give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see Appendix 9.3), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

### Potential Dust Emission Magnitude

#### Demolition

**9.50** There is no requirement for demolition on site, as it currently consists in greenfield land.

#### Earthworks

**9.51** The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website<sup>26</sup>, as set out in Table 9.8. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

<sup>26</sup> British Geological Survey (2017) UK Soil Observatory Map Viewer, [Online], Available: <http://mapapps2.bgs.ac.uk/ukso/home.html>.

**Table 9.8 Summary of Soil Characteristics**

Category	Record
Soil Layer Thickness	Deep
Soil Parent Material Grain Size	Argillic <sup>a</sup> – Arenaceous <sup>b</sup>
European Soil Bureau Description	Claystone / Mudstone
Soil Group	Medium to Light (Silty) to Heavy
Soil Texture	Clayey Loam to Silty Loam <sup>c</sup> / Clay to sandy loam

<sup>a</sup> grain size < 0.06 mm.

<sup>b</sup> grain size 0.06 – 2.0 mm.

<sup>c</sup> a loam is composed mostly of sand and silt

**9.52** The site covers approximately some 100,000m<sup>2</sup> and most of this will be subject to earthworks, involving digging of the basement levels, landscaping, and levelling the ground (where required). As the construction will be phased, it is anticipated that earthworks will be required throughout the construction period, hence over 8 to 9 years. Dust will arise mainly from vehicles travelling over unpaved ground in the first phases of the works, as it is likely roads will have not yet been tarmacked, and from the handling of dusty materials (such as dry soil) throughout the construction period. Based on the example definitions set out in Table 9.3.1 in Appendix 9.3, the dust emission class for earthworks is considered to be large.

#### Construction

**9.53** A total of 11 buildings will be constructed at the site, over six zones referred to as Zones A to F. All buildings will be three to four storeys high. Construction will start with Zones B and C, which will be completed in approximately 2 years. Zones A, D, E and F will follow alphabetically, with works lasting 12 to 18 months for each phase. A conservative worst-case approach has been adopted, which considers that construction works could occur simultaneously over several Zones. Zone A has a total building volume of 109,200m<sup>3</sup>, while it amounts to 123,840m<sup>3</sup> for each of Zones B and C, 248,624 m<sup>3</sup> for Zone D, 185,760 m<sup>3</sup> for Zone E and 261,200 m<sup>3</sup> for Zone F. Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials, and from the cutting of concrete. Based on the example definitions set out in Table 9.3.1 in Appendix 9.3, the dust emission class for each phase of the construction works is considered to be large. May works overlap, the dust emission class would remain large (as this represents the highest dust emission class).

#### Trackout

**9.54** There will be a maximum of 60 deliveries to the site per day over Phase 1 of the construction works. Vehicles accessing the site may track out dust and dirt onto the local road network. All vehicles will access the site via Lakeview Drive and then through two roundabouts providing access to the different zones of Proposed Development. Based on the example definitions set out in Table 9.3.1 in Appendix 9.3 the dust emission class for trackout is considered to be large.

**9.55** Table 9.9 summarises the dust emission magnitude for the proposed development.

**Table 9.9 Summary of Dust Emission Magnitude**

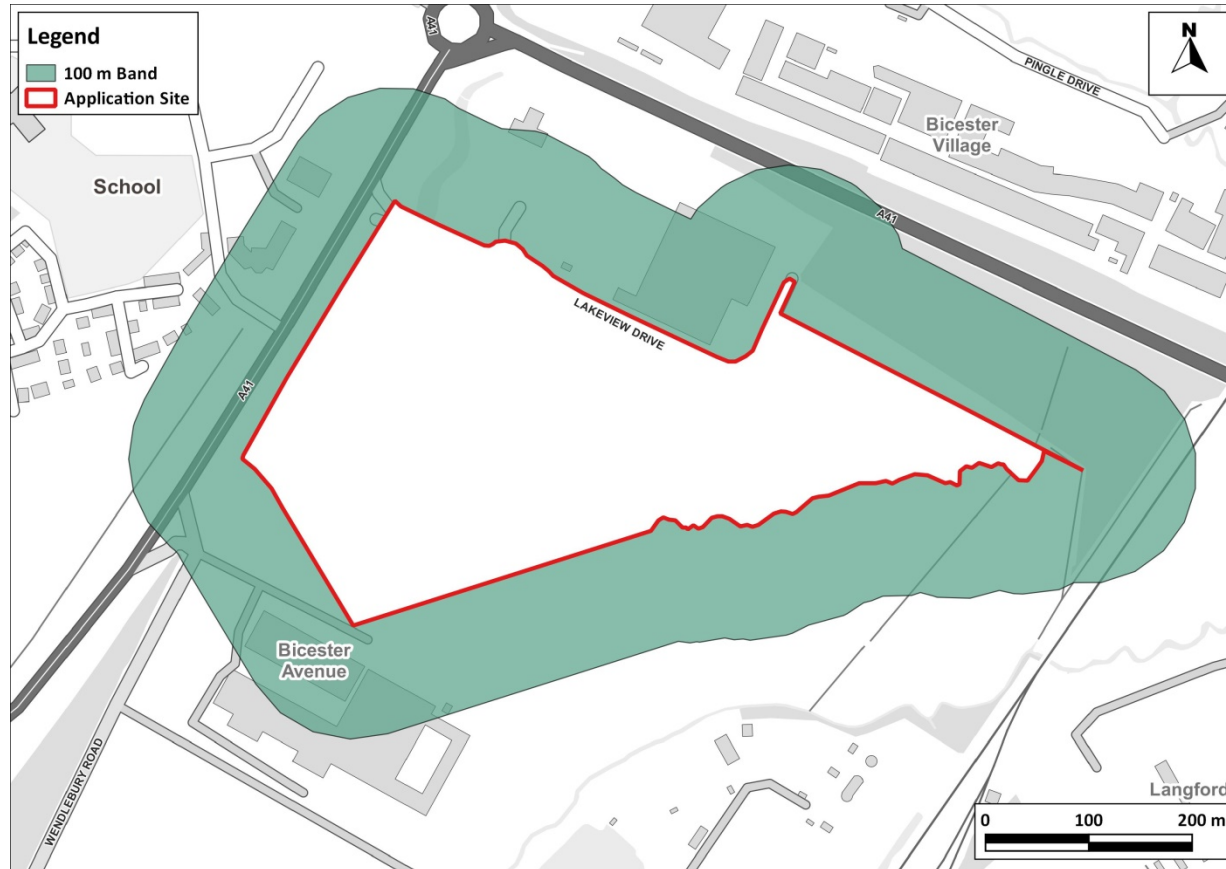
Source	Dust Emission Magnitude
Demolition	N/A
Earthworks	Large
Construction	Large
Trackout	Large

#### Sensitivity of the Area

**9.56** This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM<sub>10</sub> concentrations.

#### Sensitivity of the Area to Effects from Dust Soiling

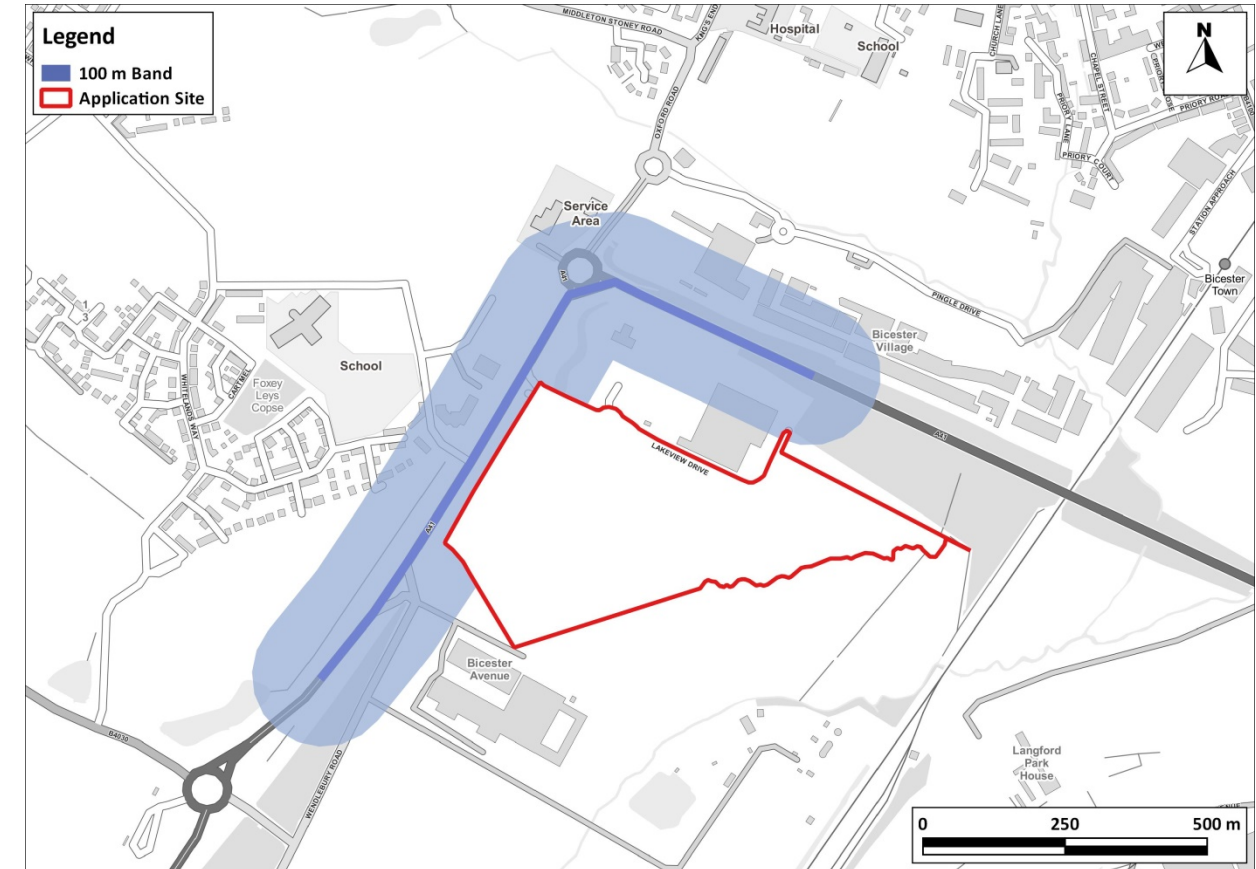
**9.57** The IAQM guidance explains that residential properties and garden centres are 'high' sensitivity receptors to dust soiling, while the Hotel (Premier Inn) located opposite the A41 is a 'medium' sensitivity receptor (Table 9.3.2 in Appendix 9.3). There are approximately five residential properties within 100m of the site, while the Hotel and Bicester Avenue Garden Centre are also within 100m from the site (see Figure 9.5). Using the matrix set out in Table 9.3.3 in Appendix 9.3, the area surrounding the onsite works is of 'low' sensitivity to dust soiling.



**Figure 9.5 100 m Distance Band around Site Boundary**

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- 9.58** Table 9.9 shows that the dust emission magnitude for trackout is large and Table 9.3.3 in Appendix 9.3 thus explains that there is a risk of material being tracked 500 m from the site exit. Construction vehicles will access the site from the A41, either from the south or west of the site. There are approximately ten residential properties within 100m of the roads along which material could be tracked (see Figure 9.6), and Table 9.3.3 in Appendix 9.3 thus indicates that the area is of 'low' sensitivity to dust soiling due to trackout.



**Figure 9.6 50 m Distance Bands around Roads Used by Construction Traffic Within 500 m of the Site Exit**

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### *Sensitivity of the Area to any Human Health Effects*

- 9.59** Residential properties are also classified as being of 'high' sensitivity to human health effects, while places of work are classified as being of 'medium' sensitivity. The matrix in Table 9.3.4 in Appendix 9.3 requires information on the baseline annual mean PM<sub>10</sub> concentration in the area. It is considered that the modelled baseline PM<sub>10</sub> concentration at Receptor R4 in Table 9.7 (17.7 µg/m<sup>3</sup>) will best represent conditions near to the site. Using the matrix in Table 9.3.4 in Appendix 9.3, the area surrounding the onsite works and the area surrounding roads along which material may be tracked from the site are of 'low' sensitivity to human health effects.

### *Summary of Area Sensitivity*

- 9.60** Table 9.10 summarises the sensitivity of the area around the proposed construction works.

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**Table 9.10 Summary of the Area Sensitivity**

Effects Associated With:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	Low	Low
Human Health	Low	Low

### Risk and Significance

**9.61** The dust emission magnitudes in Table 9.9 have been combined with the sensitivities of the area in Table 9.10 using the matrix in Table 9.3.7 in Appendix 9.3, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 9.11. These risk categories have been used to determine the appropriate level of mitigation as set out in Paragraphs 9.74 to 9.76 (step 3 of the assessment procedure).

**Table 9.11 Summary of Risk of Impacts Without Mitigation**

Source	Dust Soiling	Human health
Demolition	N/A	N/A
Earthworks	Low Risk	Low Risk
Construction	Low Risk	Low Risk
Trackout	Low Risk	Low Risk

**9.62** The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant'<sup>12</sup>.

### Completed Development

#### Impacts of Development-Generated Road Traffic Emissions

**9.63** Predicted annual mean concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> in 2026 for existing receptors are set out in Table 9.12, Table 9.13 and Table 9.14 for both the "Without Proposed Development" and "With Proposed Development" scenarios. These tables also describe the impacts at each receptor using the impact descriptors given in Appendix 9.4. For nitrogen dioxide, results are presented for two scenarios so as to include a worst-case sensitivity test.

**Table 9.12 Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations in 2026 (µg/m<sup>3</sup>)**

Receptor	Without Proposed Development	With Proposed Development	% Change <sup>a,b</sup>	Impact Descriptor	Worst-case Sensitivity Test <sup>d</sup>			
					Without Proposed Development	With Proposed Development	% Change <sup>b</sup>	Impact Descriptor
R1	21.9	23.4	4	Negligible	30.6	32.8	6	Moderate Adverse
R2	25.4	27.2	4	Negligible	35.3	37.9	6	Moderate Adverse
R3	25.1	26.9	4	Negligible	34.9	37.4	6	Moderate Adverse
R4	11.8	12.0	1	Negligible	15.0	15.4	1	Negligible
<b>Objective</b>	<b>40</b>	-	-	-	<b>40</b>	-	-	-

<sup>a</sup> In line with Defra's forecasts.

<sup>b</sup> % changes are relative to the objective and have been rounded to the nearest whole number.

<sup>c</sup> Assuming higher emissions from modern diesel vehicles as described in Appendix 9.6.

**Table 9.13 Predicted Impacts on Annual Mean PM<sub>10</sub> Concentrations in 2026 (µg/m<sup>3</sup>)**

Receptor	Annual Mean PM <sub>10</sub> (µg/m <sup>3</sup> )			Impact Descriptor
	Without Proposed Development	With Proposed Development	% Change <sup>a</sup>	
R1	19.8	20.5	2	Negligible
R2	20.2	21.0	2	Negligible
R3	20.2	20.9	2	Negligible
R4	16.9	17.0	0	Negligible
<b>Criterion</b>	<b>32<sup>b</sup></b>	-	-	-

<sup>a</sup> % changes are relative to the criterion and have been rounded to the nearest whole number.

<sup>b</sup> While the annual mean PM<sub>10</sub> objective is 40 µg/m<sup>3</sup>, 32 µg/m<sup>3</sup> is the annual mean concentration above which an exceedance of the 24-hour mean PM<sub>10</sub> objective is possible, as outlined in LAQM.TG16<sup>10</sup>. A value of 32 µg/m<sup>3</sup> is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM<sub>10</sub> objective, as recommended in EPUK & IAQM guidance<sup>13</sup>.

**Table 9.14 Predicted Impacts on Annual Mean PM<sub>2.5</sub> Concentrations in 2026 (µg/m<sup>3</sup>)**

Receptor	Annual Mean PM <sub>2.5</sub> (µg/m <sup>3</sup> )			
	Without Proposed Development	With Proposed Development	% Change <sup>a</sup>	Impact Descriptor
R1	13.1	13.5	1	Negligible
R2	13.4	13.8	2	Negligible
R3	13.4	13.8	2	Negligible
R4	11.3	11.4	0	Negligible
<b>Criterion</b>	<b>25 <sup>b</sup></b>		-	-

<sup>a</sup> % changes are relative to the criterion and have been rounded to the nearest whole number.

<sup>b</sup> The PM<sub>2.5</sub> objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

### Nitrogen Dioxide

- 9.64 The annual mean nitrogen dioxide concentrations are well below the objective at all receptors.
- 9.65 The percentage changes in concentrations, relative to the air quality objective (when rounded), are predicted to be 4% at receptors R1 to R3, and 1% at receptor R4. Using the matrix in Table 9.4.1 (Appendix 9.4), these impacts are described as negligible.
- 9.66 The annual mean nitrogen dioxide concentrations are below 60 µg/m<sup>3</sup> at all of the receptor locations. It is, therefore, unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded.
- 9.67 The results from the worst-case sensitivity test show that annual mean concentrations of nitrogen dioxide are predicted to be below the objective at all receptors. The percentage changes in concentrations are higher than for the official predictions, with values ranging between 1 and 6 % of the objective. The impacts of such changes are described as negligible to moderate adverse.

### PM<sub>10</sub> and PM<sub>2.5</sub>

- 9.68 The annual mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are well below the annual mean objectives at all receptors, with or without the Proposed Development. Furthermore, as the annual mean PM<sub>10</sub> concentrations are below 32 µg/m<sup>3</sup>, it is unlikely that the 24-hour mean PM<sub>10</sub> objective will be exceeded at any of the receptors.
- 9.69 The percentage changes in both PM<sub>10</sub> and PM<sub>2.5</sub> concentrations, relative to the air quality objective (when rounded), are predicted to range between zero and 2%. Using the matrix in Table 9.4.1 (Appendix 9.4), these impacts are described as negligible.

### Significance of Operational Air Quality Effects

- 9.70 Professional judgment applied to determine the significance of operational air quality effects has been made in accordance with the methodology set out in Appendix 9.4, and also takes into account the results of the worst-case sensitivity test for nitrogen dioxide (undertaken using AQC's CURED tool<sup>15</sup>). This sensitivity test considers the potential under-performance of emissions control technology on modern diesel vehicles, and provides an upper-bound estimate for the assessment. Defra is currently updating its own national modelling using the COPERT 5.0 emissions model. Current evidence<sup>27</sup> shows that, for an assessment year of 2026, concentrations

predicted using CURED will be much higher than those that would be predicted using COPERT 5.0. In this instance, future year concentrations are therefore expected to lie between the two sets of results presented in this chapter, as are the predicted impacts at selected receptor locations.

- 9.71 Concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> are predicted to be below the objectives at all selected receptors. Impacts attributable to the increase in traffic associated with the operation of the Proposed Development are anticipated to be moderate adverse, but only based on the worst-case sensitivity test, which, as explained above, is likely to be overly conservative for the assessment year 2026. Taking this into account, as well as the criteria defined in Paragraph 9.18, operational air quality effects without mitigation are judged to be 'not significant'.

## Mitigation and Monitoring

### Mitigation Included by Design

- 9.72 The EPUK/IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required. The Proposed Development incorporates the following good design and best practice measures:

- adoption of a Dust Management Plan (DMP) or Construction Environmental Management Plan (CEMP) to minimise the environmental impacts of the construction works; and
- provision of a detailed travel plan setting out measures to encourage sustainable means of transport (public, cycling and walking).

### Recommended Mitigation

#### Construction

- 9.73 Measures to mitigate dust emissions will be required during the construction phase of the development in order to minimise effects upon nearby sensitive receptors.
- 9.74 The site has been identified as Low Risk during earthworks, construction and for trackout, as set out in Table 9.11. Comprehensive guidance has been published by IAQM<sup>12</sup> that describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on monitoring during demolition and construction<sup>28</sup>. This reflects best practice experience and has been used, together with the professional experience of the consultant who has undertaken the dust impact assessment and the findings of the assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix 9.7.
- 9.75 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

#### Completed Development

- 9.76 The assessment has demonstrated that the Proposed Development will not cause any exceedances of the air quality objectives and that the overall effect of the Proposed Development will be 'not significant'. It is, therefore, not considered appropriate to propose further mitigation measures for this Proposed Development.

<sup>27</sup> [http://www.aqconsultants.co.uk/AQC/media/Reports/Relationship-between-CURED-V2A-and-COPERT-V5\\_0-July-2017.pdf](http://www.aqconsultants.co.uk/AQC/media/Reports/Relationship-between-CURED-V2A-and-COPERT-V5_0-July-2017.pdf)

<sup>28</sup> IAQM (2012) Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites, [Online], Available: [www.iaqm.co.uk/guidance.html](http://www.iaqm.co.uk/guidance.html).

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9.77 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law).

## Residual Effects

Table 9.15 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
<b>Construction</b>			
Dust Soiling	Low risk of impacts Local Impacts Medium term (8 years)	Negligible Local Impacts Medium term (8 years)	<b>Not significant</b>
Dust Impacts on Human Health	Low risk of impacts Local Impacts Medium term (8 to 9 years)	Negligible Local Impacts Medium term (8 to 9 years)	<b>Not significant</b>
<b>Completed Development</b>			
Road traffic impacts on air quality at existing receptors	Negligible to Minor Adverse Local Impacts Permanent	Negligible to Minor Adverse Local Impacts Permanent	<b>Not significant</b>

## Cumulative Effects Assessment

### Construction Phase

- 9.78 A total of nine developments have been identified as cumulative schemes. Relevant guidance considers that dust impacts from a construction site can arise up to 350m from the site boundary or construction area. Over that distance, a construction site is not considered capable of significantly affecting sensitive receptors in terms of dust deposition or concentrations of PM<sub>10</sub>. As such, only a scheme located within 700m of the site would be capable of impacting receptors affected by works carried out at the Proposed Development site.
- 9.79 Of the eight sites identified, three schemes are within 700m of the Proposed Development site: 'Bicester Village Phase 4', 'Bicester Gateway Retail' and 'Graven Hill'. Sensitive receptors located within 350m of these schemes and the Proposed Development could therefore experience cumulative construction dust impacts, may the works occur simultaneously. Of the receptors located within 350m of the site, those located along Haydock Road and Saxon Fields could be affected by cumulative construction dust impacts associated with the 'Bicester Gateway Retail' scheme. One residential property is located between the Proposed Development and Graven Hill, and could be affected by the two schemes in terms of construction dust. There are no sensitive receptors located within 350m of 'Bicester Village Phase 4' and the Proposed Development, and there is thus no potential for cumulative construction dust impacts to occur with these two schemes.
- 9.80 Properties located along Haydock Road and Saxon Fields are approximately within 300m of 'Bicester Gateway Retail' and within 110m of Proposed Development, while the residential property located between the site of Proposed Development and Graven Hill development site is situated more than 250m from both future construction areas. At such distances, and considering that good practice will be applied on all schemes, cumulative dust impacts, if arising, would be considered negligible, which is considered 'not significant'.

### Operational Phase

- 9.81 The traffic data used in the 2026 without Proposed Development scenario incorporates traffic flows associated with all cumulative schemes which would affect the roads included in this assessment. As such, future predictions presented in this chapter take account of cumulative impacts.
- 9.82 Operational impacts, including cumulative schemes, have been shown to be 'not significant'.

### Conclusions

- 9.83 The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emissions. With these measures in place, it is expected that any residual effects will be 'not significant'.
- 9.84 The operational impacts of increased traffic emissions arising from the additional traffic on local roads, due to the Proposed Development, have been assessed. Concentrations have been modelled for four worst-case receptors, representing existing properties where impacts are expected to be greatest. In the case of nitrogen dioxide, a sensitivity test has also been carried out which considers the potential under-performance of emissions control technology on modern diesel vehicles.
- 9.85 It is concluded that concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> will remain below the objectives at all existing receptors in 2026, whether the Proposed Development is developed or not. This conclusion is consistent with the outcomes of the reviews and assessments prepared by CDC, which show that exceedances of the PM<sub>10</sub> objective are unlikely at any location.
- 9.86 In the case of nitrogen dioxide, the annual mean concentrations remain below the objective at all existing receptors in 2026, whether the Proposed Development is developed or not and taking account of the worst-case sensitivity test.
- 9.87 The additional traffic generated by the Proposed Development will affect air quality at existing properties along the local road network. The assessment has demonstrated that the increases in concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> at relevant locations, relative to the objectives, will be 2% at most (when rounded) and the impacts will all be negligible. In the case of nitrogen dioxide, the percentage increases are predicted to range from 1% to 4% for the official predictions, and from 1% to 6% for the worst-case sensitivity test. Future concentrations and predicted impacts are expected to lie between the two sets of results, and effects at receptor locations have been judged as 'not significant'.
- 9.88 The overall operational air quality effects of the development are considered 'not significant'. This conclusion, which takes account of the uncertainties in future projections, in particular for nitrogen dioxide, is based on the concentrations being below the objective for nitrogen dioxide.



# BURIED HERITAGE (ARCHAEOLOGY) & BUILT HERITAGE

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## Introduction

- 10.1** This chapter of the Environmental Statement (ES) reports the findings of an assessment of the likely significant effects on buried heritage and built heritage as a result of the construction phase and during the operation of the Proposed Development.
- 10.2** This chapter sets out the relevant planning policy context; the methods used to assess potential effects; the baseline conditions and potential effects on buried and built heritage 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.
- 10.3** 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).
- 10.4** This chapter is supported by the following appendices provided in ES Volume II: Appendix 10.1 to 10.5:
- Appendix 10.1: Site Gazetteer;
  - Appendix 10.2 Setting Assessment Methodology;
  - Appendix 10.3 Legislative and Planning Policy Context;
  - Appendix 10.4: Site Walkover;
  - Appendix 10.5: Plates and Figures; and
  - Appendix 10.6: Written Scheme of Investigation

## Legislative and Planning Policy Context

- 10.5** Full details of the following are provided in Appendix 10.3:
- Planning policy National Planning Policy Framework (NPPF), Chapter 12;
  - Planning Policy: Local Planning Policy: Cherwell Local Plan, Policy ESD 15; and
  - National Guidance; Paragraph 13.

## Assessment Methodology

- 10.6** The primary source of information relating to the presence and significance of known non-designated historic/archaeological remains in the area has been the Oxfordshire Historic Environment Record (who hold the HER for the Cherwell District Council (CDC)). An extract was received from the HER in May 2017. Up to date information on Scheduled Monuments, Listed Buildings and Registered Parks and Gardens was obtained from Historic England (HE) in May 2017, together with GIS data recording their locations and extent. Information on boundaries of Conservation Areas was obtained from CDC; one conservation area falls within the northern part of the study area; Bicester Conservation Area.
- 10.7** All heritage assets, whether designated or not, within a distance of up to 1km from the boundary of the site have been identified within the EIA and these are recorded in Appendix 10.1. The locations of all assets are illustrated on Figure 10.1.

**10.8** 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. .

**10.9** A formal scoping response from Oxfordshire County Council's Planning Archaeologist was included in the Scoping Opinion. The scoping response considered archaeological and built heritage requirements for this chapter of the EIA. The opinion requested the assessment be in line with the Chartered Institute for Archaeology standards and guidance and stated a requirement to submit a written scheme of investigation (WSI) to ensure that the scope of assessment was agreed. The WSI was submitted to the Planning Archaeologist on 15 August 2017. The opinion also stated that there would likely be a requirement for a programme of archaeological investigation to be undertaken ahead of determination of any planning application for the site. This was discussed with the Planning Archaeologist on 15 August 2017 and confirmation requested that further investigations at the site would be as a condition of planning. A decision is awaited.

## Assessment of Significance / Assessment Criteria

**10.10** This sub-section sets out the methodology for assessing direct effects upon heritage assets. The methodology for assessing indirect effects upon heritage assets is contained within Appendix 10.2. It takes account of the NPPF, its practice guide and Historic England's Good Practice Advice Note 3: the setting of heritage assets<sup>1</sup>, and *Standards for Field Archaeology in the East of England*<sup>2</sup> as set out above.

## The Assessor

- 10.11** AOC Archaeology Group conforms to the standards of professional conduct outlined in the Chartered Institute for Archaeologists' Code of Conduct<sup>3</sup>, the ClfA Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology<sup>4</sup>, the ClfA Standards and Guidance for Historic Environment Desk Based Assessments and Field Evaluations<sup>5</sup>.
- 10.12** AOC Archaeology Group is a Registered Archaeological Organisation of the Chartered Institute for Archaeologists. This status ensures that there is regular monitoring and approval by external peers of internal systems, standards and skills development.

## Assessing Cultural Value (Significance) & Importance

**10.13** The definition of cultural significance is readily accepted by heritage professionals both in the UK and internationally and was first fully outlined in the Burra Charter, Article One of which identifies that 'cultural significance' or 'cultural heritage value' means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. This definition has since been adopted by heritage organisations around the world, including HE. The NPPF defines cultural significance as:

*"The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting."*

**10.14** The term 'cultural value' will be used throughout this assessment as opposed to 'cultural significance', in order to avoid confusion with the concept of a 'significant effect' in EIA terms.

**10.15** All heritage assets have some value, however some assets are judged to be more important than others. The level of that importance is, from a cultural resource management perspective, determined by establishing the asset's capacity to inform present or future generations about the past. In the case of many heritage assets

<sup>1</sup> Historic England (2015) The Setting of Heritage Asset - Historic Environment Good Practice Advice in Planning:3

<sup>2</sup> David Gurney, 2003. 'Standards for Field Archaeology in the East of England', *East Anglian Archaeology Occasional Papers 14*

<sup>3</sup> Chartered Institute for Archaeologists (2014) Code of Conduct

<sup>4</sup> Chartered Institute for Archaeologists (2008) Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology

<sup>5</sup> Chartered Institute for Archaeologists (2014/2017) Standards and Guidance for Historic Environment Desk Based Assessments and Field Evaluations

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their importance has already been established through the designation (i.e. scheduling, listing and register) processes applied by HE.

**10.16** The criteria used to establish importance in this assessment are presented in Table 10.1 below and are drawn from the Department of Media, Culture and Sports publication, Principles for Selection of Listed Buildings<sup>6</sup>, and the Scheduled Monuments Policy Statements published by the same body<sup>7</sup>, which outline the criteria for designating heritage assets.

**Table 10.1 Criteria for Establishing Importance**

Importance	Criteria
International and National	<ul style="list-style-type: none"> <li>World Heritage Sites;</li> <li>Scheduled Monuments (Actual and Potential);</li> <li>Grade I and II* Listed Buildings;</li> <li>Grade I and II* Registered Parks and Gardens;</li> <li>Registered Battlefields;</li> <li>Fine, little-altered examples of some particular period, style or type.</li> </ul>
Regional	<ul style="list-style-type: none"> <li>Grade II Listed Building;</li> <li>Grade II Registered Parks and Gardens;</li> <li>Conservation Areas;</li> <li>Major examples of some period, style or type, which may have been altered;</li> <li>Asset types which would normally be considered of national importance that have been partially damaged (such that cultural heritage value has been reduced).</li> </ul>
Local	<ul style="list-style-type: none"> <li>Locally Listed Heritage Assets;</li> <li>Lesser examples of any period, style or type, as originally constructed or altered, and simple, traditional sites, which group well with other significant remains, or are part of a planned group such as an estate or an industrial complex;</li> <li>Asset types which would normally be considered of regional importance that have been partially damaged or asset types which would normally be considered of national importance that have been largely damaged (such that their cultural heritage value has been reduced).</li> </ul>
Negligible	<ul style="list-style-type: none"> <li>Relatively numerous types of remains;</li> <li>Findspots or artefacts that have no definite archaeological remains known in their context;</li> <li>Asset types which would normally be considered of local importance that have been largely damaged (such that their cultural heritage value has been reduced);</li> </ul>

### Methodology for assessing direct physical effects

**10.17** A direct effect by a development can potentially result in an irreversible loss of information content and therefore cultural heritage value. The potential magnitude of change upon heritage assets caused by the Proposed Development has been rated using the classifications and criteria outlined in Table 10.2 below.

**Table 10.2 Criteria for establishing magnitude of physical change**

Physical effect	Criteria
High	<ul style="list-style-type: none"> <li>Major loss of information content resulting from total or large-scale removal of deposits from a site;</li> <li>Major alteration of a monument's baseline condition.</li> </ul>
Medium	<ul style="list-style-type: none"> <li>Moderate loss of information content resulting from partial removal of deposits from a site;</li> <li>Moderate alteration of a monument's baseline condition.</li> </ul>
Low	<ul style="list-style-type: none"> <li>Minor detectable changes leading to the loss of information content;</li> <li>Minor alterations to the baseline condition of a monument.</li> </ul>
Marginal	<ul style="list-style-type: none"> <li>Very slight or barely measurable loss of information content;</li> <li>Loss of a small percentage of the area of a site's peripheral deposits;</li> <li>Very slight alterations to a monument.</li> </ul>
None	<ul style="list-style-type: none"> <li>No physical change anticipated.</li> </ul>

**10.18** The predicted level of direct effect upon each asset was determined by considering its importance in conjunction with the magnitude of change predicted for it. The method of deriving the level of effect classifications is shown in Table 10.3 below:

**Table 10.3 Method of rating level of direct effects on heritage assets by the Proposed Development**

Magnitude of Change	Importance of Asset			
	Negligible	Local	Regional	National/International
High	Minor	Moderate	Moderate-Major	Major
Medium	Negligible-Minor	Minor-Moderate	Moderate	Moderate-Major
Low	Negligible	Minor	Minor-Moderate	Moderate
Marginal	Negligible	Negligible	Minor	Minor-Moderate
None	None	None	None	None

The level of effects recorded in dark grey highlighted cells are considered to have the potential to be 'significant'  
 Note: Unless specifically noted that level of effects are beneficial, it is presumed all levels of effect are **Adverse**.

### Harm

**10.19** The NPPF, where designated heritage assets are concerned, requires an assessment to be made as to the level of harm which could be caused to designated heritage assets by development. It requires a judgement to be made as to whether that harm is 'substantial' or 'less than substantial'. Where no effect is predicted or where effects are predicted to be neutral, e.g. where a proposed development may be perceptible but will not materially affect the setting of an asset or diminish its cultural value, it may be found that there will be no harm to a heritage asset. The level of harm predicted, or lack thereof, establishes whether the planning test should be applied and where harm is found the level of that harm establishes the correct policy test. Extant guidance on harm relevant to this assessment is set out Appendix 10.3.

<sup>6</sup> DMCS (2010). Principles for Selection of Listed Buildings.

<sup>7</sup> DMCS (2013). Scheduled Monuments Policy Statements.

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**10.20** There would be no direct effects upon designated heritage assets as a result of the Proposed Development. As such, any discussion of harm in this assessment will relate to indirect effects on the setting of designated heritage assets.

**10.21** The NPPG notes that the '*substantial*' harm is a '*high test*' and that as such it is unlikely to result in many cases. As noted in Appendix 10.2 what matters in establishing whether harm is '*substantial*' or not, relates to whether a change would seriously adversely affect those attributes or elements of a designated asset that contribute to, or give it, its value.

**10.22** In terms of effects upon the setting of designated heritage assets, it is considered that only those effects identified as 'significant' in this assessment have the potential to be of '*substantial*' harm. Where no significant effect is found, the harm is considered to be '*less than substantial*'. This is because, as noted in Appendix 10.2, effects only reach the significance threshold if their relative sensitivity to changes in setting is at the higher end of scale, or if the magnitude of change is at the higher end of the scale.

**10.23** For many designated assets, setting may not contribute to their value or the contribution to value may be limited. For these assets, even High magnitude changes to setting are unlikely to have adverse effects on the value of the designated asset. As set out in Appendix 10.2, Table 2 lower ratings of magnitude of change tend to relate to notable or perceptible changes to setting but where these changes do not necessarily obscure or damage elements of setting or relationships which directly contribute to the value of assets. As such, effects that are not significant will result in '*less than substantial*' harm. Where there are no effects or the effects are neutral, there will be no harm.

**10.24** Where significant effects are found, a detailed assessment of the level of harm will be made. Whilst non-significant effects will cause '*less than substantial*' harm, the reverse is not always true. That is, the assessment of an effect as being '*significant*' does not necessarily mean that the harm to the asset is '*substantial*'. The assessment of level of harm in this chapter, where required, will be a qualitative one, and will largely depend upon whether the effects predicted would result in a major impediment to the ability to understand or appreciate the heritage asset in question by reducing or removing its information content and therefore reducing its cultural value.

## Limitations

**10.25** This assessment is based upon data obtained from publicly accessible archives as described in paragraph 10.27 below, and a walkover survey. Data was received from Oxfordshire County Council HER and downloaded from the HE website in May 2017. The assessment does not contain records added after this date.

**10.26** The setting assessment was conducted in May 2017 – the strategy for assessing heritage assets on private property involved establishing a view point from the closest public footpath or road. It should be noted that the site walkover and the setting assessment site visits were undertaken in late spring with maximum tree coverage.

## Baseline Conditions

**10.27** The following data sources were consulted during preparation of this assessment:

- Oxfordshire Historic Environment Record (who also curate the HER for CDC);
- Oxfordshire County Council Archaeological Officer (who advises CDC);
- Oxfordshire Records Offices;
- Oxford Local Studies Library;
- Oxfordshire Historic Landscape Characterisation Project (online)
- LiDAR Data via the Environment Agency
- Historic England;

- Historic England Designated Data set (downloadable from <https://services.historicengland.org.uk/NMRDataDownload/default.aspx>)
- The Historic England Archive (formerly the National Monuments Record) (Historic England, Fire Fly Avenue, Swindon);
- The National Heritage List For England; and
- National Map Library (National Library of Scotland, Causewayside, Edinburgh).

**10.28** This assessment is based upon data obtained from publicly accessible archives as described above, and from visits to designated heritage assets undertaken during May 2017. All site visits to designated heritage assets were undertaken in clear weather and a photographic record was maintained.

## Site Context

**10.29** Data for designated heritage assets was downloaded from HE in May 2017, and designated heritage assets within 1km of the site, have been identified (Figure 10.1 and Appendix 10.1). No designated assets are located within the site.

**10.30** One Scheduled Monument is located within 1km of the site; Alchester Roman site (site 195).

**10.31** One hundred and twelve Listed Buildings stand within 1km of the site. These are all Grade II Listed, with the exception of: Church of St Edburg, Church Street (site 44), 0.83km to the north-west, which is Grade I Listed, and The Old Priory and Attached Garden Walls, Priory (site 112), 0.83km to the north-east, and The Old Vicarage, Church Street (site 113), 0.78km to the north-east which are both Grade II\* Listed. The Listed Building which lies in closest proximity to the site at c.0.4km to the east is the Grade II Listed Langford Park Farmhouse, A41 (site 116). The remaining Grade II Listed Buildings are all concentrated to the north of the site within Bicester town centre.

**10.32** The site itself does not fall within a Conservation Area. The Bicester Conservation Areas falls within 1km of the site; 0.6km to the north.

**10.33** Data regarding heritage assets was obtained from the Oxfordshire HER in May 2017. This identified 83 heritage assets within 1km of the site (Figure 10.2 and Appendix 10.1). The data extract included area records, highlighting portions of land where archaeological remains have been identified, point records, locating more discrete features such as find spots and linear records highlighting features such as prehistoric trackways. Taken together these entries record sites and artefacts dating from the Neolithic to the 20<sup>th</sup> century.

**10.34** The HER data includes three records relating to archaeological sites, finds discoveries or events within the site itself. A Mesolithic flint scatter with later prehistoric and Roman features (site 180) was recorded within the north of the site during an evaluation for Bicester Business Park (site 220). A watching brief for a power line replacement took place on the site, but no archaeological remains were recorded (sites 235 & 247).

**10.35** The HER data includes five records relating to archaeological sites, finds or discoveries adjacent or close to the site boundary. These include the site of a post-medieval floated water meadow (site 15) to the south-east of the site, and a Neolithic Axe head (site 61) recovered in connection with the Thames Water Authority, directly to the east. Adjacent to the site, across the A41 to the west, late Iron Age settlement was found during an evaluation (site 185). The same evaluation also recorded Romano-British quarries (site 187) and Bronze Age Round Barrows (site 601) which were also seen on aerial photography and identified through geophysical survey.

**10.36** No World Heritage Sites, Registered Parks and Gardens or Registered Historic Battlefield's fall within 1km of the site.

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### Prehistoric and Roman (pre AD410)

- 10.37** Oxfordshire lies close to the limits of Palaeolithic occupation and, as a result of the climatic fluctuations which characterised the Pleistocene, hominid presence in the county must have been intermittent. It is also characterised by marked differences in the availability of lithic resources. This variation is to some extent reflected in the distribution of artefacts and must have exerted some influence on hominid behaviour. Although the Palaeolithic evidence from the county is not exceptionally rich, these circumstances give it a particular interest<sup>8</sup>. No evidence for early human occupation is recorded within the 1km study area.
- 10.38** The Mesolithic evidence from Oxfordshire is not rich. Of the Mesolithic sites recorded in the HER data 66% are classified as findspots, a further 19% as artefacts scatters (including artefacts scatters of mixed date) and 14% as finds from sites predominantly related to activity of other periods<sup>9</sup>.
- 10.39** The HER records two heritage assets of Mesolithic date within 1km of the site. One record falls within the site boundary: a Mesolithic flint scatter (site 180) recorded during trial trenching evaluation of the site. The other record is also a Mesolithic flint assemblage contained within tree throw holes situated to the north-east of the site (site 191).
- 10.40** In contrast to the Mesolithic, the evidence for the Neolithic in Oxfordshire is rich, and has benefited from a long history of research. The HER records four heritage assets of Neolithic date within 1km of the site, including a small assemblage of artefacts dating to the Neolithic recovered during an excavation of middle Iron Age to Roman Settlement (site 6) and a Neolithic axehead found c. 270m west of the site (site 61). The evaluation (site 180) which took place within the site itself recorded features such as postholes and ditches which date to prehistory; possibly even as early as the Neolithic. A fragment of a Neolithic polished flint axe was the earliest find recorded during an evaluation to the south-east of the site (site 192).
- 10.41** Many of the evaluations and excavations carried out in the vicinity of the site have recorded multi-period settlement including evidence from the Bronze Age. The Bronze Age provides a useful bias towards standing monuments and in Oxfordshire such monuments consist largely of barrows and cairns. Evidence of Bronze Age monuments was recorded at the multi-period site investigated to the west of the site (site 181) which revealed evidence of possible Bronze Age round barrows (site 601) and finds of collared urn pottery sherds. Other HER records from this period include a Bronze Age ditch enclosure which was recorded to the north-east of the site (site 191) and a burial recorded during extensive investigations to the south of the site during the Wendlebury-Bicester A421 Dualling works (site 230).
- 10.42** The majority of Iron Age evidence within 1km of the site goes hand in hand with Roman activity recorded. Iron Age pottery was found within a ditch which was potentially the same date at St Edburga's Priory (site 42) which was significant as; in general, the period is poorly represented apart from in an early Roman transitional period. An extensive arrangement of shallow curvilinear ditches and larger linear ditches dating from the late Iron Age (site 193) were recorded at the Bicester MOD site to the south and east of the site; again, this was a multi-period site.
- 10.43** There has been a settlement at or near Bicester since Roman times. In the middle of the first century AD the Romans established and fortified the town of Alchester at the intersection of Akeman Street (Cirencester to St Albans) and a road from Towcester to Dorchester, a location approximately 1.5 kilometres south of the present town<sup>10</sup> and directly south of the site. The Roman Town of Alchester is a Scheduled Monument (site 195).

Multiple investigations in and around the Alchester site have produced evidence of the Roman settlement as well as earlier activity in the area (For further details see Appendix 10.1, Figure 10.2).

- 10.44** To the west of the site, multiple investigations revealed an Iron Age to Roman farmstead (site 57, 69, 181, 185-188) and to the east of the site, further Roman activity was recorded (site 192) where earlier activity had been also found. To the north of the site, prior to the development of Bicester Village, investigations revealed remains of a low status rural Romano-British settlement (site 58) which showed evidence of possible water management. Finally, a ditch (site 176) dating to the Roman period was recorded to the north-east of the site within Bicester Town Centre.

### Early Medieval and Medieval (AD410 – AD 1485)

- 10.45** The early medieval period is one of important social, political, economic, cultural and ethnic change. Archaeological evidence, traditionally given second place in terms of authority to documentary evidence, is being given increasing precedence in efforts to resolve the difficulties of interpreting the early medieval period<sup>11</sup>. The modern settlement of Bicester evolved with the Anglo-Saxon farmers who settled on the Cornbrash, a flaggy type of limestone, either side of a ford over the River Bure and close to the existing Saxon Minster of St Edburga's. The first group of farms were established in the vicinity of what became the Manor of King's End (site 35) followed by a later settlement on the east side of the Bure which became the Manor of Market End<sup>12</sup>.
- 10.46** The HER records multiple heritage assets within 1km of the site dating to this period; many of which are within and associated with the historic core of Bicester. Assets of note include an evaluation behind the Kings Arms Hotel (site 8) which revealed possible Saxon structures including Grubenhau and a series of ditches and gullies. An Anglo-Saxon ditch orientated north to south was found underlying possible horticultural deposits of medieval date during an evaluation on Chapel Street (site 16). Possible fishponds of medieval date (site 30) were likely built for Bicester Priory on marshy ground to the north-east of the site and further evidence of this period was revealed at the Minster and Priory (site 31) itself when excavation recorded features of late Saxon to post-medieval date. Prior to construction of a housing development, medieval remains (site 38-40) in the form of building foundations, a Holloway, causeway, quarries and ridge and furrow were recorded. A medieval inhumation was recorded during the extension of Bicester Library and was thought to be associated with St Edburga's Priory (site 41).

### Post-Medieval and Modern (AD1485 – Present)

- 10.47** Bicester is a market town formed from the coalescence of three, originally separate, settlements - King's End, Market End and Crockwell - the social standing and architectural character of each of these settlements being noticeably different, reflecting their separate social histories. The form of the town settlement is very much dictated by the presence of the River Bure and from examination of historic maps can be seen to have changed little throughout post-medieval to modern period; particularly at the site which has remained open field to present day. This is demonstrated in the King's End and Market End pre-enclosure map of 1752 (Figure 10.3). It is only in the later decades of the 20<sup>th</sup> century that the town under-went rapid expansion with the construction of successive waves of housing estates in-filling and around the periphery of the historic core. The Oxfordshire Historic Land Characterisation shows the proposed development site to lie within an area of *'unenclosed land reorganised through boundary gain in the 19<sup>th</sup> century'* (HOX3701). The change from unenclosed land in 1751 to enclosed land in the 19<sup>th</sup> century is document by Figure 10.3 and 10.4.
- 10.48** The HER records various heritage assets within 1km of the site dating to this period, many of which are Listed Buildings recorded in the historic core of Bicester; details of which can be found in Appendix 10.1. One heritage

<sup>8</sup> Mullin D, Booth, P, Hardly, A & Scott, I, Hayden, C, Hind, J & Spandl, K 2011 The Oxfordshire Aggregates and Archaeology Assessment (EH Proj. no. 5784)

<sup>9</sup> Mullin D, Booth, P, Hardly, A & Scott, I, Hayden, C, Hind, J & Spandl, K 2011 The Oxfordshire Aggregates and Archaeology Assessment (EH Proj. no. 5784)

<sup>10</sup> Cherwell District Council North Oxfordshire 2011 Bicester Conservation Area Appraisal

<sup>11</sup> Mullin D, Booth, P, Hardly, A & Scott, I, Hayden, C, Hind, J & Spandl, K 2011 The Oxfordshire Aggregates and Archaeology Assessment (EH Proj. no. 5784)

<sup>12</sup> Cherwell District Council North Oxfordshire 2011 Bicester Conservation Area Appraisal

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asset dating to this period lies beyond the historic core of Bicester. This comprises a floated water meadow constructed in 1835 (site 15), located c. 350m to the south-east of the site.

**10.49** Ordnance Survey (OS) mapping indicates little, if any, change between the enclosure map of 1752 and 20<sup>th</sup> century maps. A small structure is noted within the north-west corner of the Site on the OS map of 1900 (Figure 10.4); however it no longer exists on the site and is not depicted on the OS map of 1951 (Figure 10.5).

## Aerial Photographic Evidence

**10.50** Aerial Photographic evidence ranging from 1948 to the present day was assessed through a visit to the Historic England Archive at Swindon in May 2017. Both vertical and oblique sources were consulted. In general, the aerial photographs depicting the site demonstrate that, with the exception of the construction of the A41 to the north and west of the site, the area remained fairly unchanged, being characterised by enclosed agricultural land, during this period.

**10.51** The following features and changes to the Proposed Development site were noted:

- A large shadow anomaly spreads over the western area of the site which continues north. This is visible on multiple Aerial Photographs and it is likely geological in nature;
- Rig and furrow can be seen in the eastern portion of the site in the earlier aerial photos. A field boundary running east to west divides the northern portion of the site (no longer present within the site);
- A circular cropmark anomaly on the northern boundary of the site, to the east of a building (which is no longer present on the site). Visible on various Aerial Photographs. The cropmark may no longer be present due to the building of the road along the northern periphery of the site;
- Two thin linear cropmarks running E-W and a thinner one to the north are visible in the eastern portion of the site (RAF/540/1400: 141 & 142). A rectangular anomaly is visible on the northern boundary of the site (different to the above circular anomaly but in the same area). These anomalies, along with the circular anomaly above, likely relate to agriculture; perhaps field boundaries and enclosures; and
- Later aerial photos show the building on the northern perimeter to be removed. Rig and furrow lines can still be seen below new crop patterns in the eastern portion of the site.

**Table 10.4 Aerial Photographs consulted**

Sortie	Library No.	Frame No.	Centre Point	Date
RAF/106G/UK/620	1	3154	SP 577 219	10-Aug-45
RAF/106G/UK/620	1	3155	SP 580 216	10-Aug-45
RAF/106G/UK/620	1	3156	SP 583 213	10-Aug-45
RAF/CPE/UK/1897	562	3312	SP 585 224	12-Dec-46
RAF/CPE/UK/1897	562	3313	SP 579 224	12-Dec-46
RAF/CPE/UK/1897	562	3314	SP 573 223	12-Dec-46
RAF/540/1400	1563	141	SP 576 215	01-Sep-54
RAF/540/1400	1563	142	SP 582 216	01-Sep-54
RAF/543/673	2114	12	SP 571 211	24-Aug-59
RAF/543/673	2114	13	SP 580 215	24-Aug-59
RAF/543/673	2114	14	SP 588 219	24-Aug-59
RAF/542/1	2577	4	SP 569 212	04-Aug-54
RAF/541/340	2661	4119	SP 585 217	26-Jul-49
RAF/541/340	2661	4120	SP 577 217	26-Jul-49

Sortie	Library No.	Frame No.	Centre Point	Date
RAF/541/340	2661	4121	SP 571 217	26-Jul-49
US/7PH/GP/LOC267	6914	5028	SP 583 215	10-Apr-44
US/7PH/GP/LOC267	6914	5029	SP 578 205	10-Apr-44
OS/70023	10537	32	SP 575 219	23-Mar-70
OS/66042	11626	72	SP 577 217	29-Apr-66
OS/66042	11626	73	SP 583 217	29-Apr-66
OS/75312	12174	87	SP 576 210	05-Jul-75
OS/75312	12174	88	SP 584 210	05-Jul-75
OS/75392	12197	190	SP 578 210	21-Sep-75
OS/75392	12197	191	SP 586 210	21-Sep-75
OS/84243	12669	1019	SP 574 206	26-Nov-84
OS/84243	12669	1020	SP 574 215	26-Nov-84
OS/89440	13628	5	SP 586 214	23-Sep-89
OS/91258	13884	23	SP 577 216	19-Sep-91
OS/91258	13884	24	SP 583 216	19-Sep-91
OS/93002	14193	22	SP 572 214	19-Feb-93
OS/93002	14193	23	SP 576 218	19-Feb-93
OS/93002	14193	24	SP 580 222	19-Feb-93
OS/94214	14692	21	SP 578 210	28-Jun-94
OS/94214	14692	22	SP 578 215	28-Jun-94
OS/94214	14692	23	SP 579 220	28-Jun-94
OS/96633	15201	88	SP 579 214	15-Jun-96
OS/96633	15201	89	SP 574 214	15-Jun-96
RAF/540/673	15636	4443	SP 571 212	12-Feb-52
RAF/540/673	15636	4444	SP 570 218	12-Feb-52

## LiDAR Data

**10.52** LiDAR Data was consulted through the Environment Agency Website in August 2017. Composite Digital Surface Models (DSM) – 1m, dating to 2011, showed no obvious suggestion of below ground archaeological features.

**10.53** Historic England was also contacted to obtain information on the Alchester cropmark transcripts following advice from the Planning Archaeologist. This information was received on 27 September 2017 and studied on Geographical Information System software. Extensive cropmarks are mapped within the Scheduled area of Alchester Roman Town (Site 195) and extend beyond into neighbouring fields; however no cropmarks extend into the Proposed Development site; the nearest plotted cropmark being located c.300m to the south of the southern point of the site.

## BURIED HERITAGE (ARCHAEOLOGY) & BUILT HERITAGE

### Archaeological and Cultural Heritage Importance

**10.54** The Cultural Heritage Importance of the heritage assets recorded within the site has been classified according to the method shown in Table 10.1 and the results are shown in Table 10.5.

**Table 10.5 Importance of Heritage Assets**

Site no.	Site Name	Status	Description	Cultural Heritage Importance
180	Mesolithic Flint scatter with Later Prehistoric and Roman features	Non-designated	Evaluation recorded well preserved in situ Mesolithic worked flint and cores. Also found were evidence of later prehistoric and Roman settlement and agricultural land management, as well as Post Medieval features.	Local
285	Ridge and Furrow	Non-designated	Ridge and furrow identified from Aerial Photographic source (RAF/CPE/UK/1897) in eastern part of field. These are visible in both a north-south and east-west orientation	Negligible
286	Circular cropmark from aerial photography	Non-designated	Circular anomaly cropmark identified from Aerial Photographic source (RAF/CPE/UK/1897-3113), east of a house (which is no longer present-May 2017) on a field boundary.	Negligible
287	Field boundaries (extant and buried)	Non-designated	In addition to the extant boundaries within the site, two thin linear features running E-W and a thinner one to the north are visible in the eastern	Negligible

Site no.	Site Name	Status	Description	Cultural Heritage Importance
			portion of the site (RAF/540/1400: 141 & 142). A rectangular anomaly is visible on a northern field boundary which is no longer present. These likely relate to agriculture; perhaps field boundaries and enclosures.	

**10.55** The Mesolithic flint scatter and late prehistoric and Roman features (site 180) were recorded during evaluation of the site in 2007. Excavations prior to the Tesco Superstore directly to the north of the site uncovered similar archaeological evidence. The heritage asset groups well with the other significant remains recorded in the vicinity and therefore is judged to be of Local Importance.

**10.56** Three heritage assets were recorded through studying of aerial photography. Evidence of the ridge and furrow in the east of the site (site 285) is not visible as an extant monument and was not confirmed during the site walkover. Examples of well-preserved ridge and furrow have been recognised by Historic England as significant<sup>13</sup>. However, the ridge and furrow within the site is not well preserved and is therefore considered of Negligible Importance.

**10.57** The site is predominately contained within the existing field systems however the development requires total loss of the internal sub-surface field boundaries and of the extant field boundaries. There is no evidence on the surface of the cropmarks recorded through aerial photography, or of the field boundaries previously in existence on the site. The circular cropmark and field boundary may have previously been investigated and removed during the construction of the Tesco Superstore. As the field boundaries are not shown on the pre-enclosure map of 1752, it is likely they came into existence in the 19<sup>th</sup> century. Therefore the boundaries are considered to be of Negligible importance.

### Assessment of Effects

#### Construction Phase

**10.58** Effects on heritage assets deriving from the construction phase of the Proposed Development are predominantly related to direct effects on heritage assets due to the fact that there is a possibility of disturbing, removing or destroying *in situ* remain and artefacts during groundbreaking works. The potential for indirect effects on the settings of heritage assets is discussed within the Operation of the Proposed Development section below.

#### Direct Effects: Known Remains

**10.59** Potential effects on known or unknown buried archaeological remains which may survive relate to the possibility of disturbing, removing or destroying *in situ* remains and artefacts during groundbreaking works (including excavation, construction and other works associated with the Proposed Development) within the site boundary.

<sup>13</sup> Gloucestershire County Council for Historic England (2012) NHPP 2D1: Agriculture and Forestry Impacts Project No. 6468 Turning the Plough Update Assessment 2012

## BURIED HERITAGE (ARCHAEOLOGY) & BUILT HERITAGE

**10.60** Four cultural heritage assets are located within the site boundary. An assessment of potential direct effects on heritage assets is summarised below. Table 10.6 outlines the predicted level of effect that the Proposed Development could have upon the remains of Negligible or greater Cultural Heritage Importance located within the site boundary. Its conclusions have been formulated using the criteria laid out in Tables 10.1 to 10.3.

**Table 10.6 Direct Effects on Heritage Assets**

site no.	Site Name	Cultural Heritage Importance	Magnitude of Direct Change from Proposed Development	Level of Effect
180	Mesolithic Flint scatter with Later Prehistoric and Roman features	Local	High	Moderate Adverse
285	Ridge and Furrow	Negligible	High	Minor Adverse
286	Circular cropmark from aerial photography	Negligible	High	Minor Adverse
287	Field boundaries (extant and buried)	Negligible	High	Minor Adverse

**10.61** The Proposed Development requires reduction of the existing ground level within the majority of the site to accommodate the construction of the new Business Park. This will require complete removal of areas of sub-surface archaeological remains recorded previously as a Mesolithic flint scatter and prehistoric and Roman features (site 180). The magnitude of direct change from the construction of the Proposed Development is therefore considered High. Taking into consideration the Local importance of this asset, these changes would result in a *moderate* impact, which is considered significant.

**10.62** The requirements of the construction of the Proposed Development will also result in the complete removal of areas of ridge and furrow (site 285) and field boundaries and cropmark anomalies (sites 286 & 287). The magnitude of direct change from the Proposed Development is therefore considered High. Taking into consideration the negligible importance of these assets, these changes would result in a minor impact, which is not significant.

### **Direct Effects: Unknown Remains**

**10.63** The assessment has established that the site is likely to form part of the agricultural hinterland of Bicester from the 16th century through the post-medieval period. Significant unrecorded finds or features from these periods are considered unlikely. However, the site lies in close proximity to a number of earlier medieval sites, including the historic town of Bicester itself and it is located on a historic route in and out of Bicester, in place since Roman times (Alchester to Towcester Road - site 3).

**10.64** The site lies in close proximity to the Roman town of Alchester (a Scheduled Monument) and multiple heritage assets dating from early prehistory to the Roman period are recorded within the vicinity of the site. Within the site, evidence has been recorded through evaluation of archaeological features dating from early prehistory through to the Roman period. It is likely these remains will extend somewhat beyond the trenching area and therefore the potential for further prehistoric and Roman finds or features is considered high.

**10.65** Thus, deep groundworks across the site associated with the Proposed Development, including in particular construction of deep foundations, piling and deep services have the potential to encounter and impact upon such remains. This could result in a High magnitude of direct change from the Proposed Development, resulting in a moderate adverse level of effect on unknown remains.

### **Operation of the Proposed Development**

#### **Introduction**

**10.66** Effects on heritage assets resulting from the presence of the Proposed Development once each phase of construction has finished are likely to be limited to indirect effects on the settings of heritage assets. No direct effects are predicted during the Operation of the Proposed Development. Therefore, this assessment is limited to indirect effects on the settings of heritage assets.

**10.67** There are other, non-visual factors which could potentially result in setting effects of heritage assets. Such factors could be other sensory factors, e.g. noise or smell, or could be associative (See Methodology for assessing indirect effects upon setting – Appendix 10.2). As the Proposed Development would be located adjacent to the existing A41 corridor, it is considered that it would not give rise to any significant adverse effects on settings with regards to odour and noise. It should be noted that the Noise and Air Quality Assessments set out in Chapters 8 and 9 have not identified any significant effects. Thus, this assessment focuses on visual changes to the settings of heritage assets.

**10.68** A screening exercise has been undertaken, using GIS analysis, desk-based survey of the assets, site visits/area visits and Google Maps, which has resulted in the scoping out all of the heritage assets from detailed consideration in this assessment and explained below.

**10.69** As a result of the above screening exercise, it was concluded that all of the Listed Buildings within the 1km study area would have no clear visibility with the Proposed Development due to topography and built structures, mainly within the town of Bicester, and vegetation. Whilst glimpses of the Proposed Development cannot be discounted for all of these assets, the Proposed Development would be seen at a distance and beyond other urban built features. As such effects are likely to be non-material in that they would not result in a change to the setting of the asset such that there would be a reduction in the cultural value of the asset.

**10.70** One Scheduled Monument is located within 1km of the site. Alchester Roman site (site 195) is located 0.9km to the south of the site. The scheduling covers a large area located within private grounds. No inter-visibility with the site was possible from the closest publicly available position due to topography, built structures and vegetation (Plate 7). It should be noted that the site visit took place in late May whilst vegetation was at its peak. Glimpses of the Proposed Development may be visible during winter months, however these are still likely to be very limited and any effects are likely to be non-material in that they would not result in a change to the setting of the asset such that there would be a reduction in the cultural value of the asset. As such, the level of effect on setting of this designated asset is considered Minor and has not been taken forward for detailed assessment.

#### **Harm**

**10.71** No effects have been found, or are expected, on the setting of designated heritage assets from the Proposed Development. Therefore, there will be no harm to designated heritage assets.

## BURIED HERITAGE (ARCHAEOLOGY) & BUILT HERITAGE

### Mitigation

- 10.72** The NPPF<sup>14</sup> and associated guidance, as well as local planning policies (all outlined in Appendix 10.3) require a mitigation response that is designed to eliminate, reduce or compensate for the effects of the Proposed Development on the heritage assets within the site.
- 10.73** Before mitigation there is potential for a *moderate impact*, which is considered significant, upon identified Mesolithic, prehistoric and Roman finds and features found within the site (site 180). The assessment has also identified potential for previously unrecorded finds and deposits or prehistoric (including paleoenvironmental) to medieval periods to survive within the site. As such, a programme of strip, map and record will take place. This will be focused on areas of known archaeology highlighted within the evaluation. An archaeological watching brief will also take place on topsoil stripping in areas not included in the strip, map and record. This will allow the identification, assessment and recording of any further surviving remains in advance of construction of the Proposed Development.
- 10.74** Before mitigation a minor impact, the effect of which is not considered significant is predicted, upon the ridge and furrow (site 285) in the east of the site, the circular cropmark (site 286) on the northern boundary of the site and the extant and buried field boundaries (site 287) across the site. This effect is not considered significant. The quality / preservation of the ridge and furrow and field boundaries on site is not considered to be of sufficient importance to warrant recording through topographical survey. The existing aerial photographs described within this assessment provide a permanent record of these features.
- 10.75** 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.
- 10.76** This assessment found that no significant effect upon the setting of heritage assets is predicted. Consequently, no mitigation is considered necessary.

### Residual Effects and Conclusions

- 10.77** The Proposed Development has the potential to cause a direct effect with a *moderate impact*, the effect of which is considered significant, upon identified prehistoric and Roman archaeological remains (site 180). It has a potential to cause minor impact, which is considered not significant, upon ridge and furrow (site 285) cropmarks (site 286) and extant and buried field boundaries within the site (site 287).
- 10.78** The assessment has identified the potential for previously unrecorded finds and deposits of prehistoric (including paleoenvironmental) to medieval periods to survive within the site. Taken into consideration the known archaeological remains within the site, 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.
- 10.79** 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. Following the implementation of the outlined mitigation residual effects upon the assets within the site would be **negligible** and not significant.

Table 10.7 Residual effects on Heritage Assets post-mitigation

site no.	Site Name	Cultural Heritage Importance	Mitigation	Magnitude of Direct Change from Proposed Development post-mitigation	Residual Effect
180	Mesolithic Flint scatter with Later Prehistoric and Roman features	Local	Strip, map and record / watching brief	Marginal	Negligible
285	Ridge and Furrow	Negligible	Strip, map and record / watching brief	Marginal	Negligible
286	Circular cropmark from aerial photography	Negligible	Strip, map and record / watching brief	Marginal	Negligible
287	Field boundaries (extant and buried)	Negligible	Strip, map and record / watching brief	Marginal	Negligible

- 10.80** This assessment has not identified any indirect effects on the settings of designated / undesignated heritage assets; therefore, no harm is expected to designated heritage assets.

### Cumulative Effects

- 10.81** The Proposed Development is situated between the current developments of Bicester Village Outlet Centre and Bicester Avenue Garden Centre. There will be no direct cumulative effects upon heritage assets resulting from the developments. The potential for cumulative effects upon the setting of heritage assets has been considered. However, due to the distance to any assets and intervening landscaping such as hedgerows, there is extremely limited visibility of the developments together when viewed from the assessed assets. As such it is judged that the current developments, taken cumulatively with the Proposed Development, will not give rise to any significant cumulative effects upon the setting of heritage assets.

<sup>14</sup> DCLG: Department for Communities and Local Government (2012). National Planning Policy Framework.



## Introduction

- 11.1 This chapter of the ES reports the findings of an assessment of the likely significant effects on ecology as a result of the Proposed Development.
- 11.2 This chapter sets out the relevant planning policy context; the methods used to assess potential effects; the baseline conditions and potential effects on ecology 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.
- 11.3 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).
- 11.4 This chapter is supported by a number of appendices provided in Volume 2 of the ES including:
- Appendix 11.1: Preliminary Ecological Appraisal;
  - Appendix 11.2: Bat Survey Report;
  - Appendix 11.3: Great Crested Newt Survey Report; and
  - Appendix 11.4: Legislative and Planning Policy Context.

## Legislative and Planning Policy Context

- 11.5 The planning policy framework for ecology and biodiversity in Bicester, Oxfordshire is nationally through the National Planning Policy Framework (NPPF), and at the local level through policies in the Cherwell Local Plan 2011-2031 in addition to saved policies in the Cherwell Local Plan 1996 and policies in the Non-Statutory Cherwell Local Plan 2011. Any proposed development will be judged in relation to the policies contained within these documents. Full details will be provided in Appendix 11.4.
- The National Planning Policy Framework (NPPF) section 11:
    - Cherwell Local Plan 2011-2031 Planning policy: Strategic Development Site Policy Bicester 4, ESD9, ESD10, ESD11, ESD17;
    - Cherwell Local Plan 1996 (saved polices): C1, C2, C4; and
  - Cherwell Local Plan 2011 (non-statutory interim policy): EN1, EN2, EN13, EN22, EN23, EN24, EN25, EN27.

## Assessment Methodology

- 11.6 This section of the chapter sets out method used for identifying important ecological features that will be effected by the proposed works, and how impacts have been assessed. The method follows the CIEEM 'Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater and Coastal - Second Edition'.
- 11.7 The aims of the ecology assessment will be to:
- Identify relevant ecological features (i.e. designated sites, habitats, species or ecosystems) which may be impacted;

- Provide an objective and transparent assessment of the likely ecological impacts and resultant effects of the Proposed Development. Impacts and effects may be beneficial (i.e. positive) or adverse (i.e. negative);
- Facilitate objective and transparent determination of the consequences of the Proposed Development in terms of national, regional and local policies relevant to nature conservation and biodiversity; and
- Set out what steps would be taken to adhere to legal requirements relating to the relevant ecological features concerned.

- 11.8 In line with the CIEEM guidelines the terminology used within the chapter draw a clear distinction between the terms 'impact' and 'effect'. For the purposes of the chapter these terms will be defined as followed:
- 11.9 Impact – Actions resulting in changes to an ecological feature. For example, demolition activities leading to the removal of a building utilised as a bat roost.
- 11.10 Effect – Outcome resulting from an impact acting upon the conservation status or structure and function of an ecological feature. For example, killing/injury of bats and reducing the availability of breeding habitat as a result of the loss of a bat roost may lead to an adverse effect on the conservation status of the population concerned.
- 11.11 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 ecology assessment. The Scoping Opinion highlighted that there are known records of otter within Langford Brook (including at the nearby Bicester Village Shopping Centre) and ditches on or near the site could form part of their habitat. However, the preliminary ecology appraisal (Appendix 11.1). undertaken for the site scope otters out of the assessment on the basis that the site's ditches do not hold sufficient water to support a water vole population. Although dry ditches may be used by otters moving between rivers or to foraging areas, the site is not close to major river systems. Otters and water vole are unlikely to occur at the site.

## Evaluation of Ecological Features

- 11.12 Data received through consultation, desk-based investigations and field-based investigations has been used to allow relevant ecological features (including designated sites, ecosystems, habitat and species) of value (or potential value) to be identified, and the main factors contributing to their value described and related to available guidance.
- 11.13 Ecological features may be important for multiple different reasons (e.g. rarity in a particular geographic context; role in habitat connectivity; or a species on the edge of their range). Relevant reasons for which an ecological feature is important are described and considered in order to assign each relevant ecological feature an overall value in accordance with the following geographical frames of reference:

### International (i.e. European);

- National (i.e. England);
- County;
- Borough;
- Local;
- site; and
- Negligible (used where the value is lower than the site level).

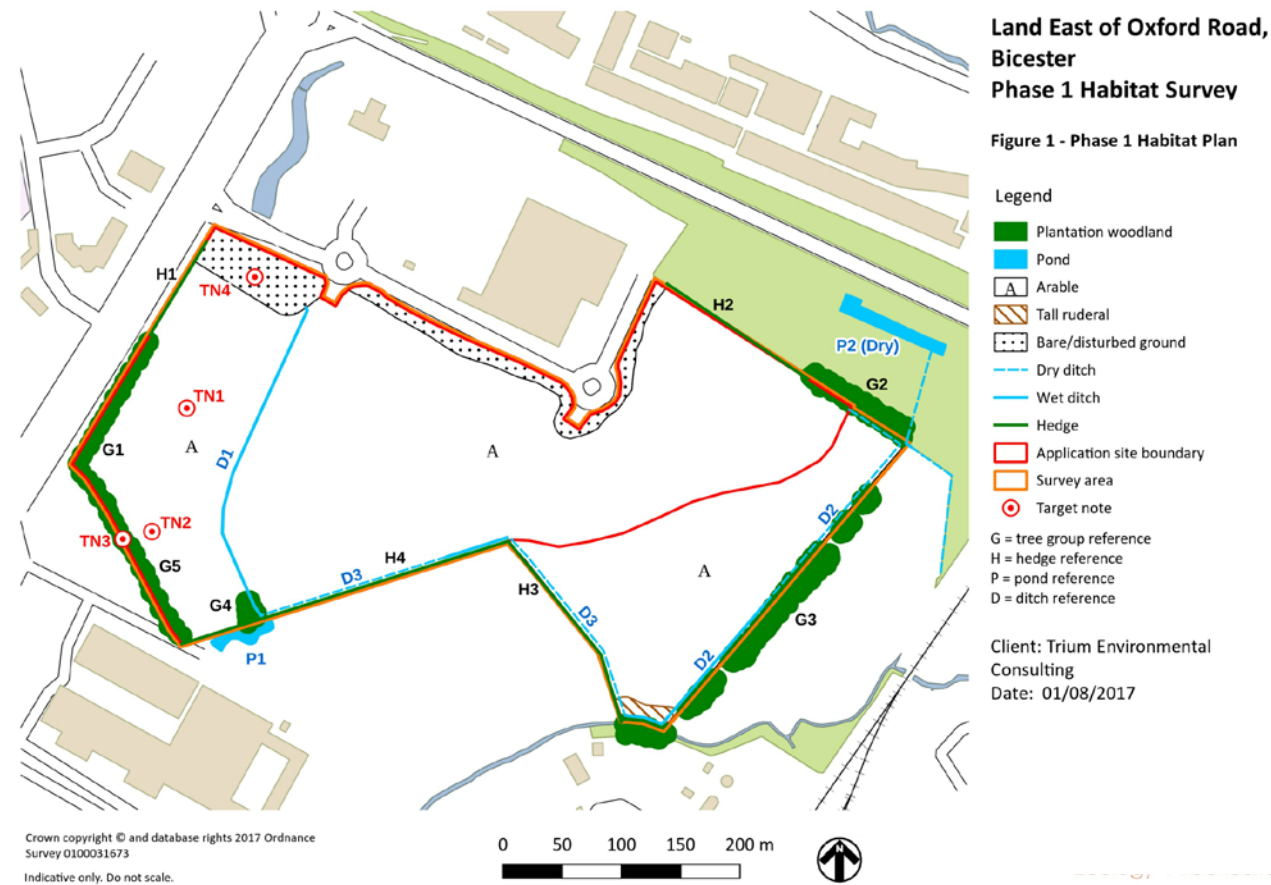


Figure 11.1: Habitat Plan

11.14 In determining the value of relevant ecological features the social and economic values are considered separately. Where appropriate the significance of relevant social and economic effects are defined and reported within separate community and/or socio-economic assessments.

### Characterising potential ecological impacts

11.15 When describing potential impacts (and where relevant the resultant effects) reference are made to the following characteristics:

- Beneficial/adverse:
- Magnitude:
- Spatial extent:
- Duration:
- Reversibility; and
- Timing and frequency.

11.16 For each receptor only those characteristics relevant to understanding the ecological effect and determining the significance are described.

### Significance Criteria

11.17 Potential impacts on relevant ecological features are assessed and a judgement reached on whether or not the resultant effect on conservation status or structure and function is likely to be significant. This process will take into consideration the characteristics of the impact, the sensitivity of the ecological feature concerned, and the geographic scale at which the feature is considered important.

11.18 The CIEEM guidelines state that:

*'For the purposes of EclA a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' (i.e. relevant ecological features) or for biodiversity in general'.....*

*In broad terms, significant effects encompass impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution).*

11.19 For designated sites, defined sites and ecosystems the assessment considers how the proposals are likely to affect the conservation objectives for the site and/or its interest/qualifying features. For ecosystems, consideration is given to whether the proposals are likely to result in a change in ecosystem structure and/or function.

11.20 For species and habitats the effects of impacts on individual habitats and species will be considered in relation to 'conservation status' which is defined in the CIEEM guidelines as follows:

*For habitats: conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area;*

*For species: conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.*

11.21 In considering effects on conservation status, reference will be made to relevant available guidance on the existing conservation status of a feature. Conclusions on the significance of effects relate to the concepts of 'structure and function' or 'conservation status' as being either:

- Not-significant (i.e. no effect on structure and function, or conservation status); or
- Significant (i.e. structure and function, or conservation status is affected).

11.22 Such judgements are based, wherever possible, on quantitative evidence. However, where necessary the professional judgement of an experienced ecologist are applied.

11.23 For those effects considered significant, the effect is also characterised as appropriate (e.g. adverse or beneficial), and qualified with reference to the geographic scale at which the effect is significant (e.g. an adverse effect significant at a national level).

11.24 The scale of significance of an effect may not be the same as the geographic context in which the feature is considered important. For example, an effect on a species of principal importance for nature conservation at the national level may not have a significant effect on the conservation status of the national population of that species.

### Baseline Conditions

11.25 Full baseline conditions are given in the reports in Appendix 11.1-11.3 in Volume 2 of this ES. In summary, the site is part of an arable field to the south of Bicester. The whole field has hedge and tree lines to most

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boundaries, except where a supermarket has been constructed in the north west of the site. Here, a bund has been created and seeded with grass. There is a ditch running into the site in the south west. The ecological features present within the zone of influence are shown in Table 11.1 below. Features of negligible value have been omitted. No designated sites are included in the assessment as direct or indirect effects to these have been scoped out.

**Table 11.1 Important Ecological Features within the Zone of Influence**

Feature	Description	Value (geographic frame of reference)
<b>Field Margins</b>	The grass field margins are approximately 2m wide in the north east and south west of the site, but almost absent from the south (along hedgerow 3 and 4).  The field margins do not qualify as the Habitat of Principal Importance 'arable field margins' as they are not deliberately created and managed for wildlife.	<b>Local:</b> The habitat is species poor and common in the area. However, in conjunction with the site's hedgerows and ditches, the habitat provides a commuting and foraging corridor for bats, and possibly other species.
<b>Hedgerows</b>	Most of the field boundaries with shrubs are no longer managed as hedgerows and could be considered to be tree lines.  Most are species poor, but one (hedgerow 4 / H4) has five woody hedge species and a further three have taller standard trees.	<b>Borough:</b> Most of the habitat is species poor and all are common in the area. However, in conjunction with the site's hedgerows, the habitat provides a commuting and foraging corridor for bats, and possibly other species.  Also, the habitat is recognised nationally as a habitat of principal importance. H4 qualifies as important under the hedgerow regulations.
<b>Trees</b>	This includes tree lines formed from former hedgerows and standard trees in hedges.  Many trees include some features which are suitable for roosting bats (assessed as low to high suitability)	<b>Borough:</b> The mix of tree species is common and there will be many trees in the local area that are suitable for bats to roost in. However, in association with local habitats (such as the wetland reserve) and the results of bat activity surveys, these form part of a more important network of habitats for bats in the area.
<b>Ditches</b>	The site's ditches include standing water and wet mud (Ditch 1 (D1) and Ditch 2 (D2)). At the juncture of D2 and Ditch 3 (D3) is a stream (off site). These areas have pond-like vegetation.  D1 is the most biodiverse area of the site.	<b>Borough:</b> The habitat is not common in the area; the pond-like standing water will provide a resource for invertebrates and amphibians. Also, in conjunction with the site's hedgerows and field margins, the habitat provides a commuting and foraging corridor for bats, and possibly other species.
<b>Log pile</b>	Two large piles of wood, which appear to comprise trees felled from clearance of bank side vegetation.	<b>Local:</b> The logs may provide a habitat for wintering hedgehogs and reptiles, a nesting site for birds and habitat for dead-wood invertebrates.
<b>Reptiles</b>	The site's rough field margins are suitable for common lizard <i>Zootoca vivipara</i> and slow worm <i>Anguis fragilis</i> .  The majority of the site (the crop) is considered to be of very limited value to reptiles due to the monoculture of the field and lack of basking areas. It is possible that some reptiles are present in the rough vegetation at the boundaries and the log piles,	<b>Local:</b> On the assumption that reptiles are present, the population size will be very limited and confined to small areas of the site.  However, the field margins may form part of a wider habitat connected in the local area.

Feature	Description	Value (geographic frame of reference)
	however, it is considered unlikely that there is a large population present.  The site may therefore support a small population of common lizard and/or slow worm. Grass snakes may hunt within the site as part of a much wider home range.  The EIA assessment makes an assumption that reptiles are present as full surveys were not considered warranted.	
<b>Birds – nesting in hedgerows</b>	A number of birds associated with hedgerows in arable land were recorded in the desk study. Some of these are declining species and listed as amber or red in Birds of Conservation Concern. It is assumed that the site supports small number of most of these species during the breeding season and foraging habitat for those species which winter here.	<b>Local:</b> The site's hedgerows may support a number of nesting birds typical of arable land. This is likely to include some species which are listed as amber or red conservation concern (such as song thrush or bullfinch). However, the amount of hedgerow habitat is limited.
<b>Birds – skylark</b>	Based on observations during the Preliminary Ecological Appraisal, the site may include three skylark (red listed and species of principal importance) nests. Skylark nest on the ground and so the suitability of the site will vary from year to year, depending on the cropping and management regime.	<b>Local:</b> The site provides occasional resources for breeding skylark, however the ability of skylark to breed here may not be consistent between years.
<b>Birds – Red kite</b>	During bat surveys, red kite have been observed roosting (not breeding) on a tree at the north boundary of the site.	<b>site:</b> Breeding red kite and their <i>nests</i> are protected, but their roost sites are not. There are many other mature trees within the landscape that red kite could use.
<b>Badgers</b>	A single large mammal hole was recorded in the south west of the site, near the site boundary. The hole is of a size and shape consistent with badgers, but no signs of current occupation.	<b>Negligible:</b> This feature has only been included as badger setts receive legal protection and mitigation is required. A single outlier sett is not a significant feature in term of the EIA.
<b>Bats</b>	At least six species of bat occur in the Study Area (Common pipistrelle <i>Pipistrellus pipistrellus</i> , Soprano pipistrelle <i>Pipistrellus pygmaeus</i> , Brown long-eared bat <i>Plecotus auritus</i> , Noctule bat <i>Nyctalus noctula</i> , Serotine <i>Eptesicus serotinus</i> and at least one species of <i>Myotis</i> bat).  <i>Pipistrellus</i> species bats dominated activity levels, the majority being common pipistrelle. Common pipistrelle were evenly distributed across the site, however, soprano pipistrelles were concentrated in the southwest and eastern area.  Nyctalus species bat activity was higher than normally expected for these habitats, with levels highest in the western area of the site. As the western boundary and the northern boundary are	<b>Borough:</b> A number of species of bat forage within the site at relatively high levels of activity. The site's value seems to be limited to commuting and foraging, and does not support confirmed roosting or hibernating sites.

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Feature	Description	Value (geographic frame of reference)
	<p>flooded with light, it is likely the bats are foraging over the field.</p> <p>Other species of bat were recorded, but all at relatively low levels of activity. No regular activity close to typical emergence time were recorded for any species. The results suggest that roosts are not in the immediate area to the Study Area during the time of surveys.</p> <p>However, with activity higher during the middle of the night the site is of importance for foraging bats.</p>	

## Assessment of Effects

### Construction

11.26 Construction will be completed over four phases over an 8 – 9 year period. Access to the site is via the two existing vehicular access points from Lakeview Drive. Further construction details are provided in Chapter 5: Construction.

11.27 The following effects and impacts (without mitigation) have been identified. Where assumptions of general practice are made these are stated here.

**Table 11.2 Assessment of Construction Impacts and Effects (without mitigation)**

Feature	Impact	Effect
<b>Field Margins</b>	Loss of 725m arable margin within the site, likely to be phased as construction progresses.	Adverse, permanent. Significant at site Level.
<b>Hedgerows</b>	None. (assumed protection of hedgerows to BS 5837:2012)	None.
<b>Trees</b>	None. (assumed protection of hedgerows to BS 5837:2012)	None.
<b>Ditches</b>	Loss of Ditch 1 (300m x 2 m)  Possible pollution of Ditch 2 and 3 from sediment loaded run-off, dust settlement or pollution incident.	Adverse, permanent. Significant at Local Level.  Possible adverse, temporary or reversible (depending on incident). Significant at Borough Level.
<b>Log pile</b>	Removal of log pile habitats	Adverse, permanent. Significant at Local Level.
<b>Reptiles</b>	Removal of habitat which may support a small population of common reptiles.  Killing or injury of individual reptiles	Adverse, permanent. Significant at Local Level.  Adverse, permanent. Significant at site Level (not all of the population's individuals are likely to be effected).
<b>Birds – nesting in hedgerows</b>	Disturbance through noise, dust and lighting	Adverse, temporary. Significant at site Level only – some birds will be able to nest during construction, although the range of species may change to those more tolerant of disturbance.

Feature	Impact	Effect
<b>Birds – skylark</b>	Gradual reduction in nesting habit as each phase commences. Disturbance through noise, dust, vibration.	Will prevent successful breeding on site and immediate area during construction; possible that reduced numbers will be able to breed until the last phase. Adverse impact at local Level.
<b>Birds – Red kite</b>	Disturbance of roosting habitat through noise and lighting.	Adverse, temporary impact at site Level.
<b>Badgers</b>	Destruction of outlier sett. Potential disturbance or injury of badger if occupied.	Not significant in EIA terms, but included for animal welfare and legal grounds (required mitigation).
<b>Bats</b>	Disturbance of some species of bat through lighting (most significantly long-eared bats and myotis bats). Reduced foraging habitat over fields (most significantly Serotine and Nyctalus bats)	Adverse effect significant at a Local Level.

### Completed Development

11.28 The majority of impacts and effects relating to ecology will occur at the construction stage e.g. through changes to habitats. Impacts during the operation of the development are likely to be limited to disturbance of bats and birds.

**Table 11.3 Assessment of Completed Development Impacts and Effects (without mitigation)**

Feature	Impact	Effect
<b>Field Margins</b>	No further impact	None.
<b>Hedgerows</b>	None.	None.
<b>Trees</b>	None.	None.
<b>Ditches</b>	None.	None.
<b>Log pile</b>	No further impact	None.
<b>Reptiles</b>	No further impact	None
<b>Birds – nesting in hedgerows</b>	Disturbance through transport noise, presence of people and lighting (from buildings, streetlight and car parks)	Adverse, permanent. Significant at site Level only – some birds will be able to nest during operation of the site, although the range of species may change to those more tolerant of disturbance.
<b>Birds – skylark</b>	No further impact	None
<b>Birds – Red kite</b>	No further impact	None
<b>Badgers</b>	No further impact	None
<b>Bats</b>	Disturbance through transport noise and lighting (from buildings, streetlight and car parks)	The bats most commonly recorded at the site (pipistrelles) are likely to continue to use the site, although possibly at reduced numbers. Myotis, long-eared bat, noctule and serotine bat activity may be completely removed from the site on to other areas. Adverse effect significant at a Local Level.

## Mitigation, Compensation and Monitoring

### Construction

#### Pollution Prevention

- 11.29 An appropriate pollution prevention and control method statement will be produced to control construction activities. This will include (but not be limited to), dust, run-off and chemical spills.
- 11.30 In addition to a standard pollution CEMP, the plan will include avoiding illuminating the bat corridors between March and October (bat activity will be very limited November – February).

#### Site Preparation

- 11.31 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.
- 11.32 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 200 mm, 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).
- 11.33 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.

### Completed Development

#### Scheme Design

- 11.34 In order to retain flight corridors for bats across the site to the wider landscape an east – west and north-south bat corridor has been identified (this has been included in the scheme design evolution based on the outline plan below). The corridors will include a vegetated path along hedge and ditches which will be subject to careful control of lighting and will be approved by a suitably qualified ecologist.
- 11.35 Where external lighting (e.g. street lights or security lights) are required in proximity to the bat corridor, they will be designed to include appropriate height, cowling or other deflection devices to minimise light spill to a maximum of 1 lux at ground level within the dark corridor. Should and buildings be situated within 20 m of a dark corridor, further screening (such as evergreen hedges or fencing) will be provided to maintain the dark corridor. The lighting scheme will be approved by a suitably qualified ecologist.
- 11.36 To compensate for the loss of arable margin habitats and provide habitat for reptiles and nesting skylark, a strip of wildflower meadow will be created between the site and the flood zone to the south east (green area of the plan). A management plan for the meadow will be produced to set out preparation, control, monitoring, responsibility for intervention and maintenance. This will be agreed by a suitably qualified ecologist.
- 11.37 The meadow will include three 3x3m skylark plots 24m from each other and from buildings. Plots will be managed to provide areas of lower / more sparse vegetation within the sward.
- 11.38 Two log pile habitats (using logs from the piles within the site) will be created to provide habitat for invertebrates and hibernating reptiles. It is unlikely that all of the material from the existing log piles will be used, but to

maximise the use of space the log piles will include a 3 x 4m wide and 2m deep pit, filled with logs to a height of 2m.

- 11.39 The landscape strategy will include a water feature which includes no less than 600m<sup>2</sup> of shallow margins planted with native aquatic and semi-aquatic species. The landscape strategy will be agreed by a suitably qualified ecologist.

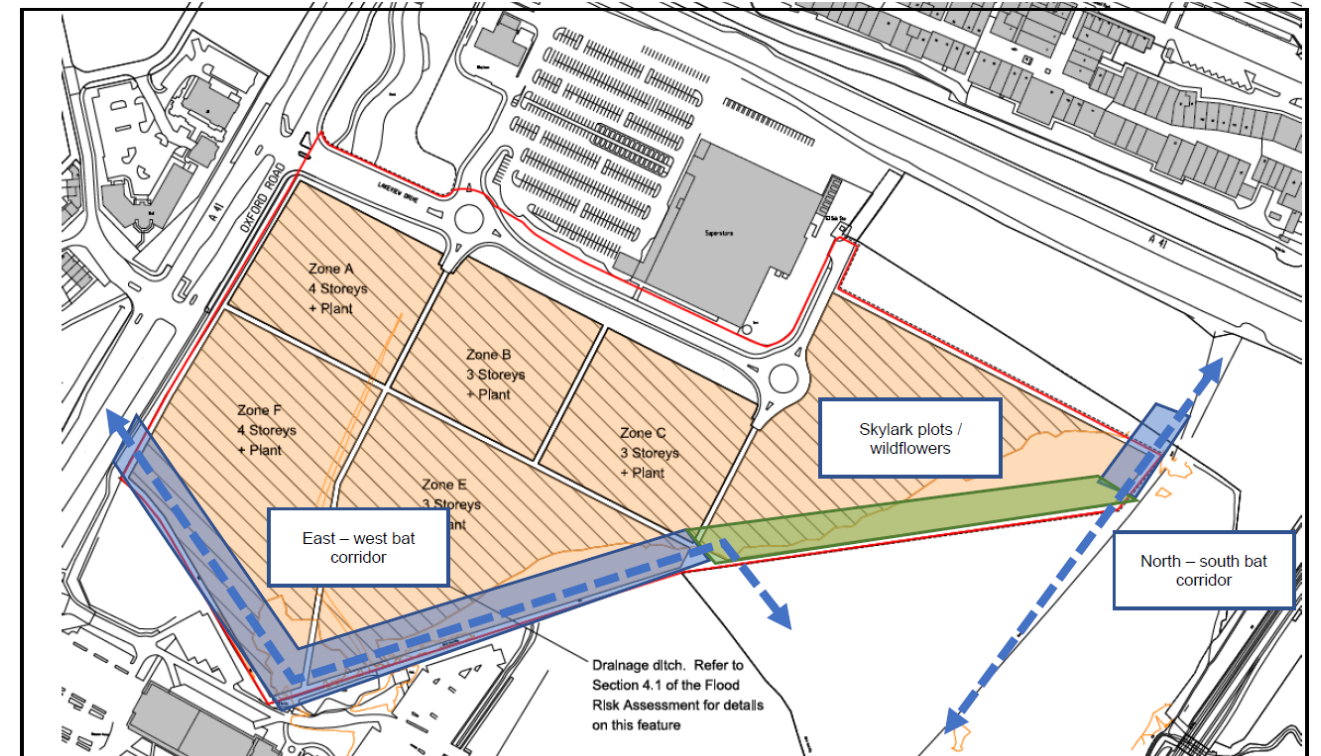


Figure 11.2: Proposed Bat Corridors

## Residual Effects

Table 11.4 Summary of Residual Effects

Feature	Residual Effect (Post Mitigation)
<b>Construction</b>	
<b>Field Margins</b>	Temporary loss of habitat until new habitat established, Local level significance reducing to no significant impact over approximately 1 year
<b>Hedgerows</b>	None
<b>Trees</b>	None
<b>Ditches</b>	Temporary loss of habitat until new habitat established, Local level significance reducing to no significant impact over approximately 3 years
<b>Log pile</b>	Temporary loss of habitat until new habitat established, Local level significance reducing to no significant impact over approximately 1 year

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Feature	Residual Effect (Post Mitigation)
<b>Construction</b>	
<b>Reptiles</b>	Temporary disturbance and loss of habitat until new habitat established, adverse effect of local level significance reducing to no significant impact over approximately 3 years
<b>Birds – nesting in hedgerows</b>	Temporary disturbance during construction (over 8-9 years), adverse significant effect at site level only
<b>Birds – skylark</b>	Temporary disturbance and loss of habitat until new habitat established, adverse effect of local level significance reducing to not significant impact over 8-9 years
<b>Birds – Red kite</b>	Temporary disturbance over 8-9 years, adverse effect significant at site level only.
<b>Badgers</b>	Destruction of outlier sett. Potential disturbance of badger if occupied whilst being closed under licence, not significant in EIA terms, included for legal protection.
<b>Bats</b>	Reduced foraging habitat over fields (most significantly Serotine and Nyctalus bats), but limited effect on other species and commuting bats. Permanent adverse effect, significant at a site level only.
<b>Operation</b>	
<b>Field Margins</b>	No further impact
<b>Hedgerows</b>	None.
<b>Trees</b>	None.
<b>Ditches</b>	None.
<b>Log pile</b>	No further impact
<b>Reptiles</b>	No further impact
<b>Birds – nesting in hedgerows</b>	Disturbance through transport noise, presence of people and lighting (from buildings, streetlight and car parks), likely to change species present, but not reduce number of birds. Permanent adverse effect significant at site level only.
<b>Birds – skylark</b>	No further impact
<b>Birds – Red kite</b>	No further impact
<b>Badgers</b>	No further impact
<b>Bats</b>	No further impact.

- Bats – monitor bat activity to ensure that bat corridors have been successful, static detector surveys in spring, summer and autumn every other year during construction and for one year after construction. Use method as for baseline surveys to allow comparison;
- Birds – monitor use of skylark plots every other year during construction and for one year after construction; and
- Habitats – the meadow will be monitored regularly during preparation and establishment (year 1) whilst there is a risk of weeds encroaching (frequency will depend on timing of sowing meadow and condition of soil), annually for three years, then every other year until one year after construction is complete.



Figure 11.3 Local Cumulative Schemes Connected to the Bat Corridor

## Cumulative Effects Assessment

- 11.41 Bicester and the surrounding land is subject to many large allocations for development (e.g. NW Bicester zero carbon village – 690 ha). These schemes are likely to have in combination effects *with each other*, in particular arising from loss of arable land and those plants, invertebrates and birds associated with it.
- 11.42 Given the relative size of this site compared to the other allocations in Bicester, the additional loss of arable land will not be significant in combination with the other schemes. With the creation of new habitats and careful scheme design, no impacts are predicted that would work in combination with other schemes to create a significant effect through addition of effects (e.g. adding loss per hectare of habitats).

## Monitoring

11.40 The following monitoring will be required to assess the success of mitigation and compensation and identify whether modifications to the proposed measures is required. All monitoring will be undertaken by a suitably qualified ecologist.

- Trees and hedgerows – prior to construction an arborist will inspect protective fencing;
- Badgers – monitor mammal hole for 21 days three months prior to development;

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- 11.43 However, the schemes in the cumulative assessment could have a landscape wide effect on the movement of animals; a reasonably likely scenario that could create in combination effects with the development of the site are where habitats that are linked to the site are going to be removed, and therefore the placement of bat corridors in the Proposed Development are made redundant (and therefore assumptions of the success of proposed mitigation are also redundant).
- 11.44 The bat corridor allows the movement of bats north - south on the east side of the site and east west on the southern boundaries. The image below shows the local schemes that are connected to this bat corridor.
- 11.45 It can be seen that in time, the east-west bat corridor may in time become redundant if bats use of land at South West Bicester Phase 1 or at Graven Hill is reduced (effects at Graven Hill are likely to be limited as the allocation in this area is small and much of the area of Graven Hill is a Local Wildlife site and unlikely to be developed. However, bats passing through the site north – south, for example from roosts in Bicester to the Bicester Wetland Reserve and the open countryside further south and west will be protected by the proposed bat corridor.

## Conclusions

- 11.46 The application site is a large arable field with trees, hedges and ditches. The site is not of sufficient ecological value to warrant whole scale protection from development. However, the site does support nesting birds (including skylark) and is used by commuting and foraging bats. The assessment includes proposals to ensure that habitat loss is compensated, and that bats can continue to move through the site through bat corridors. In time one of these corridors may become less used by bats due to development of land outside of the site, but the proposed north-south corridor may become more important in time. No long-term adverse effects of the Proposed Development are significant above a site level.

## Introduction

**12.1** This chapter of the ES reports the findings of an assessment of the likely significant landscape and visual effects resulting from the construction phase and during operation of the Proposed Development. This landscape and visual assessment has been prepared by Hyland Edgar Driver Ltd. The report is supported by information located in the following appendices:

- Appendix 12.1: Drawings and Photographs;
- Appendix 12.2: Legislative and Planning Policy Context;
- Appendix 12.3: Assessment Methodology; and
- Appendix 12.4: Photography Methodology.

**12.2** Landscape impacts are defined as those that derive from physical changes to the landscape and changes to the character of the landscape and to the landscape setting, whilst visual impacts are those that derive from changes to views and visual amenity resulting from the Proposed Development.

## Legislative and Planning Policy Context

**12.3** A review of legislation and planning policy has been undertaken, which considers the relevant local, sub-regional and national planning policies, comprising:

- National Planning Policy Framework, Section 7: Requiring Good Design<sup>1</sup>;
- National Planning Policy Framework, Section 11: Conserving and Enhancing the Natural Environment<sup>2</sup>;
- Cherwell Local Plan 2011-2031 Part 1 (incorporating Policy Bicester 13 re-adopted on 19 December 2016) (part 1 of 3): Policy ESD15: The Character of the Built and Historic Environment;
- Strategic Development: Bicester 4 – Bicester Business Park Policy Bicester 4: C.65 and C.66
- Public Rights of Way - The Countryside and Rights of Way Act, 2000; and
- Tree Preservation Orders - Town and Country Planning (Tree Preservation) Regulations 2012.

**12.4** The full legislative and planning policy review is included in the Volume 2: Technical Appendix 12.2.

## Assessment Methodology

**12.5** The methodology for this assessment has followed current best practice, the Guidelines for Landscape and Visual Impact Assessment (GLVIA)<sup>3</sup> as defined by the Landscape Institute and Institute of Environmental Management & Assessment and is based on the following three main stages:

- Stage 1 - establishment of the study area;
- Stage 2 - description of the landscape and visual baseline conditions; and
- Stage 3 - landscape and visual assessment of the likely significant effects of the proposed facilities.

**12.6** The updated third edition GLVIA methodology concentrates on the principles and process of LVIA and has opted not to provide a detailed or formulaic 'recipe' for the assessment of likely significant effects. When considered appropriate to this assessment, definitions and detailed methodologies from the earlier second edition of the GLVIA have been used.

**12.7** The landscape in the study area has been examined and describes the baseline physical landscape elements such as vegetation and topography in addition to landscape character and qualities.

**12.8** The nature of the landscape receptor (sensitivity) will also form part of the baseline studies and will include an evaluation of the landscape value and or quality and condition.

**12.9** Landscape sensitivity is a measure of the value of a particular landscape and its capacity to accept change resulting from a particular development type. Landscape sensitivity identifies the vulnerability of the landscape to change through the introduction of the new features, such as housing, or the loss of existing valued features such as mature hedgerows.

**12.10** Experience based professional judgement is used to identify the magnitude of the potential change that would result from the identified landscape impact. The magnitude of the impact is the degree of change experienced by a receptor to identify the significance of effect.

**12.11** The significance of the predicted landscape effects has then been identified using a matrix form of evaluation. Effects have been assigned one of the four categories of Insignificant, Minor, Moderate or Major considering the magnitude of the change and the ability of the receptor to accommodate the proposed change (sensitivity).

**12.12** The GLVIA defines the sensitivity of a landscape as varying with a combination of:

- Landscape sensitivity resulting from existing land use, the pattern and scale of the landscape/townscape;
- Visual sensitivity resulting from visual enclosure/openness of views, and distribution of visual receptors;
- The value placed on the landscape/townscape; and
- The scope for mitigation, which would be in character with the existing landscape/townscape.

**12.10** The baseline assessment will be applied to the construction phase and operation of the Proposed Development using the methodology criteria.

**12.13** For a detailed description of the assessment methodology refer to Volume 2, Appendix 12.3.

## Stage 1 - The Study Area

**12.14** The study area for the assessment of landscape and visual effects is approximately 1km from the centre of the site. Within this initial study area the potential visibility of the site has been considered in relation to the key landscape and visual receptors.

## Stage 2 - Description of the Landscape and Visual Baseline Conditions

**12.15** For the purposes of this assessment the terms landscape and townscape are interchangeable, e.g. landscape character assessment can be applied to the assessment of landscape character within rural or urban areas.

**12.16** The landscape in the study area has been described using a combination of desk-based study and site survey. This has examined physical landscape elements, such as vegetation and topography, in addition to landscape character, sensitivity, value and quality.

**12.17** Baseline visual and landscape receptors have been identified using a combination of desk-based study and site survey. This has identified the following types of potential community, residential, employment and transport based receptor locations:

<sup>1</sup> 'National Planning Policy Framework', Section 7: Requiring Good Design, Department for Communities and Local Government, (March 2012)

<sup>2</sup> 'National Planning Policy Framework', Section 11: Conserving and Enhancing the Natural Environment, Department for Communities and Local Government, (March 2012)

<sup>3</sup> 'Guidelines for Landscape and Visual Impact Assessment', Third Edition, published by the Landscape Institute and Institute of Environmental Management & Assessment (2013). (GLVIA)



- Public places e.g. playing fields, cricket club, church, school, Common Land;
- Public Rights of Way e.g. footpaths, byways and bridleways;
- Residential e.g. detached, semi-detached, bungalow, terrace, apartment;
- Workplaces e.g. business or commercial property;
- Transport routes e.g. classified and unclassified roads (country lanes), cycle routes; and
- Sites of natural or historic importance.

## Stage 3 - Landscape and Visual Assessment of the Likely Significant Effects of the Proposed Facilities

- 12.18** The assessment methodology has followed the standard GLVIA approach of assessing the impact of the Proposed Development against the baseline condition.
- 12.19** Predicted effects have been identified for each receptor, and the magnitude of the identified landscape and visual changes evaluated by professional judgement. The significance of these effects has been determined by the inter-relationship of magnitude of impact and receptor sensitivity; a standard and accepted principle that is described in more detail in Appendix 12.3.

### Baseline Conditions

#### The Site

- 12.20** There are no Scheduled Ancient Monuments (SAM), Conservation Areas or Listed Buildings on or directly adjacent to the site.
- 12.21** A Schedule Ancient Monument is located approximately 650m to the south west of the boundary of the site, and consists of the site of a Roman town. There will be no physical or visual impact on this designation.
- 12.22** A Conservation Area is located approximately 420m to the north east of the site boundary and is a Conservation Area that covers the whole of the centre of the town of Bicester. A further Conservation area for the village of Chesterton lies over a 1km to the west. Neither of these two areas will be affected physically or visually.
- 12.23** A single Listed Building is located approximately 550m to the south east of the site boundary, this is part of Langford Park Farm. There are a number of further listed buildings in the town centre of Bicester which are within the Conservation Area previously mentioned. None of the Listed Buildings would be physically affected by the Proposed Development or be visible from the site.
- 12.24** There is only one Public Right of Way (129/6) close to the site (shown on drawing HED.1288.004 in Appendix 12.1.) which starts in the centre of Bicester town and runs south west around the edge of Bicester Village development and then around the Kingsmere Residential Estate before changing to 161/13 and 161/2.
- 12.25** There would be views from this footpath for a short length as it comes close to the corner of the site on the A41 Oxford Road, these are discussed further in the visual section of this report.
- 12.26** Tree Preservation Order's (TPO) are created and protected under the Town and Country Planning Act 1990 and the Town and Country Planning (Tree Preservation) (England) Regulations 2012.

- 12.27** A TPO is made by a Local Planning Authority to protect specific trees or a particular area, group or woodland from deliberate damage and destruction. Felling, lopping, topping, uprooting or otherwise willful damaging of trees cannot occur without the permission of the Local Planning Authority with exceptions.

- 12.28** None of the trees on the site or adjacent to the boundary are covered by a TPO.

### Landscape Physical Baseline

- 12.29** The landscape baseline is comprised of the landscape character and its aesthetic characteristics and physical landscape elements, such as topography and vegetation.

### Landscape Character

#### National Character Areas

- 12.30** At a national level the character area profile are very broad assessments as identified by Natural England in their National Character Area Profiles 2013 (NCA). The relevant profile that covers the site area is No.108: Upper Thames Clay Vales<sup>4</sup>.
- 12.31** The Upper Thames Clay Vales National Character Area (NCA) covers an extensive area of low-lying land extending from west of Swindon through to Aylesbury in the east, and completely encircles the Midvale Ridge NCA. The site is located on the north east boundary of this character area with the Cotswolds (NCA 107) located directly to the north.

- 12.32** The landscape character comprises contrasting landscapes, including enclosed pastures of the claylands with wet valleys, mixed farming, hedges, hedge trees and field trees and more settled, open, arable lands. Typical key characteristics of the landscape as described in the document and relevant to the study area are:

- Mature field oaks provide a parkland feel in the study area;
- Low-lying clay-based flood plains encircle the Midvale Ridge;
- Superficial deposits, including alluvium and gravel terraces, spread over 40% of the area, creating gently undulating topography;
- The Upper Jurassic and Cretaceous clays and the wet valley bottoms give rise to enclosed pasture, contrasting with the more settled, open, arable lands of the gravel;
- Woodland cover is low at only about 3%, but hedges, hedgerow trees and field trees are frequent. Watercourses are often marked by lines of willows;
- Fields are regular and hedged;
- In the river corridors, grazed pasture dominates, with limited areas of historic wetland habitats including wet woodland, fen, reedbed and flood meadow; and
- There are also rich and extensive ditch systems. This site itself has a ditch which runs in a north south direct across the site.

#### County Character Areas

- 12.33** The Oxfordshire Wildlife and Landscape Study<sup>5</sup> (OWLS) is the current landscape character assessment for Oxfordshire. The site falls within Type 3 – Clay Vale character area as identified by the county landscape assessment. It is very close to the boundary with Type 1 – Alluvial Lowlands and therefore key characteristics

<sup>4</sup> 'National Character Area Profiles', No.108: Upper Thames Clay Vales, Natural England, (September 2013), (NCA).

<sup>5</sup> 'The Oxfordshire Wildlife and Landscape Study' (OWLS), Oxfordshire County Council, Natural England and The Earth Trust, (2004)

of both that are relevant to the site have been identified in the following paragraph with the source noted. The following are the relevant key characteristics of the character area to the site as identified by the assessment:

- Broad alluvial plains (1);
- Densely scattered hedgerow trees of ash and willow (1);
- Dense willow corridors bordering a large number of ditches (1);
- A flat, low-lying landform (3);
- Mixed land uses, dominated by pastureland, with small to medium-sized hedged fields (3); and
- Many mature oak, ash and willow hedgerow trees (3).

### **Local Character Areas**

**12.34** A site Landscape Character Plan which assesses the study area has been carried out and this is shown on Figure 12.1. The following are typical of the site and the area immediately surrounding it;

- Large retail developments of Bicester Village, Bicester Avenue Garden Centre and the Tesco foodstore;
- The Kingsmere Estate residential area;
- Major road and rail networks on either side of the site including the A41 trunk road;
- Bicester Sewage Treatment Works to the south of the site; and
- River and stream network such as the Pingle Stream and Langford Brook.

**12.35** The plan shows the site being wholly made up of the Clay Vale classification which is the source of the countryside's character. There is retail development to the north and south of the site, built development of Bicester to the west and a main railway line and the main sewage treatment works for Bicester to the east.

**12.36** The site appraisal plan is shown in Figure 12.2: Site Appraisal Plan.

### **Landscape Sensitivity**

**12.37** Landscape sensitivity is a measure of the value of a particular landscape and its capacity to accept change resulting from a particular development type. Landscape sensitivity identifies the vulnerability of each landscape unit to change through the introduction of the new features, such as housing, or the loss of existing valued features such as mature hedgerows.

**12.38** Landscape sensitivity is influenced by a combination of existing land use, the pattern and scale of the landscape, from visual sensitivity (resulting from visual enclosure/openness of views and the distribution of visual receptors), from the value placed on the landscape/ townscape and from the scope for mitigation.

**12.39** The site is adjacent to development on three sides and has the busy A41 as its west boundary. This gives it an urban feel which marks the distinct transition in character from the urbanised areas to the north to the countryside to the south and east.

**12.40** The sensitivity of the site would be graded as low as the landscape is attributed with moderate value characteristics of local value, which would make it potentially tolerant to substantial change.

### **Movement and Access**

**12.41** The A41, a dual carriageway is the nearest arterial route and is located adjacent to the west boundary and to the north as it links the A34/M40 junction to Bicester Town centre and then on to Aylesbury.

**12.42** There is only one PROW close to the site and none that cross the site itself. For detail refer to the legislative and planning policy section that is included in Volume 2: Technical Appendix 12.2.

### **Landform**

**12.43** Topography is important in itself, as a natural feature to be appreciated and preserved and is important for its indirect influences on views and on how the land is used.

**12.44** The 13.1 hectare site is defined by the underlying topography and has a central high point central on the northern boundary. There is a drop in level across the site from north to southwest of approximately 4m with the high point of 68.5m AOD in the north central area and the low point at approximately 64.35m AOD in the southwest corner

**12.45** The topography of the surrounding area and site area is illustrated on drawing HED.1288.004 in Appendix 12.1.

**12.46** The Proposed Development has therefore taken into account the landform and how this influences availability of views towards and from the site during the design and determination of location, density and height of the development as well as retention of existing features and open space.

### **Vegetation**

**12.47** Vegetation is important as a natural feature, often with ecological and cultural associations, but it is also important as an enclosing and screening element which restrict or allow views across the surrounding countryside. The vegetation of the landscape adjacent to the site is shown on Figure 12.2: Site Appraisal Plan.

**12.48** The site is a single open arable field with mature and overgrown hedges to parts of the west and southern boundaries.

**12.49** The western boundary is enclosed for about half its length with the A41 road with a mature unmanaged hedgerow. This hedge is approximately 4m high with frequent trees of 8-10m high and occasional 15-20m high trees. It provides a dense visual barrier to view from the west and from along the A41 road as users approach Bicester.

**12.50** The south western boundary with Bicester Avenue Garden Centre has a mature unmanaged hedgerow along its full length with mature trees within it. This hedge is approximately 4-6m high with frequent trees of 8-10m high and groups of mature trees 20-30m high. It provides a dense visual barrier to view from the south and users within the garden centre.

**12.51** The existing vegetation on the site boundaries are typically of the following species:

- Blackthorn (*Prunus spinosa*);
- Oak (*Quercus robur*);
- Hawthorn (*Crataegus monogyna*);
- Ash (*Fraxinus*);
- Hazel (*Corylus avellana*);
- Willow (*Salix* spp.); and
- Elder (*Sambucus nigra*)

# LANDSCAPE AND VISUAL IMPACT

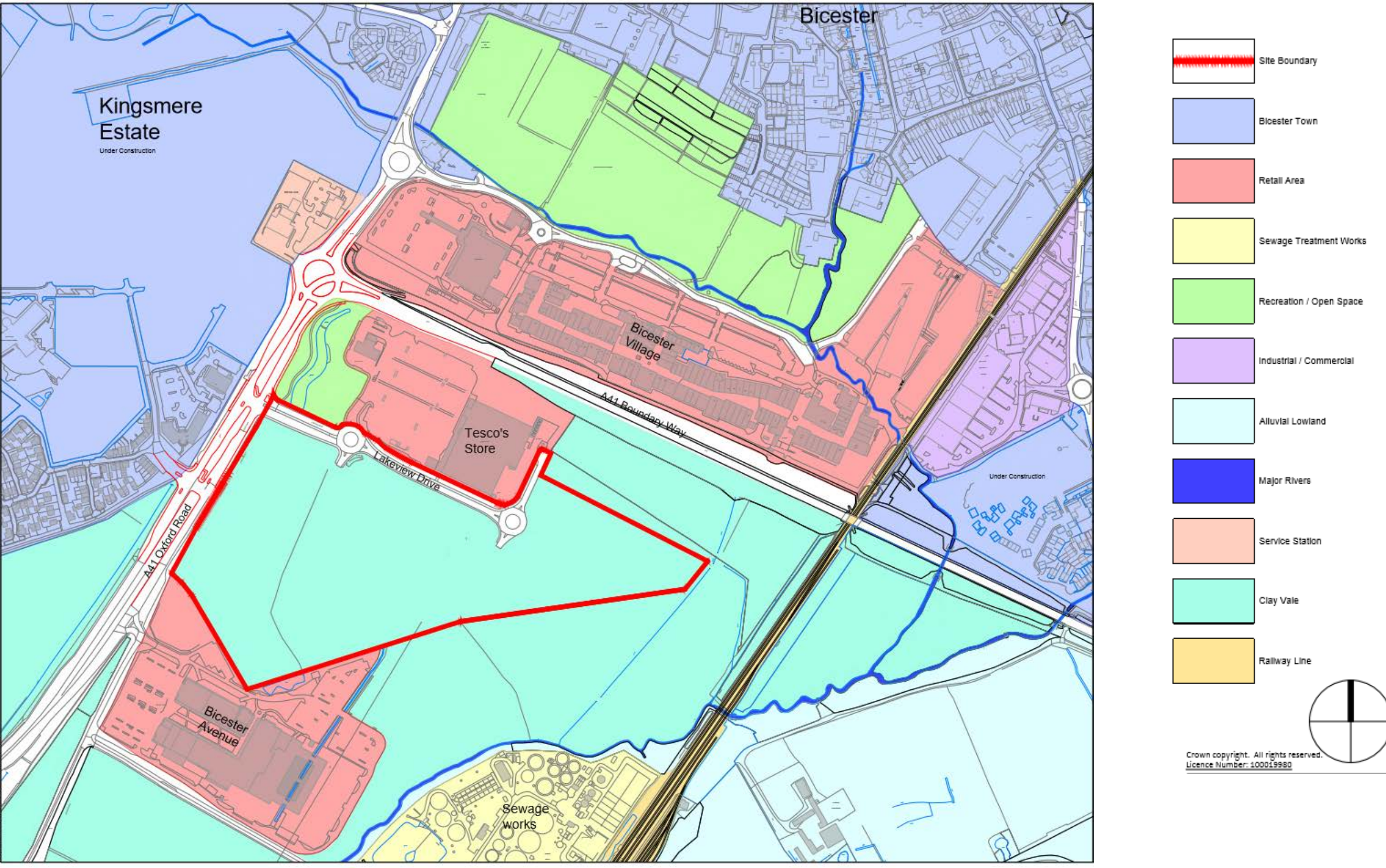


Figure 12.1: Landscape Character Plan

# LANDSCAPE AND VISUAL IMPACT

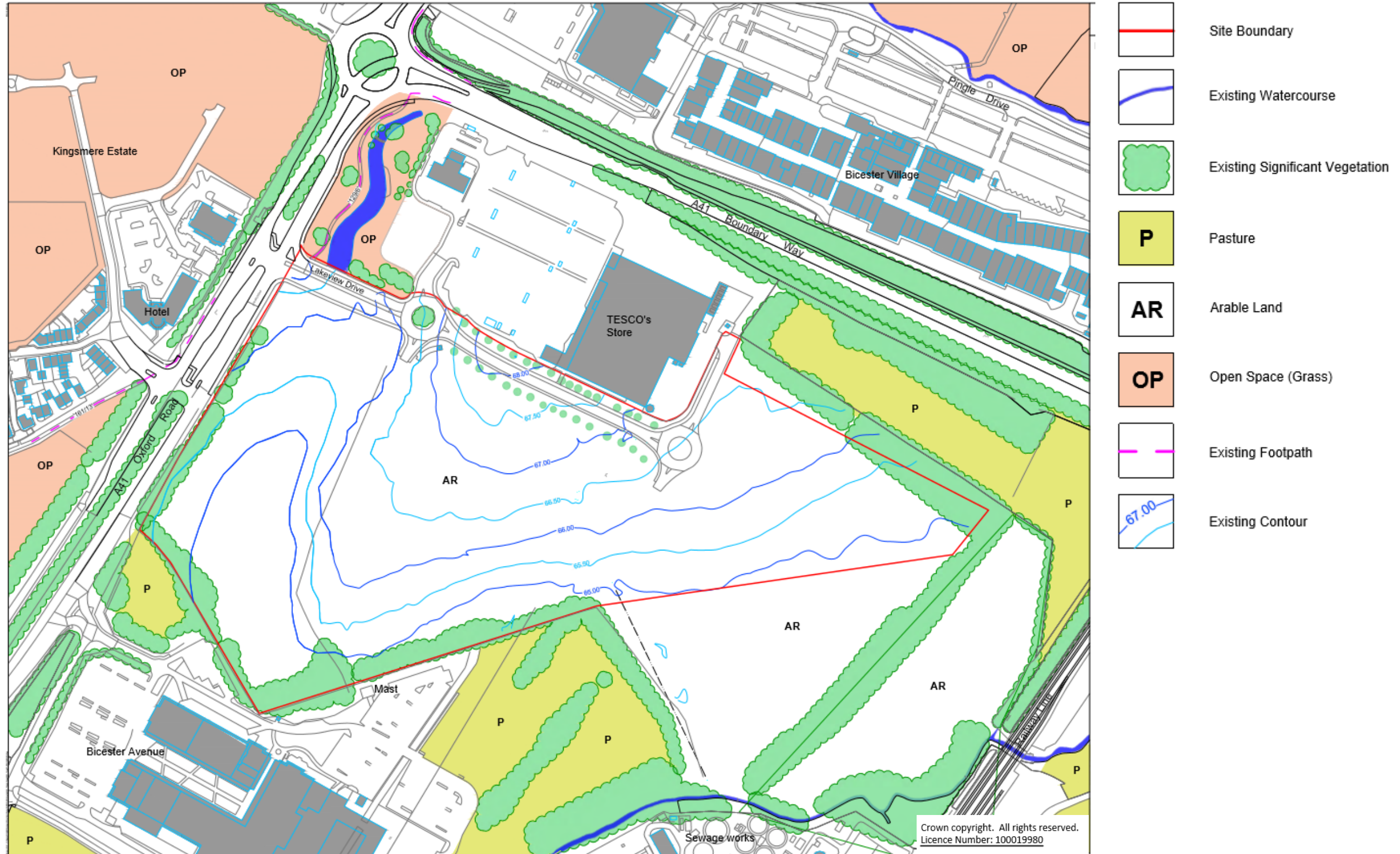


Figure 12.2: Site Appraisal Plan

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## LANDSCAPE AND VISUAL IMPACT

### Visual Baseline

- 12.52** The visibility into the site is limited by mature tree and dense hedge planting along the west and southern boundaries and buildings and topography from other directions.
- 12.53** There are some intermittent views into the site from a number of locations mainly from the west of the site.
- 12.54** There are a few glimpsed medium distance views from the new development area of Kingsmere Residential Estate to the west of the site and very limited long distance views from the surrounding countryside from a number of directions, refer to Table 12.1 below for detail of the selected typical views.

### Viewpoint Locations and Receptor Descriptions

A representational coverage of potential visual and landscape effects of the Proposed Development has been assessed from the positions described in Table 12.1 below. The baseline photographs of the views are shown in on plans HED.1288.201 to HED.1288.205 in Appendix 12.1, with their locations shown in Figure 12-3: Photograph Location and also found in Appendix 12.1.

### Short Distance Views from in and around the Site

- 12.55** Receptors in all these locations are either motorists or pedestrians using the A41 Oxford Road or adjacent residential roads or homeowners and occupants of the hotel looking out from these properties. Residents and recreational pedestrians and cyclists etc. would be interested in their visual surroundings and therefore more sensitive to development, but this would be relative to their immediate visual context of a busy trunk road and new development surrounding the location. Motorists would be generally less sensitive due to the fleeting view they would have of the site. Receptor sensitivity is thus summarised as follows:
- Motorists: Low sensitivity due to activity with the limited presence of the site from the A41 Oxford Road;
  - Pedestrians and cyclists: Low to Medium depending upon their context and activity in relation to the Proposed Development; and
  - Residents: Low to Medium sensitivity due to context of surrounding new development.

**Table 12.1: Schedule of Viewpoint**

Proposed Viewpoint	Location/receptor type	Grid Reference	Description/comments
1	View from the northern corner of the site looking south across the site.	51.891436N, - 1.162738W	Open view across the site from the edge of Lakeview Drive. The site can be seen in the view with partial screening through landform. The site boundary hedge and tree line along the A41 can be seen as can the vegetation between the site and Bicester Avenue retail area. In the distance Graven Hill can be seen along with filtered views of the MoD central ordnance depot in front of it.
2	View from north-west of the site looking south-east across the A41 towards the site.	51.890931N, - 1.165335W	View framed by existing residential building and hotel looking across the A41 towards the site. Views are partially restricted by vegetation on the western boundary with traffic on the trunk road visible. To the north there are glimpses of the recently constructed Tesco's building.
3	View from west of the site on the A41 trunk road looking north-east towards the site.	51.889901N, - 1.165332W	View along the A41 towards the town centre of Bicester with the site to the east. Views are restricted by site boundary hedge and tree line which is located on the western site boundary, this prevents all views of the proposed development site. To the left of the view three storey properties on the Kingsmere estate and the hotel are visible. This view is the main approach to Bicester from the south.

4	View from south west of the site on Whitelands Road looking north-east towards the site.	51.888391N, - 1.191816W	View towards the site and town centre of Bicester with land on the Kingsmere Estate allocated for a school in the foreground. Views are restricted by site boundary hedge and tree line which is located on the western and southern site boundary, this prevents all views of the proposed development site. There are glimpses of the recently constructed Tesco's building and Graven Hill can be seen in the distance.
5	View from the south-west of the site looking north east from the A41 overbridge.	51.884386N, - 1.172422W	View from the overbridge over the A41 on the Chesterton road looking towards the site. The view illustrates the wooded nature of the area with the site hidden behind a number of layers of tree blocks and hedgerows. There is a glimpse of the recently constructed Tesco's building but the retail area at Bicester Avenue is completely obscured. Residential properties and the hotel on the west of the A41 can be seen over the roadside tree planting.
6	View from footpath no. 161/3 looking north east towards the direction of the site.	T51.892374N, - 1.183790W	<b>View point from south west of the site on a footpath looking towards the site. All of the site is obscured by dense intervening vegetation as is the A41 trunk road.</b>
7	View from the footpath no.129/7 looking east towards the site.	51.894478N, - 1.166986W	Viewpoint taken on the footpath no.129/7 looking across land that is allocated as part of the Kingsmere estate for residential housing looking towards the site. The site is very obscured by landform and semi-mature hedgerow and trees on the western boundary. There are glimpses of the recently constructed Tesco's building with Graven Hill beyond. Development on the Kingsmere estate can be seen in the form of a play area, residential properties and the hotel.
8	View looking south from footpath no. 129/6a on the edge of the Bicester town.	51.893868N, - 1.154790W	Viewpoint taken from south of the cemetery on footpath no.129/6a looking south west towards the site. Pingle Drive and Bicester Village is visible on the skyline. The A41 Boundary Way road and the site beyond are not visible.
9	View looking west from footpath no. 105/1 looking towards the site.	51.882586N, - 1.130105W	Viewpoint taken from along footpath no. 105/1 east of the site. The A41 Aylesbury Road is hidden behind roadside vegetation but shipping containers on the MoD Central Ordnance Depot is visible as is the top of Graven Hill. The site is completely obscured by landform and vegetation.
10	View looking north towards the site from Langford Lane overbridge (recently constructed as part of the main railway line improvements).	51.872652N, - 1.172280W	<b>Viewpoint taken from overbridge over the main railway line looking north towards the site. Development at Bicester Avenue and the recently constructed Tesco's store can be seen although these are glimpsed and seen through intervening vegetation. No ground level views of the site are possible from this location.</b>
11	View looking north west towards the site from the northern edge of the Bicester 2 development area (Graven Hill) recent commencement of construction.		Viewpoint taken from the northern edge of the Graven Hill development area (Bicester 2) which has recently started on site. Very few viewpoints are available are currently available from this location due to extensive 'layers' of vegetation, existing buildings and the retaining structure of the main railway line. The view shows the existing vegetation between the location and site, the retaining structure of the main railway line and over this the roof of Tesco's and the Kingsmere Estate. There are currently no ground level views of the site but this may alter as the residential development proceeds.