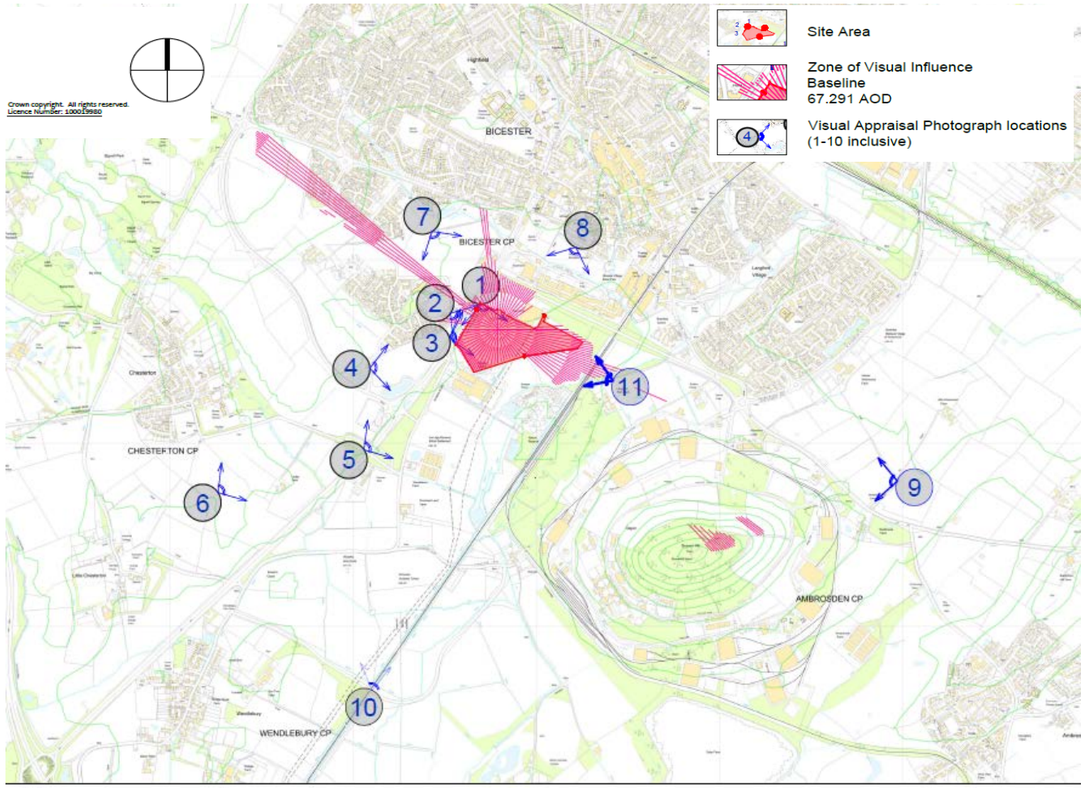


Figure 12.3: Baseline Zone of Visual Influence and Photograph Location Plan

Medium Distance Views around the Site (non-public locations)

12.56 Receptors in all these locations are either land workers or some homeowners looking out from their properties and future owners of properties on the Bicester 2 development area (Graven Hill). Residents would be interested in their visual surroundings and therefore more sensitive to further development, but this would be relative to their immediate visual context and the distance/view that they can already see. Receptor sensitivity is thus summarised as follows:

- Land workers: Low to Medium depending upon their context and activity in relation to the Proposed Development; and
- Residents: Medium to High sensitivity due to context.

Summary of the Landscape Physical and Visual Baseline

12.57 The site has a high point to the centre of the northern boundary and an even level change to the southern boundary. It is composed of agricultural arable field with native hedgerows to the south and partly west side.

12.58 There is a small number of dwellings with views into the site from the west in the new development area of Kingsmere Residential Estate although the hedgerow and trees along the A41 create significantly barrier particularly to the southern part of the site. From the south east on the Graven Hill development area there will be some future residents that will have views of the Office Park seen in the context of the sewage works, railway line, existing Tesco's foodstore and existing development on the Kingsmere Estate.

12.59 There will be views available from the recently built Tesco foodstore building to the north of the site.

12.60 There are a significant number of mature trees separating the site from the Bicester Avenue Garden Centre area to the south although filtered views will be possible particularly during the winter months

12.61 There will be a single Statutory Right of Way (no.129/6) that is located close to the site which starts in the center 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. There will be views of the site from this footpath at the location of the junction with Lakeview Drive and A41 Oxford Road.

12.62 The site sits wholly within the new employment allocation site of Bicester 4.

Assessment of Effects

Environmental Change without the Proposed Development

12.63 In the event that the land south of Lakeview Drive is not developed, it would remain in the state as described in the baseline section.

Environmental Change with the Proposed Development

12.64 Any development on the site would potentially generate a range of landscape and visual impacts including:

- Land use change and character impacts on the landscape of the arable field;
- Direct landscape impacts on existing landscape elements such as vegetation and topography;
- Indirect landscape impacts on the adjacent Landscape Character from visual change;
- Visual impacts on residential amenity views from properties looking towards the site; and
- Visual impacts on motorists, recreational walkers and other users of the adjacent footpaths and local roads.

Mitigation

12.65 In considering these potential impacts, the parameters have been developed through the iterative LVIA process to avoid and minimise potential landscape and visual impacts through the restriction of building elevation and massing as set out in the parameters plans. Furthermore, a landscape strategy, secured through a planning condition will be developed at detailed design stage in order to ensure:

- Retention of the existing site vegetation, in particular the strong boundary hedges on the western southern and eastern boundaries of the site; and
- Introduction of new tree and shrub planting throughout the site to reinforce the boundaries and filter views throughout the site.

Landscape and Visual Effects

12.66 The landscape and visual assessment has followed the defined methodology of assessing receptor sensitivity against the magnitude of change to identify a significance category for each identified effect. This process has been and is used as the basis for the description of the likely significant landscape and visual effects for both the construction and operational phases of the project.

12.67 For the operational phase, effects at day one and at plus 15 years have been examined, this date is from the point of completion of the construction of the whole site which maybe a number of years following start of the construction as the development maybe phased. This is to understand any potential benefits of mitigation

that may accrue through the maturing of the soft landscape that form an intrinsic part of the Proposed Development.

12.68 The design principle for the site is to construct an office park off the existing access road as identified in the parameters plan drawing 1105(SK)070 produced by Bennetts Associates. The heights of the buildings will be range between 2 and 5 storeys. The design of the Proposed Development reflects the area in terms of massing but more importantly the Proposed Development will be contained within the existing strong boundary hedge and existing trees.

12.69 The proposed access points are off the existing road stubs on Lakeview Drive which will provide access to the Office Park and its associated car parking and open space.

12.70 The design of the Proposed Development will minimise impacts on the landscape and visually from the surrounding countryside. This will be done through the control of development building heights and mass as set out in the parameters plans and through a landscape strategy which set outs principles of planting to reduce visual impacts which is secured by way of a planning condition.

Construction Phase

12.71 Construction effects have been defined as those resulting from the temporary construction work required to build out the Proposed Development, earth moving, construction movements, etc. As the project is constructed, which may be over a number of phases and over a period of 8-9 years, the permanent effects from the construction of the office buildings are assessed under the Operational Phase section of this report.

Landscape Effects

12.72 Construction phase landscape effects may be both direct and indirect. Potential direct landscape effects may result from:

- Temporary effects to topography (e.g. stockpiles);
- Vegetation loss due to temporary construction measures;
- Temporary changes to the site character resulting from construction activity;
- Temporary construction vehicle and operatives activity; and
- Temporary site cabins and security fencing.

12.73 The indirect construction effects on landscape character may result from visual intrusion (reinforced by noise intrusion) and from lighting effects. These may influence the character of the surrounding landscapes.

12.74 The Magnitude of Impact Landscape Criteria (see Assessment Methodology in Appendix 12.2) has been assessed using the scale set out in Appendix 12.2, Table 7, (ranging from Major to No Change) then assessed against the sensitivity of the site (Low, Table 4) to define the Significance Threshold for Landscape and Visual Effects (Appendix 12.2, Table 8) to provide a range of effects from Major to Neutral.

Landscape Character / Planning Policy Designation

12.75 The extent of the impacts would be site wide but of a temporary nature. The impact would be a significant alteration to the baseline with the presence of site construction teams including vehicles, site cabins and associated noise. The site is on the edge of the existing built form of Bicester and therefore the impacts during the construction phase are considered minor/moderate adverse.

12.76 Direct and indirect construction phase landscape character impacts on the site and its context would be temporary and of minor/moderate magnitude resulting in adverse effect of minor-moderate significance.

Topography and Drainage

12.77 The Proposed Development parameters already reflect the existing site levels, using the slope, so that the building elevation as set by the parameters plan ensures that the built form isn't intrusive. Any potential adverse effects on topography and drainage (e.g. from excavations for services) would be small scale and local.

12.78 Direct and indirect construction phase changes to the topography would be site wide, given the field wide change to the landform. Such activities are not uncharacteristic of a built area, the magnitude of impact would be minor resulting in a minor/moderate adverse effect.

Vegetation

12.79 The visually important existing vegetation is located on the boundaries of the site, specifically along parts of the west, east and southern boundary. These hedges form a strong visible containment from view in the wider area. The vegetation along the northern boundary allows open views from the recently built Tesco foodstore and its carpark.

12.80 The Proposed Development landscape design strategy should seek to retain all of the existing site boundary vegetation as previously noted and develop a management plan to enhance the boundaries by reinforcing the existing trees and improving their current management regimes.

12.81 The loss of the arable field vegetation would be a minor change to the overall site vegetation, resulting in minor/moderate adverse effect.

Visual Effects

12.82 Direct visual effects of the construction would result from the temporary appearance of the site as construction works progress and from the increased level of activity in the landscape. The effects of the removal of existing landscape features, such as the earthworks site strip and permanent small scale changes to the site, would also lead to 'existence' effects. These have been assessed as operational effects.

12.83 Visual changes resulting from the construction would be most pronounced in close proximity to the site and would diminish very quickly with distance, to the point that individual construction activities would no longer be visible due to the restricted zone of visibility at the site.

12.84 The Visual Sensitivity (as set out as in Assessment Methodology in Volume 2, Appendix 12.3) is set as Low, on account of the relatively degraded and low valued landscape character of the site and its surroundings. This sensitivity is used in the following assessment of individual receptors to identify the impacts upon them.

Short Distance Views from in and around the Site (Views 1-3)

12.85 These views are directly adjacent to the site's boundary. The content of the views would change with the construction works and increased activity resulting in a noticeable difference to the baseline. This would be mitigated with reduced visibility of the site construction activity with the installation of non-permeable security hoarding along the A41 and Lakeview Drive boundaries. Therefore, the Visual Magnitude of Impact would be Moderate and of a short-term and temporary nature during the Construction phase.

- Workers as Low sensitivity receptors, would experience minor/moderate adverse visual effects.
- Pedestrians, motorists and cyclists: as Low sensitivity receptors would experience minor/moderate Adverse.
- Residents: Medium to low visual receptors would experience moderate adverse from the limited number of adjacent properties.

Medium Distance Views around the Site (Views 4, 5, 7-8, 11)

12.86 These are views looking across open ground from the south-west around to the north of the site towards the Proposed Development. There are limited views from the medium distance, these are predominately from the edge of recent or future development areas, such as the Kingsmere Estate to the site with construction activity on the site being potentially visible. Views from the south east on the edge of the Graven Hill development area will be available from the emerging residential area but will be limited by vegetation and seen in the context of the existing sewage works, railway line and Tesco's store.

12.87 Receptors in this location would be construction/farm/land workers and the few residents that have a view from the completed Kingsmere Estate. The construction phase changes would be minor scale additions, glimpsed over the tops of the intervening vegetation and in the context of the existing built development or construction areas resulting in Minor magnitude impacts realising minor /moderatee adverse visual effect.

Long Distance Views around the Site (Views 6, 9-10)

12.88 These are views looking across countryside from the south-west around to the south-east of the site towards the Proposed Development, they are from limited locations, for views from the wider countryside are predominately screened by existing intervening vegetation.

12.89 Receptors in this location would be farm/land workers and recreational walkers. The changing nature of the construction phase would be minor or negligible scale changes, that are glimpsed through intervening vegetation and in the context of the existing built development or local construction areas such as the continuing development on the Kingsmere Estate, resulting in Minor magnitude impacts that give a negligible to minor adverse effect.

Operational Phase

Landscape Effects

12.90 Operational phase landscape effects are both direct and indirect. Potential direct landscape effects will result from:

- Land take resulting in changes to landscape character, sensitivity and quality of surrounding landscape; and
- Additional building massing.

12.91 Potential indirect operational phase effects on landscape character of the site may result from:

- Visual intrusion from the proposed built form;
- Activity of people working on the site;
- Vehicle movement on the site;
- Landform change; and
- Lighting effects.

Landscape Character / Planning Policy Designation

12.92 The national and local character areas characteristics are noted in paragraph 12.28-12.34 of this chapter.

12.93 At day one there would be a noticeable change in the landscape character of the site from an area of arable use to an area of office park development.

12.94 The operational activity of people working in the buildings would also bring about noticeable change in the character of the site but this would be seen in the context of the adjacent existing Tesco foodstore. The

12.95 Proposed Development would overall be seen as more active than the baseline condition particularly with the effects from associated building lighting.

12.96 Operational activity effects and existence effects, resulting from the presence of the Proposed Development, would impact on the site itself and its immediate context with the introduction of the built form.

12.97 Sensitive design of the buildings massing and orientation to assimilate the buildings with its surroundings. The magnitude is assessed as moderate adverse, given these elements will partially alter the key baseline characteristics of the surrounding area but the introduction of the new built element is so well contained within the existing strong hedgerows on the boundaries and the landform and vegetation in the surrounding countryside so that only local views are available.

12.98 At year 15 the landscape of the site would be maturing, in particular the trees and new native hedges within the Proposed Development which will filter and breakup the building mass will reduce visual intrusion from the surrounding landscape, reducing the indirect impact from a moderate to neutral adverse effect.

Vegetation

12.99 The Proposed Development will include a landscape design strategy which addresses boundary planting of native trees and shrubs, reinforcing the retained planting and creating new planting to divide the office areas.

12.100 Day one operational impacts would be permanent, minor adverse on a very small proportion of the sites landscape resulting in a minor adverse effect which is not considered significant. At year 15, effects would be reduced to neutral or minor beneficial as the existing and proposed planting matures. Landscaping will be managed through an agreed management plan, which should aim to both visually screen and create a high quality office park in keeping with the adjacent landscaping of the access road and open space. The design and management plan will need to be agreed with the local planning authority through a reserved matter planning condition.

Topography and Drainage

12.101 The Proposed Development will retain the general existing site topography with areas raised slightly to create mounding to screen and filter views within the development.

12.102 Day one operational impacts would be a permanent minor magnitude and would result in minor/ neutral adverse effects that would continue through to year 15 and beyond.

Visual Effects

12.103 Operational visual effects are changes to views that would be apparent on opening day and at Year 15. These include both intermittent and long term visual changes that would occur through the presence of the Proposed Development.

12.104 The visual changes would follow a similar pattern to that described for the construction phase, as the operation activities and visual changes would occur in the same locations and relative to the same visual receptors.

Short Distance Views from in and around the Site (Views 1-3)

12.105 At day one, the change in view with the Proposed Development will be the addition of new office buildings seen from the PROW and the adjacent residential properties on the Kingsmere Residential Estate.

12.106 The magnitude of the change in close views around the site has been assessed as Moderate, as the change will be from limited locations and well screened by retained existing vegetation.

12.107 At year 15 the mature landscape setting around the Proposed Development and additional native screen planting will have matured so that views of the buildings and structures will be limited if not obscured so that the magnitude will be minor.

12.108 Impacts at day one would be:

- Workers as Low sensitivity receptors, would experience minor adverse visual effects;
- Pedestrians, motorists and cyclists: as Low sensitivity receptors would experience a minor adverse effect; and
- Residents: Medium to low visual receptors would experience a moderate/ minor adverse effect from the limited number of adjacent properties.

12.109 At year 15 the adverse impacts would be balanced by the mitigating effects of the new landscape:

- Workers as Low sensitivity receptors, would experience neutral or a positive enhancement of visual effects;
- Pedestrians, motorist and cyclists: as Low sensitivity receptors would experience neutral visual effects; and
- Residents: Medium to low visual receptors would experience a minor adverse effect from the limited number of adjacent properties.

Medium Distance Views around the Site (Views 4, 5, 7-8, 11)

12.110 At day one, the change in view with the Proposed Development will be the addition of new office buildings seen from various locations in the surrounding countryside.

12.111 The magnitude of the change in medium distance views around the site has been assessed as Minor/ Neutral as the change will be from limited locations and well screened by intervening existing vegetation and seen in the context of existing built development.

12.112 At year 15 the mature landscape setting around the Proposed Development and additional native screen planting will have matured so that views of the buildings and structures will be limited if not obscured so that the magnitude will be Neutral.

12.113 Impacts at day one would be:

- Workers as Low sensitivity receptors, would experience neutral visual effects;
- Pedestrians, motorists and cyclists: as Low sensitivity receptors would experience neutral; and
- Residents: Medium to low visual receptors would experience neutral from the limited number of adjacent properties.

12.114 At year 15 the adverse changes would be balanced by the mitigating effects of the new landscape:

- Workers as Low sensitivity receptors, would experience neutral or a positive enhancement of visual effects.

Long Distance Views around the Site (Views 6, 9-10)

12.115 At day one, the tops of the office buildings and lighting glow from the buildings at night will visible.

12.116 The magnitude of the change in the long distance views around the site has been assessed as minor/ neutral as the change will be from limited locations and well screened by intervening existing vegetation and landform.

12.117 At year 15 the mature landscape setting around the Proposed Development and additional native screen planting will have matured so that views of the buildings and structures will be obscured so that the magnitude will be neutral.

12.118 Impacts at day one would be:

- Workers as Low sensitivity receptors, would experience neutral visual effects;
- Pedestrians, motorists and cyclists: as Low sensitivity receptors would experience neutral effects; and
- Residents: Medium to low visual receptors would experience Neutral effects from the limited number of adjacent properties.

Mitigation and Enhancement Measures

12.119 Landscape and visual measures will be incorporated at detailed design stage to prevent or reduce construction and operational effects as an integral part of the design development process. These measures have been taken into account in the preceding assessment of potential landscape and visual effects.

12.120 These features include the following elements:

- Retaining all of the existing trees and hedges along the western, eastern and southern boundary of the site;
- New native trees and shrub screen planting to reinforce existing boundaries which needs to be developed as part of an overall landscape design strategy for the site The landscape strategy plan will need to be agreed with the local planning authority through a reserved matter planning condition;
- Trees and hedges within the site to define the plots and boundaries and filter the mass of the buildings which will need to be developed as part of an overall landscape design strategy for the site. The landscape strategy plan will need to be agreed with the local planning authority through a reserved matter planning condition;
- Material, form and details of the dwellings that complement the character of the existing surrounding built form will need to be agreed with the local planning authority; and
- The elevation and massing of the buildings that complement the adjacent built development.

12.121 The Illustrative Masterplan (See Figure 12.3 below) provides an example of how the site could be developed using the parameters that have been set for the building height, massing, landscape strategy and with the retention of the existing boundary features.

12.122 New tree planting as agreed through a reserved matter planning condition would typically consist of native and indigenous species suitable for the location and having considered the future size and spread of the particular species.

12.123 These typically would include the following species: hazel (Corylus avellana), oak (Quercus robur), field maple (Acer campestre), rowan (Sorbus aucuparia), beech (Fagus sylvatica), holly (Ilex aquifolium) elm (Ulmus minor Atinia) and hornbeam (Carpinus betulus).

12.124 New hedge planting would also consist of native and indigenous species suitable for the location and be chosen to achieve dense screen hedge even in the winter months.

12.125 These typically would include the following species: hazel (Corylus avellana), hawthorn (Crataegus monogyna), holly (Ilex aquifolium) and hornbeam (Carpinus betulus).

12.126 The planting will be important in conserving and enhancing the character of the surrounding landscape.

Residual Significant Impacts

12.127 The Proposed Development includes design parameters as identified above that prevent or reduce the landscape and visual impacts and form an integral part of the project. Visual impacts will be mitigated through a landscaping strategy developed at detailed design stage and secured through a planning condition. Therefore, no further measures are considered necessary.

12.128 The level of impacts would remain unchanged from those identified in the preceding assessment and would not increase further over time.

12.129 Table 12.2 below details the residual visual and landscape effects as a result of the Proposed Development.

Table 12.2: Residual Landscape and Visual Effects

Description of Residual Effect	Geographic Scale of the Effect	Scale and Nature of Effect	Significance of Residual Effect	Duration of Effect
Residual Effects during the Demolition and Construction Phase				
Landscape Effects				
Landscape Character	Local	Minor to Moderate - adverse	**Significant**	Temporary
Topography and Drainage	Local	Minor to moderate - adverse	**Significant**	Temporary
Vegetation	Local	Minor to moderate - adverse	**Significant**	Temporary
Visual Effects				
Short Distance Views from in and around the Site (Views 1-3) – Workers	Local	Minor to moderate - adverse	**Significant**	Temporary
Short Distance Views from in and around the Site (Views 1-3) – Pedestrians	Local	Minor to moderate - adverse	**Significant**	Temporary
Short Distance Views from in and around the Site (Views 1-3) – Residents	Local	Moderate -adverse	**Significant**	Temporary
Medium Distance Views around the Site (Views 4,5,7-8, 11) (construction/farm/land workers, and residents with a view from the completed Kingsmere Estate and from the emerging Graven Hill development area)	Local	Minor to moderate - adverse	**Significant**	Temporary
Long Distance Views around the Site (Views 6,9-10) (farm/land workers and recreational walkers)	Local	Negligible to minor - adverse	Not Significant	Temporary
Residual Effects once the Proposed Development is Complete and Occupied				
Landscape Effects				
Landscape Character (0-15 years)	Local	Moderate adverse	**Significant**	Temporary (up to 15 years)
Landscape Character (after 15 years)	Local	Neutral adverse	Not Significant	Long-term
Topography and Drainage (0-15 years)	Local	Minor / neutral adverse	Not Significant	Temporary (up to 15 years)
Topography and Drainage (after 15 years)	Local	Minor / neutral adverse	Not Significant	Long-term
Vegetation (0-15 years)	Local	Minor adverse	Not Significant	Temporary (up to 15 years)
Vegetation (after 15 years)	Local	Neutral to minor - beneficial	Not Significant	Long-term
Visual Effects				
Short Distance Views from in and around the Site (Views 1-3) – Workers (0-15 years)	Local	Minor adverse	Not Significant	Temporary (up to 15 years)
Short Distance Views from in and around the Site (Views 1-3) – Workers (after 15 years)	Local	Neutral beneficial	Not Significant	Long-term
Short Distance Views from in and around the Site (Views 1-3) – Pedestrians, motorists and cyclists (0-15 years)	Local	Minor adverse	Not Significant	Temporary (up to 15 years)
Short Distance Views from in and around the Site (Views 1-3) – Pedestrians, motorists and cyclists (after 15 years)	Local	Minor adverse	Not Significant	Long-term
Short Distance Views from in and around the Site (Views 1-3) – Residents (0-15 years)	Local	Minor to moderate - adverse	**Significant**	Temporary (up to 15 years)
Short Distance Views from in and around the Site (Views 1-3) – Residents (after 15 years)	Local	Minor adverse	Not Significant	Long-term
Medium Distance Views around the Site (Views 4,5,7-8, 11) Workers (0-15 years)	Local	Neutral	Not Significant	Temporary (up to 15 years)
Medium Distance Views around the Site (Views 4,5,7-8, 11) Workers (after 15 years)	Local	Neutral - beneficial	Not Significant	Long-term

Table 12.2: Residual Landscape and Visual Effects				
Description of Residual Effect	**Geographic Scale of the Effect**	**Scale and Nature of Effect**	**Significance of Residual Effect**	**Duration of Effect**
Medium Distance Views around the Site (Views 4,5,7-8, 11) Pedestrians, motorists and cyclists (0-15 years)	Local	Neutral	Not Significant	Temporary (up to 15 years)
Medium Distance Views around the Site (Views 4,5,7-8, 11) Residents (0-15 years)	Local	Neutral	Not Significant	Temporary (up to 15 years)
Long Distance Views around the Site (Views 6,9-10) - Workers (0-15 years)	Local	Neutral	Not Significant	Temporary (up to 15 years)
Long Distance Views around the Site (Views 6,9-10) – Pedestrians, motorists and cyclists (0-15 years)	Local	Neutral	Not Significant	Temporary (up to 15 years)
Long Distance Views around the Site (Views 6,9-10) - Residents (0-15 years)	Local	Neutral	Not Significant	Temporary (up to 15 years)

Cumulative Impacts

12.130 Cumulative impacts are those that result from additional changes to the landscape or visual amenity caused by the Proposed Development in conjunction with other developments. There needs to be a consideration of the likely significant effects rather than a comprehensive cataloguing of every conceivable effect that might occur.

12.131 The schemes and range of developments that are to be considered are provided in Chapter 2: EIA Methodology, however those specific to landscape and visual chapter include:

- Bicester 3 (Kingsmere Residential Estate) a residential, community facilities and open space development;
- Bicester Gateway Retail (part of the Bicester 3 policy area); and
- Bicester Gateway Office Park (part of the Bicester 10 policy area).

Landscape Effects

12.132 Cumulative landscape effects result from in-combination impacts on the physical landscape elements and on landscape character. The latter may be direct effects on the site's landscape character or indirect intrusion based effects on the wider landscape.

12.133 In terms of the direct landscape effects these changes would result in urbanisation of the site landscapes however in all cases effects are contained within a strong structure of mature vegetation which reduces the adverse effects.

12.134 Cumulative effects would be limited to the change of character of the location from rural edge to urban form, there would be limited physical change in the landform with the developments generally being retained at the same or similar levels and form.

12.135 Landscape effects would be particularly noticeable along the A41 Oxford Road and Boundary Way as this quadrant of land including the site is altered in character

Figure 12.4: Illustrative Masterplan

Visual Effects

12.136 Cumulative visual effects result from simultaneous or successive or sequential visual effects from the individual projects acting on receptors in, and moving through, the landscape.

Kingsmere Estate

12.137 The residential estate is located directly to the west of the Proposed Development site on the opposite side of the A41 Oxford Road. There would be direct and simultaneous views of both sites for a short length of the main road that is an important gateway to Bicester Town. The development of the Kingsmere Estate will have greater prominence than the proposed Bicester Office Park, the significance of effects of the Proposed Development will therefore not alter.

Bicester Gateway Retail

12.138 The retail development is located to the north east of the hotel on the Kingsmere Residential Estate, adjacent to the A41 Oxford Road. This development is visually separated from the site and would result in no close views containing both developments and no cumulative effects.

Bicester Gateway Office Park

12.139 The office development is located to the south west of the Bicester Avenue Garden Centre, adjacent to the A41 Oxford Road. This development is visually separated from the site and would result in no close views containing both developments and no cumulative effects.

Summary of Landscape and Visual Effects

12.140 The various developments in close proximity to the Proposed Developmentt site are sufficiently distinct entities to ensure that cumulative landscape and visual effects are not significantly greater than those identified for the individual projects.

12.141 The three cumulative projects form a larger more prominent urban form and would have a wider influence on the study area landscape. Only in one instance would there be simultaneous views of both projects and this would only be for a short distance and local area.

12.142 In combination effects would perhaps be most important for landscape character (and tranquillity) but even here effects would be subtle with an intensification of land use and an introduction of urbanising elements but no step change in impact that would elevate the significance of the previously identified effects.

Conclusion

12.143 Any development will change the character of a location to some degree. However, with the correct siting, design, architectural and landscape treatment, the development can provide a positive enhancement to the existing site, with positive impacts on the physical and visual character and quality of the surrounding landscape.

12.144 The site is located to the south of Bicester adjacent to the A41 and occupies an area of approximately 13.1 hectares (ha) and consists of an area of arable field with hedgerows and mature tree bordering the western, and southern boundary and a new access road to the northern boundary.

12.145 The visual appraisal concludes that the site is not visually prominent within the wider landscape nor is it widely perceptible from the built up areas of Bicester Town. The topography of the site and that of the wider landscape is flat with areas of gently undulating countryside and, as a result views towards the site from near or middle distance views are mainly screened by intervening vegetation. Views from the southern edge of Bicester are screened by vegetation or buildings particularly Bicester Village and the elevated section of the A41.

12.146 Views towards the site from further to the east are screened either by intervening vegetation or landform. Graven Hill is an effective barrier in curtailing views from the southeast. There will be some limited views from the emerging residential development on Graven Hill (Bicester 2) but these are seen in the context of existing built development and screen by vegetation. Views towards the site from further to the south from the villages of Chesterton and Wendlebury are effectively screening by either landform or intervening vegetation. There are some local views from the east and south east direction towards the development these are from the recently constructed Kingsmere residential estate and are generally from frontage buildings only.

12.147 The Proposed Development would create a new business park for Bicester, which would also have open space and associated parking. The new business park parameters are shown on the architect's plans and would be located within a sensitively planned and extensive landscape proposal.

12.148 Access to the business park will be afforded from the A41 via the recently constructed Lakeview Drive which also serves the new Tesco's foodstore.

12.149 The results of the visual assessment and preparation of the ZVI plans of the Proposed Development Zones demonstrate that only limited filtered and partial views of the upperparts of the development zones are visible from the surrounding area, in particular from the south and east of the site which are being developed for housing at present.

12.150 The overall landscape objective is one of integration and the creation of a high quality office buildings set in a landscaped park. This will need to be achieved through a landscape design and management plan agreed with the local planning authority and submitted as a reserved matter planning condition.

12.151 The Proposed Development has been informed by the desirability to protect the intrinsic features of the site and to ensure that the Proposed Development is sensitively integrated into the existing landscape setting.

12.152 The landscape strategy adopted for Proposed Development will provide a high quality landscape at the entrance to the town of Bicester. The Proposed Development will provide a strong sense of place with a high quality landscape that will comprise of connected open spaces, pedestrian and public transport linkages and ecological enhancements.

12.153 The key benefits provided by the landscape and masterplan strategy can be summarised as follows:

- The integration of the Proposed Development by providing a carefully considered and comprehensive landscape setting, thereby minimising the effects of new buildings and car parking on the existing character of the site;
- The retention and enhancement of existing boundary vegetation along the western, eastern and southern boundaries of the site, including the provision of landscape buffer planting along the northern boundary of the site;
- The introduction of trees and hedgerow planting to provide green connections between existing habitats at the perimeter of the site and beyond; and
- The Proposed Development will be built to current sustainable requirement sand reflect the best in architecture and urban design.

It is considered that the Proposed Development would be acceptable in landscape and visual terms and would not conflict with the aims and objectives of the landscape and environment policies within the Local Plan. The Proposed Development would offer opportunities to significantly enhance the setting and appearance of the site, including the diversification and protection of existing habitats benefiting both local ecology and landscape amenity.

Water Resources and Flood Risk

13

Introduction

13.1 This chapter of the ES reports the findings of an assessment of the likely significant effects on water resources and flood risk as a result of the Proposed Development.

13.2 This chapter sets out the relevant water resources planning policy context; the methods used to assess potential effects; the baseline conditions and potential effects on water resources 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.

13.3 The potential for cumulative effects associated with the Proposed Development and with other relevant development schemes are discussed later in this chapter. The potential for effect interactions with other identified likely significant effects arising as a result of the Proposed Development are discussed in Chapter 14: Effect Interactions of this ES (Volume I).

13.4 This chapter is supported by a Flood Risk Assessment (FRA) for the site which has been prepared in accordance with the National Planning Policy Framework (NPPF) (Department for Communities and Local Government, 2012) and the accompanying National Planning Practice Guidance and consultation with the Environment Agency (EA). A drainage strategy has also been prepared and provides information on how surface water from the Proposed Development will be managed to ensure existing surface water management and flood risk are not compromised. The drainage strategy additionally outlines the proposed plans for the management of foul water from the development. The FRA and drainage strategy are provided as ES Volume II: Appendix 13.1.

Legislative and Planning Policy Context

13.5 The legislation, policy and guidance that has influenced the assessment is listed below. Further details are provided in Appendix 13.2.

National Policy and Guidance

- National Planning Policy Framework (NPPF) (DCLG, 2012);
- National Planning Practice Guidance – Water Supply, Wastewater and Water Quality (DCLG, 2013);
- Water Resources Act (1991);
- Future Water (2008);
- Making Space for Water; and
- Water for life (white paper) (2011).

Regional Policy and Guidance

- Environment Agency River Basin Management Plan: Thames River Basin District 2016-21 (EA, 2016) - Prepared by the Environment Agency (EA) in conjunction with wider stakeholders, the Environment Agency River Basin Management Plan aims to protect and improve the water environment and will inform planning decisions and policy making. The intention is for all water bodies to achieve good status as defined by the European Water Framework Directive (WFD). The plan is updated every six years.

Local Policy and Guidance

- Cherwell Local Plan 2011-2031 – The Cherwell Local Plan 2011 – 2031 has been produced by Cherwell District Council (CDC) and sets out how the guiding policies and vision for how CDC will grow and develop in the period up to 2031. A number of policies are relevant to water resources and have been considered in this chapter. These include:
    - Policy ESD 1: Mitigating and Adapting to Climate Change;
    - Policy ESD 6: Sustainable Flood Risk Management;
    - Policy ESD 7: Sustainable Drainage Systems (SuDS);
    - Policy ESD 8: Water Resources; and
    - Policy ESD 10: Protection and Enhancement of Biodiversity and the Natural Environment.

Other Relevant Policy and Guidance

- Pollution Prevention Guidance Notes (now withdrawn);
- Construction Industry Research and Information Association Guidance; and
- Guidance C753 – The SuDS Manual.

Assessment Methodology

Assessment Approach

13.6 The methodology adopted in this assessment involves the following:

- Review of international, national and local legislation, policies and guidelines in relation to water resources, water quality and flood risk;
- Establishment of baseline conditions on and around the site through literature review and analysis of existing data obtained from the Environment Agency and Thames Water;
- Identification of sensitive receptors through desk study and consultations with the Environment Agency as reported within the FRA for the development, and with Thames Water as reported in the Drainage Strategy for this development;
- Identification of risks to water quality, water resources and flooding from development and hence the likely effects, magnitude of change and significance of environmental effects during both the demolition/construction and operational phases;
- Development of mitigation strategies through consultation with the design team;
- Identification of opportunities for enhancement of surface water quality and surface water management through design and mitigation; and
- Identification of residual effects and identification if cumulative effects.

13.7 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 broadly confirmed acceptability of the scope and method proposed for the Water Resources Assessment and highlighted the need for a surface water drainage scheme for the site will need to be submitted with a planning application (see Appendix 13.1).

Assessment of effects

Receptor Sensitivity

13.8 A qualitative assessment of receptor sensitivity is described in Table 13.1:

Table 13.1 Criteria for Determining Receptor Sensitivity

Sensitivity	Criteria
High	Water body of high amenity value, including areas of bathing and water sports are regularly practiced. Water body of good or high chemical or ecological status. Includes designated bathing waters, shellfish and salmonid fisheries. A source used for public water supply or designated as a source protection zone. Site of Special Scientific Interest (SSSI), Special Protection Area (SPA)/Special Area of Conservation (SAC), Ramsar site or highly sensitive aquatic ecosystem. Water bodies currently failing water quality objectives. Areas which are highly vulnerable. With reference to flood risk, these can include essential infrastructure, emergency services and basement dwellings.
Moderate	Water body of moderate amenity value including public parks, boating, non-contact sports, popular footpaths adjacent to water courses, or water courses running through housing developments/town centres. Water body of moderate ecological status and/ or non - public water supply or cyprinid fishery. Water body of nature conservation importance at the regional level or a moderately sensitive aquatic ecosystem e.g. Site of Nature Conservation Interest (SNCI). Areas which are more vulnerable. With reference to flood risk, these can include hospitals, residential units, educational facilities and waste management sites.
Low	Water body of poor ecological status. A source in close proximity to a source protection zone or abstraction point. Water body of particular local social/cultural/educational interest. Water body of low amenity value with only casual access, e.g. along a road or bridge in a rural area. Areas which are less vulnerable. With reference to flood risk, these can include retail, commercial and general industrial units, agricultural/forestry sites and water/sewage treatment plants.
Negligible	Low sensitivity aquatic ecosystem. Water of poor ecological status. Water body of no amenity value, seldom used for amenity purposes, in a remote or inaccessible area. Areas which are considered to be water-compatible. With reference to flood risk, these can include flood control infrastructure, docks/marinas, pumping stations and recreational/landscape areas.

Magnitude of Change / Impact

13.9 The qualitative criteria used to assess how far an effect deviates from the baseline condition, i.e. the magnitude of change, are described in Table 13.2.

Table 13.2 Criteria for Determining Effect Magnitude

Magnitude	Criteria
Large	Wholesale changes to the watercourse channel, route or hydrology. Significant changes to soil erosion or sedimentation patterns. Major changes to the water chemistry of surface run-off and groundwater. Changes to site resulting in an increase in discharge/run-off with flood/sewerage exceedance potential. A large increase to flood risk of water bodies and areas downstream. A large risk of flooding to site infrastructure and users, as determined by an on-site FRA in accordance with NPPF.
Medium	Some fundamental changes to the watercourse and hydrology. Moderate changes to soil erosion or sedimentation patterns. Moderate changes to the water chemistry of surface run-off and groundwater. Changes to site resulting in an increase in discharge/run-off within system capacity. A medium increase to flood risk of water bodies and areas downstream. A medium risk of flooding to site infrastructure and users, as determined by an onsite FRA in accordance with NPPF.
Small	Minor changes to the watercourse. Minor changes to soil erosion or sedimentation patterns. Minor changes to the water chemistry of surface run-off and groundwater. Changes to site resulting in slight increase in discharge/run-off well within drainage system capacity. A small increase to flood risk of water bodies and areas downstream. A small risk of flooding to site infrastructure and users, as determined by an onsite FRA in accordance with NPFF.
Negligible	No change to the watercourse, run-off and soil erosion and sedimentation patterns and water chemistry. Very minor to no change in discharge run-off and increased pressure on sewer capacity. No increased flood risk to water bodies and areas downstream. No risk of flooding to site infrastructure and users, as determined by an onsite FRA in accordance with NPPF

Significance Evaluation

13.10 The significance of a potential effect is derived by considering both the sensitivity of the feature and the magnitude of change, as demonstrated in 13.3.

Table 13.3 Matrix for Determining Effect Significance

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

13.11 Note that moderate and major effects are considered to be 'significant'.

Baseline Conditions

Current Baseline

Existing Land Use

13.12 The current baseline is 2017. The baseline assessment covers the site and areas surrounding which may impact the Proposed Development or be susceptible to impact as a result of the Proposed Development; this includes major water bodies within a material distance of the site, as deemed by the technical specialist.

13.13 The plot is approximately 13.12 hectares and is bound to the north and west by a dual carriageway (A41), and to the east by the London – Birmingham Snow Hill railway line. Bicester Avenue Garden Centre lies directly to the south.

13.14 The land is primarily agriculture (Grade 4) although it has been upgraded in recent years to provide access and infrastructure off Oxford Road to serve the new Tesco foodstore to the north.

Existing Site Levels

13.15 land levels along Lakeview Road in the north of the site are typically between 66.5m AOD, increasing in the west to 67.5m AOD. Along the south of Lakeview Road, there is a 0.8m to 1.5m high bund and an area of material storage north of the drainage ditch. Land slopes downwards from the road to the south boundary where land levels vary from 66.0m AOD to 65.0m AOD and to south east where levels are typically between 64.6m AOD and 64.9m AOD.

Surface Water Features

13.16 The nearest surface water feature to the site is Langford Brook which flows past the site to the south-east. The location of the Langford Brook in relation to the site boundary can be seen in Figure 13.1. There is also a small pond along the south east boundary of the site which forms part of the surface water drainage strategy for the Bicester Avenue Garden Centre. There is the potential for some water in the south of the site to drain into this pond.

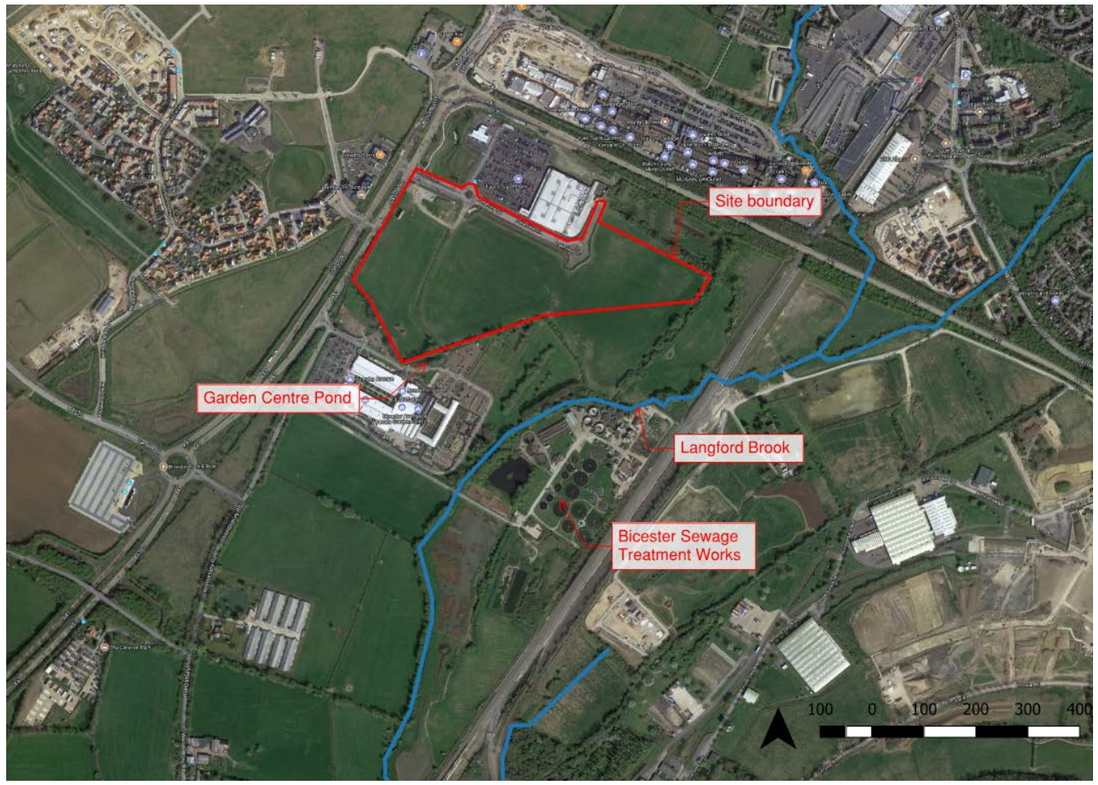


Figure 13.1 Surrounding water features in relation to indicative red line boundary

Langford Brook Water Quality

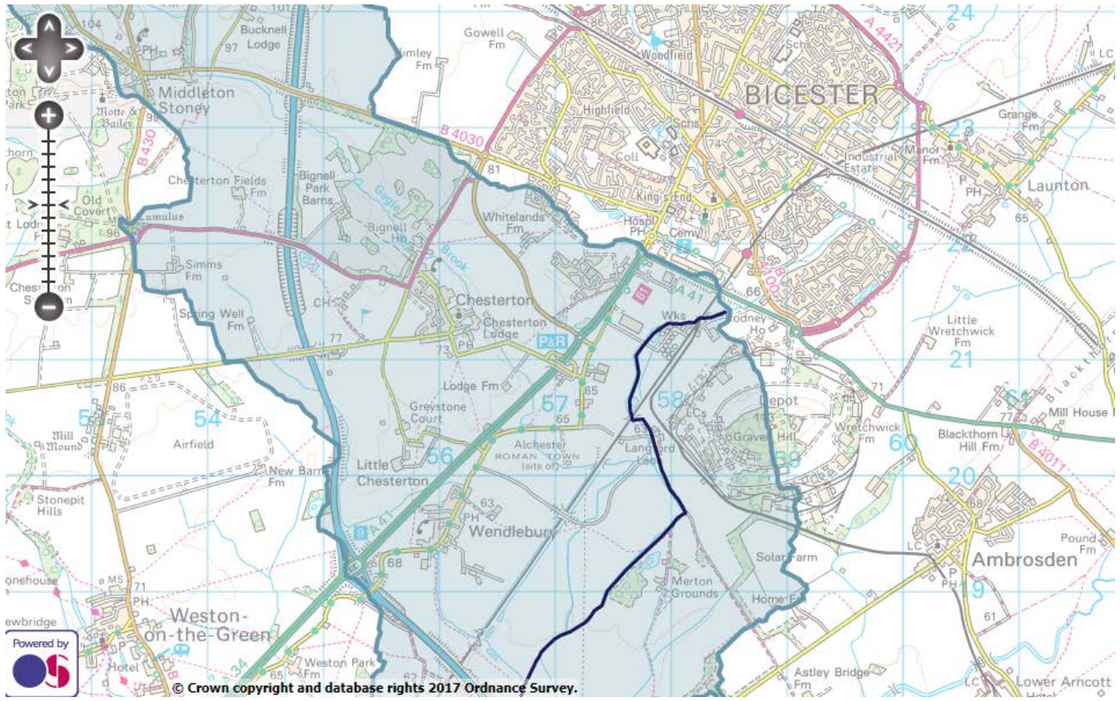
13.17 On-site drainage currently connects to the surface drainage sewer which connects to Langford Brook. Some surface water may also drain into the Garden Centre pond to the south. There is potential for on-site activities to influence the water quality of this water body through this connection both during construction and operational phases of the Proposed Development.

13.18 The European Water Framework Directive (WFD) was transposed into national law through the Water Environment WFD (England and Wales) Regulations 2003 (Statutory Instrument 2003 No. 3242). The aim of this Directive is to provide an integrated, Europe-wide approach to the management of water resources, particularly water quality. As part of the Directive, River Basin Management Plans have been established.

13.19 Langford Brook falls within the Thames River Basin District. The associated River Basin Management Plan establishes a number of requirements that must be met to comply with the WFD.

13.20 The ecological status of the Langford Brook at this location is classified as 'Poor' (Figure 13.2). The stream is expected to maintain this status at the end of the previous WFD planning cycle.

13.21 The chemical status of the Langford Brook at this location is classified as 'Good'. The stream is expected to maintain this status during the current WFD planning cycle.



	2009 Cycle 1	2016 Cycle 2	Objectives
Overall Water Body	Moderate	Poor	Poor by 2015
Ecological	Moderate	Poor	Poor by 2015
Chemical	Does not require assessment	Good	Good by 2015

Figure 13.2 WFD classification of the Langford Brook adjacent to the site (EA Catchment Data Explorer, accessed 07.08.17)

Existing Surface Water and Foul Water Drainage

13.22 A full description and drawings of the existing drainage infrastructure is provided in the drainage strategy, which forms Appendix 13.1. For the purpose of this ES chapter a brief summary is provided below.

13.23 There is an existing surface water sewer running along Lakeview Drive This was constructed as part of the primary infrastructure that was installed to serve the Tesco store and the proposed development within the red line boundary.The sewer then traverses the application site before connecting to a ditch (ordinary watercourse) which connects a stream known as the Langford Brook. A foul water sewer also follows the same route as the surface water sewer, however connects up to sewage treatment works.

13.24 It is believed that all surface water from the site currently either infiltrates into the ground, or discharges into the surface water sewer which connects to the ditch leading to the Langford Brook.

Water Supply

13.25 The Proposed Development will create an additional demand for water supply in the area. Thames Water supplies water in this location. The majority of Thames Water's water supply is derived from surface water abstraction from the River Thames and the remainder is derived from groundwater abstraction.

13.26 The EA has identified the Bicester area to be an area of water stress through the 'Identifying Areas of Water Stress for the UK' consultation.

On-site Flood Risk

13.27 A detailed assessment of existing flood risk to the site and a full summary of consultations with the EA is provided in the FRA (ES Volume II: Appendix 13.1). A summary is provided below:

Risk of Fluvial Flooding

13.28 Fluvial flooding occurs when sustained or intense rainfall events increase the flow in rivers causing water level to rise above the level of the banks and into surrounding areas.

13.29 The Flood Zone map produced by the EA shows that the majority of the site lies within Flood Zone 1 which is considered at low risk of flooding. However, land along the south east boundary lies within Flood Zones 2 (0.1% - 1% probability of flooding), 3a (>1% probability of flooding) and 3b (floodplain - >5% probability of flooding) due to the Langford Brook approximately 180m from the site.

13.30 The fluvial flood hazard map for the 1 in 100 year + 35% climate change event has been provided in Figure 13.3. The map shows the hazard rating across the site (defined in Table 13.1). This is based on the following calculation which takes into consideration velocity (v) and depth of the floodwater (d) and debris factor (DF):

$$HR = d * (v+0.5) + DF$$

Table 13.4 Flood Hazard Calculations

Flood Hazard	Hazard to People Classification	
Less than 0.75	Very Low Hazard	Caution
0.75 to 1.25	Danger for some	Includes children, the elderly and the infirm
1.25 to 2.0	Danger for most	Includes the general public
More than 2.0	Danger for all	Includes the emergency services

13.31 Figure 13.3 shows that along the south eastern boundary, there are areas of that are defined at 'Very low hazard', 'Danger for some' and some small localised spots where it is classified as 'Danger for most'.

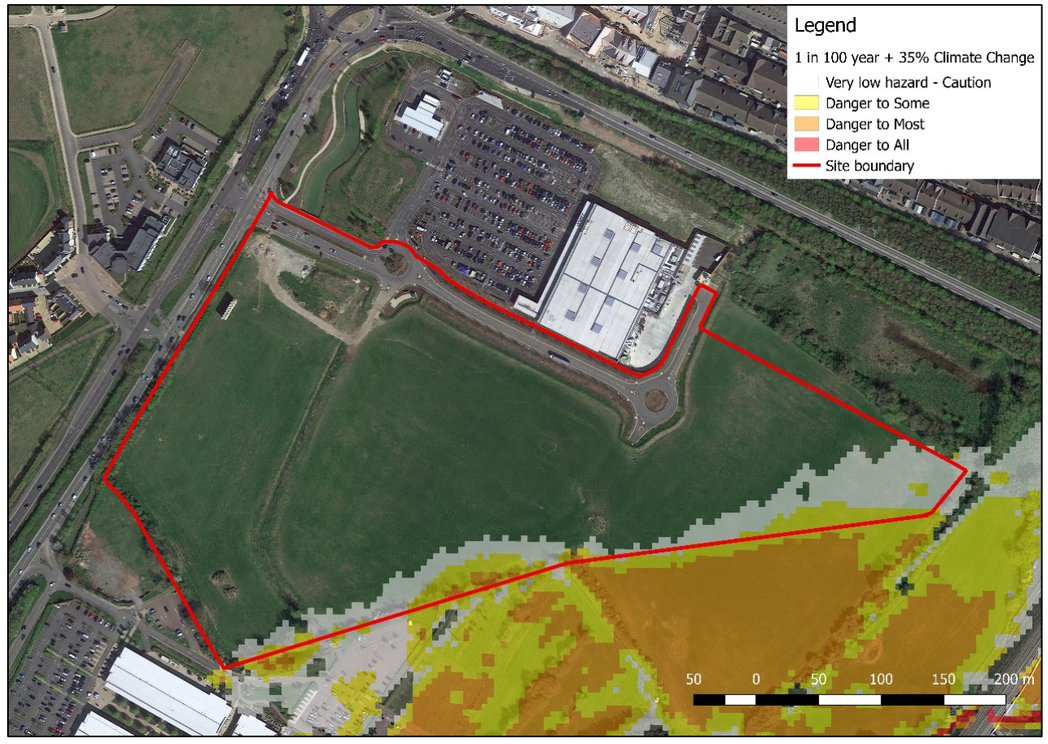


Figure 13.3 Fluvial flooding hazard map for 1 in 100 year storm event + 35% climate change *(Contains Environment Agency Information © Environment Agency and/or database right) Imagery © Google 2017, Map data © Google 2017)*

Risk of Flooding from Surface Water

13.32 Surface water flooding occurs when intense rainfall is unable to naturally soak into the ground due to impermeable ground covering such as concrete or tarmac, or low permeability ground conditions preventing infiltration. This excess surface water can flow through built-up areas and open space and pond in lower-lying areas causing localised flooding.

13.33 The Environment Agency surface water map shows that the majority of the site is at very low risk of surface water flooding (i.e. less than 1 in 1,000 annual probability of surface water flooding in any year). Figure 13.4 has been reproduced using the EA flood extent data. The map shows that there is an area at high risk of flooding (less than a 1 in 30 annual probability of surface water flooding) from the north to the south of the site. This corresponds to the location of the drainage ditch. The EA's model results typically show between 300 to 600mm of flooding with localised spots between 600 to 900mm for the 1 in 100 annual exceedance probability event as shown in Figure 13.4.

13.34 There are areas of low to medium risk of surface water flooding (between a 1 in 30 and 1 in 100 and between a 1 in 100 and 1 in 1000 annual probability respectively) adjacent to drainage ditch, along the eastern boundary and south eastern corner of the site. The predicted depths from the EA's modelling are less than 300mm for the 1 in 100 annual probability event.

13.35 The area along the northern boundary of the site shows areas of low, medium and high surface flood risk. This area has been re-configured as part of the 2015 superstore works which may not be reflected in the modelling. Depths for the 1 in 100 annual probability event are predicted as below 300mm.

Figure 13.4 Environment Agency's surface water flood extents map (© Environment Agency copyright and/or database right 2015. All rights reserved. Some features of this map are based on digital spatial data from the Centre for Ecology & Hydrology, © NERC (CEH). Soils Data © Cranfield University (NSRI) and for the Controller of HMSO 2013. Imagery © Google 2017, Map data © Google 2017)

Figure 13.5 Environment Agency's surface water flood depth map for 1 in 100 annual probability event (© Environment Agency copyright and/or database right 2015. All rights reserved. Some features of this map are based on digital spatial data from the Centre for Ecology & Hydrology, © NERC (CEH) and © Lead Local Flood Authorities. Soils Data © Cranfield University (NSRI) and for the Controller of HMSO 2013. Imagery © Google 2017, Map data © Google 2017)

Figure 13.6 shows that for the 1 in 100 annual probability event, the flooding in the locality of the drainage ditch has areas which pose a 'Danger for most', 'Danger for some' and areas 'Very Low Hazard – Caution'. There is also a 'Very Low Hazard – Caution' areas along the eastern and northern boundary with localised spots of 'Danger for some' on Lakeview Drive.

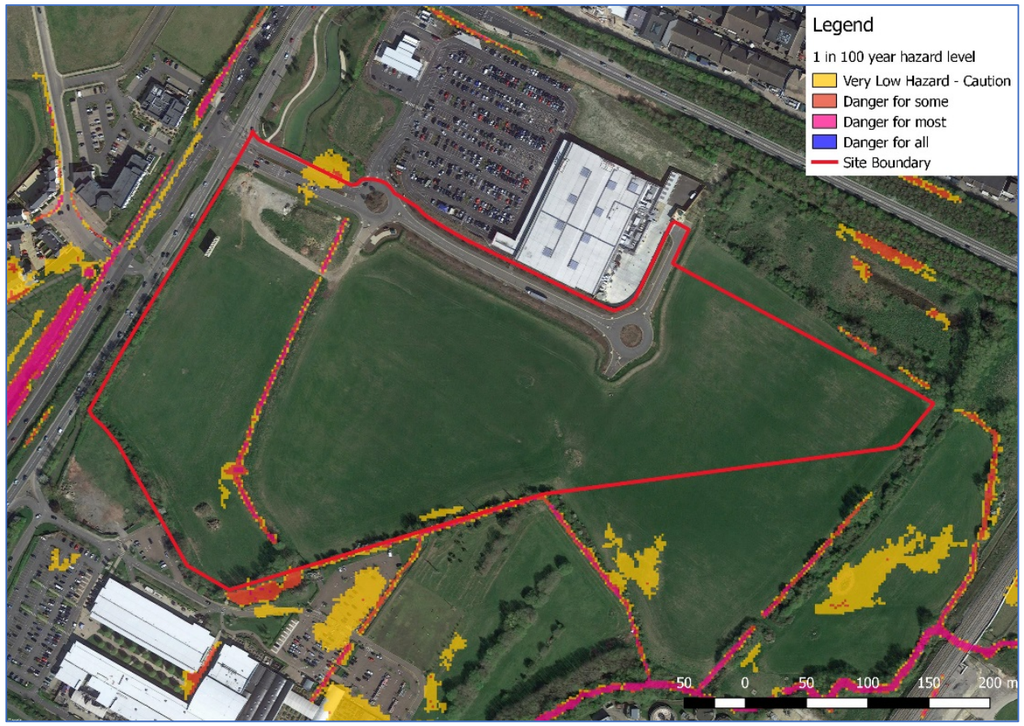


Figure 13.6 Environment Agency's surface water flood hazard map for the 1 in 100 annual probability event (© Environment Agency copyright and/or database right 2015. All rights reserved. Some features of this map are based on digital spatial data from the Centre for Ecology & Hydrology, © NERC (CEH). Soils Data © Cranfield University (NSRI) and for the Controller of HMSO 2013. Imagery © Google 2017, Map data © Google 2017)

Risk of Flooding from Sewers

13.36 Flooding from sewers is typically associated with blockage, failure or overloading of the sewer network.

13.37 The Level 2 SFRA Thames Water DG5 database map showed no recorded sewer flooding incidents within or in the vicinity of the site for the period during 2000-2010 from public foul, combined or surface water sewers. The SFRA also reported that Cherwell District were not aware of any historical incidents on the site but 'are aware of the limited sewer capacity in Bicester'.

13.38 There are two existing combined public sewers which are to the south east of the proposed development site, parallel to the existing ditch (tributary of the Langford Brook) from Bicester village to the sewage treatment plant as shown in Figure 13.7 taken from the 2011 BuroHappold Drainage Strategy for the Tesco Development. The BHE site report from 2014 showed evidence of localised sewer flooding however, these were related to manholes outside of the site boundary as shown in Figure 13.7.

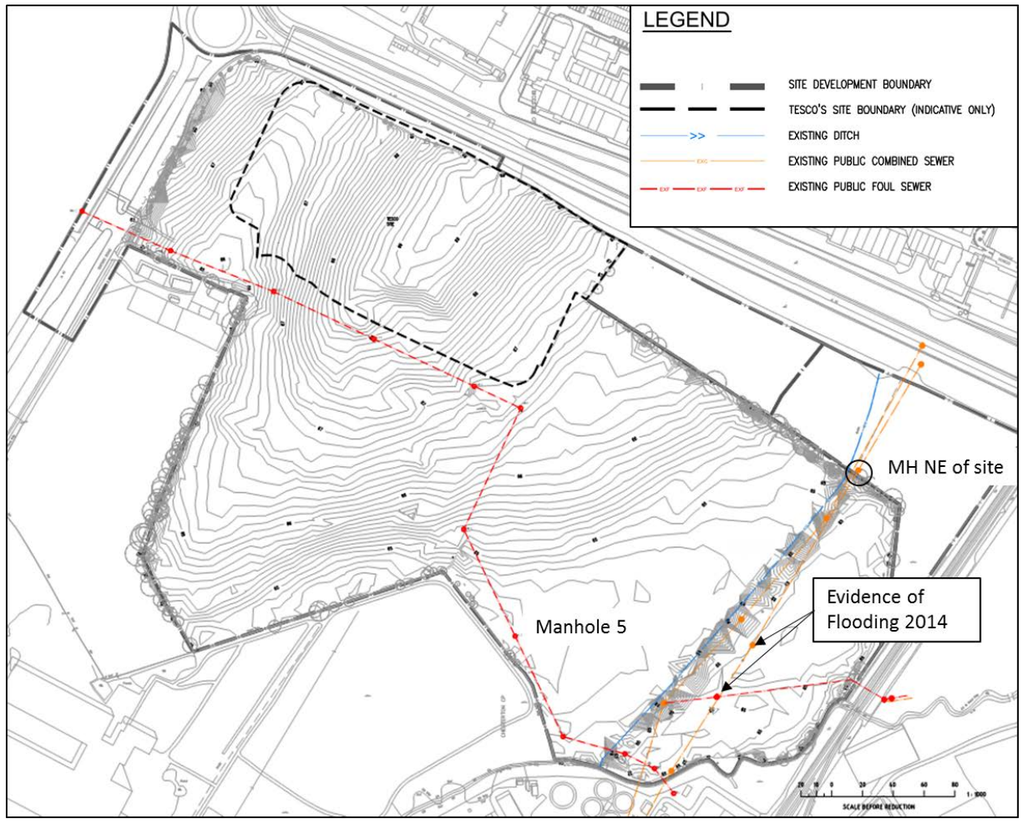


Figure 13.7 Existing Services Information from 2011 Tesco Drainage Strategy

13.39 There is also an existing 600mm diameter foul sewer which crosses the site from the A41 Oxford Road east along Lakeview Drive before turning south and then south east towards the sewage treatment works. This was installed as part of the primary infrastructure works to support the Tesco foodstore and masterplan works.

13.40 In December 2014 / January 2015, it was reported that there was localised foul flooding at a manhole 80m to the south-east of the site and at two combined sewers approximately 240m to the east of the site. It is understood that this was associated with an issue downstream at the sewage treatment works rather than a capacity issue.

13.41 There are no known sewer flood incidents on site however, there have been incidents of sewer flooding in the vicinity of the site due to downstream issues. During a site visit in November 2017, there was evidence of sewer flooding from the two combined sewer manholes and the manhole north-east of the site (circled on Figure 13.7) by the presence of detritus. From a review of the topographic survey and LiDAR data in combination with a review on site, flood water from the north east manhole would likely flow along the drainage ditch to the east away from the site. We are led to believe that the offsite foul sewer flooding at MH5 was as a result of a combination of unusual events which led to surcharging rather than a pipe capacity issue. The risk

of sewer flooding to the site is therefore considered low. However, further consultation will be needed with Thames Water during detailed design.

Risk of Flooding from Groundwater

13.42 Flooding from groundwater occurs when the water table in permeable rocks such as chalk and limestone rises to enter underground spaces such as basements and cellars or reaches a sufficient level to emanate from the ground surface itself. Groundwater flooding is not necessarily directly linked to a specific rainfall event and is generally of longer duration than other causes of flooding (possibly lasting for weeks or months).

13.43 The Cherwell District Council Level 2 SFRA provides the Environment Agency's Area Susceptibility to Groundwater Flooding map. The map shows that the eastern half of the site lies within a 1km square which has up to 25% of its area susceptible to groundwater flooding and the western site between or equal to 25% and less than 50%.

13.44 Ground investigation was undertaken on site in 2008 and 2014. Boreholes and a Trial Pit show that groundwater was either not encountered or was an artisian groundwater level at depth between 8.9, and 11.7m within the Forest Marble Formation. This formation is considered a confined aquifer with low permeability.

13.45 The Eastern part of the site is underlain immediately by the Kellaways Formation which is classified as an Unproductive Aquifer with the Forest Marble Formation at depth. Boreholes and Trial Pits showed groundwater levels were within the superficial deposits between 0.6m and 1.4m. Given the low permeability of the Kellaways Formation geology, it is considered that there is a low risk of groundwater flooding for the Eastern part of the site.

Risk of Flooding from Artificial Sources

13.46 The Environment Agency map shows that there are no reservoirs located within the vicinity of the site and that the site does not lie within a breach flood flow path of a reservoir. Neither are there canals within the vicinity of the site and therefore the site is not at risk of canal flooding.

13.47 There is a pond to the north of the site as part of the Tesco foodstore. This is an ornamental pond which forms part of the landscaping works and has an overflow into the drainage network. The pond is lower than the surrounding ground levels so the risk of breach of the pond is considered to be low.

13.48 There is also a small pond along the south east boundary of the site which forms part of the surface water drainage strategy for the Garden Centre. This is also at a lower elevation than the site and therefore is not considered to pose a risk of flooding from breach.

13.49 In summary, the site is at a low risk of flooding from artificial sources.

Identified Receptors and their Sensitivity

13.50 Potential receptors have been identified through the assessment of baseline conditions. Sensitivities have been applied as indicated in Table 13.5.

Table 13.5 Identified receptors and their sensitivity

Receptor		Sensitivity	Justification
Langford Brook	Water Quality	Moderate	Poor dilution of pollutants due to low water volume. Amenity value associated with this water body.
Garden Centre Pond	Water Quality	Moderate	Amenity value associated with this water body.
Water services infrastructure	Capacity	Low	Drainage infrastructure has been sized appropriately to manage development on the proposed site.
Water services infrastructure (supply)		High	Bicester is a water stressed area. The WRMP has identified a growing water supply deficit.
Water services infrastructure (foul treatment)		Low	Sewerage system has been sized appropriately to manage development on the proposed site.
Site users		High	Demolition and construction site workers and site users during operation.

Pre mitigation Construction Effects

Relevant Aspects of The Proposed Development

13.51 The risks to the water environment during construction includes:

- Increase in sediment loads caused by site run-off containing elevated suspended sediment levels. This can result from land clearance, excavation, stockpiling, bunding, wheel washing and movement of materials to and from the site;
- The release of hydrocarbons and oils into the on-site drainage system due to a large number of vehicles accessing the site, leakage from oil / fuel storage tanks and accidental spillages;
- Accidental leaks and use of hazardous materials, particularly concrete and cement products, which can be contained in uncontrolled wash-down water and surface water run-off;
- Dust and debris caused by poor management of site; and
- Leaks or breakage of temporary sewerage system infiltrating groundwater and/or migrating to surface waters.

13.52 These effects can be identified as temporary (construction activities) or permanent (loss of habitat) and risks relating to the water environment as a result of the Proposed Development are discussed in detail below, and summarised in Table 13.6.

Increased Sediment Loads

13.53 Site run-off containing elevated suspended sediment levels can result from land clearance, excavation, stockpiling, bunding, wheel washing and movement of materials to and from the site. Run-off with high sediment loads can have adverse effects on water bodies through increasing turbidity (thus reducing light penetration and reducing plant growth), and by smothering vegetation and bed substrates (thus effecting on animal communities through the destruction of feeding areas, refuges and breeding / spawning areas). Indirect adverse effects can also be associated with suspended sediments that have inorganic or organic contaminants (e.g. heavy metals and pesticides respectively). Sediment can additionally cause issues within runoff channels through clogging and blockages resulting in reduced flow capacity.

13.54 As the primary existing receptor, the sewer network is most likely to be affected by elevated sediment loads through clogging / blocking, premature operation of combined sewer overflows or localised flooding. The magnitude of change to the sewer network capacity is considered to be medium without effective management of sediment loads during construction. The effect significance is therefore minor adverse.

13.55 Langford Brook is also likely to be affected by construction activities through construction site drainage draining into the stream. When considering receptor sensitivity, the overall significant effect is considered to be moderate adverse for water quality in Langford Brook.

13.56 Water drainage from runoff and foul sewerage will link into the existing sewerage system running through the site and will not be routed near the Garden Centre Pond therefore any effects related to sewerage systems will not be relevant for this receptor. Additionally, surface runoff from the site into the Garden Centre Pond is

deemed to be indiscernible as the pond is protected by surrounding vegetation and there is no hard standing leading from the site to the pond, meaning water will largely infiltrate into the ground. Therefore, the only risk for the Garden Centre Pond relates to dust as discussed below.

Hydrocarbons and Oils

13.57 The release of hydrocarbons and oils into the on-site drainage system is a common form of pollution within urban areas. There is a risk such pollution will increase during construction with greater numbers of vehicles accessing the site.. This increase will likely include a significant number of heavy vehicles. Increased vehicle movements results in a greater likelihood of leakage from oil / fuel storage tanks and accidental spillages. Oils and fuels that are washed from surfaces into the on-site drainage system are likely to discharge to the drains.

13.58 Hydrocarbons form a film on the surface of the water body, deplete oxygen levels and can be toxic to freshwater fish. Even at very low concentrations the film can negatively affect the visual appearance of the water body. The effect would be temporary, and water quality within the affected water body would improve over time as pollutants disperse and are treated by natural processes.

13.59 Hydrocarbons may affect Langford Brook through discharge into the sewer. When considering receptor sensitivity, the overall significant effect is considered to be moderate adverse for water quality in Langford Brook.

Accidental Leaks of and Use of Hazardous Materials

13.60 The use of concrete and cement products on-site can present a pollution risk because of the potential for uncontrolled release of wash-down and surface water run-off If these activities are not carried out in designated areas, wastewater may enter a water body and adversely affect the combined sewer and aquatic environment. Concrete products are highly alkaline and corrosive; fish can be physically damaged and their gills blocked, and both vegetation and the bed of the water body can be smothered.

13.61 During demolition and construction there is an elevated risk of potential leaks or accidental spillage of hazardous chemicals infiltrating to groundwater or migrating to surface water bodies. However it is only when large quantities of hazardous substances are spilled, or the spillage is directly into the water body, that a significant risk of acute toxicity will arise in the receiving water body. The magnitude of any change will depend on the scale and nature of any potential incident and thus is difficult to predict.

13.62 For the most part, effects are likely to be temporary, water quality within the affected water body will improve over time as pollutants are dispersed and diluted.

13.63 Hazardous materials may affect Langford Brook through drainage into this water body. Considering any spillage would not be direct and the likely nature of chemicals used on this site, the overall significant effect is considered to be moderate adverse for water quality for both receptors.

Dust and Debris

13.64 Construction activities located on site have the potential to release dust and debris that may be blown into adjacent water bodies. Increased dust levels in water bodies may reduce the levels of light reaching aquatic plant and animal species. Debris blown into water bodies can decrease the recreational and aesthetic quality of the water body. Effects will however be temporary; water quality within the affected water body will improve over time as dust and debris settle or are trapped by vegetation. Sediment/debris can additionally cause issues within combined sewer networks through clogging / blocking, a reduction in flow capacity and premature operation.

13.65 The effect of dust blowing directly into water bodies will depend on the distance and site practices employed. Considering the sensitivity of the Langford Brook and the Garden Centre Pond, and the magnitude of change likely, the effect significance has been placed at minor adverse. Dust may indirectly affect water bodies through settling on site, and draining into the draining network, the effect of this is acknowledged in the assessment of increased sediment loads within surface water run-off.

Leak or Breakage of the Temporary Sewerage System

13.66 Leaks and breakages of sewers from the temporary toilet facilities on-site during construction works may result in crude sewage infiltrating groundwater or being washed into the site drainage system. Sewage contains high levels of nutrients, organic matter, coliforms and suspended solids. These can result in nutrient enrichment and eutrophication, smothering of bottom-dwelling organisms and plants, and significantly reduced oxygen levels. The effect would be temporary as water quality within the affected water body would improve over time as organic matter is dispersed and treated by natural processes.

13.67 Any temporary sewerage system will be connected to the foul sewerage system that runs under the site. Langford Brook will be affected if breakage results in sewage draining into the surface water drainage sewer which drains into the Langford Brook. With this considered, and the sensitivity of the receptors, the overall significant effect is considered to be moderate adverse for water quality for the Langford Brook.

Flood Risk to Construction Workers and Construction Plant

13.68 Without appropriate mitigation to protect construction workers from excavations/basement flooding and surface water flooding, the magnitude of change on the construction workers and plant is likely to be medium and the significance of effect is considered to be major in significance.

Table 13.6 Summary of Potentially Significant Effects During Construction

Receptor	Sensitivity	Description of effect	Magnitude of change / impact	Effect significance
Garden Centre Pond (water quality)	Moderate	Dust and debris	Small adverse	Minor adverse
Langford Brook (water quality)	Moderate	Increased sediment loads	Medium adverse	Moderate adverse
		Accidental release of hydrocarbons	Medium adverse	Moderate adverse
		Accidental release of hazardous materials	Medium adverse	Moderate adverse
		Dust and debris	Small adverse	Minor adverse
		Leak or breakage of the temporary sewerage system	Medium adverse	Moderate adverse
Water services infrastructure – drainage sewer (surface water capacity)	Low	Increased sediment loads	Medium adverse	Minor adverse
Site users (construction workers and plant)	High	Flood risks to site workers	Medium adverse	Major adverse

Completed Development Effects

Relevant Aspects of The Proposed Development and Designed-In Mitigation

13.69 The following commitments, made through the FRA and Drainage Strategy (Appendix 13.1) for the planning application, are considered to form designed in mitigation. The subsequent assessment assumes that the design measures specified in these documents are implemented.

Foul Water Drainage

13.70 The Drainage Strategy (Appendix 13.1) includes more detail regarding proposals for foul water drainage and associated demands form the Proposed Development. A summary of the proposals is provided here.

13.71 A 600mm public foul sewer constructed as part of the primary infrastructure works with blank connection points to serve the Proposed Development. The flow rates from the Proposed Development has been estimated based on the benchmarks for B1 (office) use. The total flow rate is from the Proposed Development in operation will be very low in comparison with the capacity of public sewer. It is not anticipated that there will be any flow restrictions placed on the connections by Thames Water.

13.72 The foul sewer network to serve the development will be designed in accordance with Sewers for Adoption 6th Edition or subsequent revisions.

Surface Water Drainage

13.73 The Drainage Strategy (Appendix 13.1) includes more detail regarding proposals for surface water drainage and associated demands from the development. A summary of the proposals is provided here.

13.74 The surface water sewer was designed with a capacity to serve the masterplan proposals. In accordance with the previously agreed drainage strategy that surface water runoff from the developed site will be limited to current 'greenfield' runoff rates and onsite storage will be required. The sewer capacity of the constructed surface water drainage has been designed on this basis. The storage has been assumed to be provided in accordance with Sustainable Drainage System (SuDs) design requirements

13.75 In order to limit the runoff of the current 'Greenfield' rates the drainage system to serve the Proposed Development will incorporate the recommendations within the current good practice guidance for SuDS contained in CIRIA Report C753, issued in 2015. This will be used to design the onsite drainage network unless superseded in the future.

13.76 In term of the SuDS hierarchy, the following considerations have been made:

- *"Store rainwater for later use* Rainwater harvesting could be incorporated within the Pproposed Development.
- *"Use infiltration techniques, such as porous surfaces in non-clay areas".* French drains and infiltration trenches are proposed. Permeable pavement is recommended for all car parking areas. It is not suitable for servicing/waste storage areas.This is unlikely to be suitable due to the ground conditions.
- *''Attenuate runoff by storing rainwater in swales or other 'dry' areas of landscaping''*. Swales were constructed adjacent to the access road to convey highway drainage. The system helps to reduce the rate of runoff provide infiltrations to the ground, and a degree of cleansing. These may be suitable for inclusion in the proposed landscaping.
- *"Attenuate runoff by storing rainwater in ponds or open water features for gradual release".* Ponds or water features could be incorporated into the landscape proposals. The system would provide temporary storage required during storm events and promote pollutant removal.

13.77 *"Attenuate rainwater by storing in tanks or sealed water features for gradual release".* If insufficient storage can be provided above ground, below ground storage tanks can be used. Note these can be used in combination with rainwater harvesting tanks Surface water attenuation will be required to store the runoff from 1 in 100 year storm event + 20% climate change balanced against current Greenfield runoff rate for a 1 in 100 year storm. When the drainage strategy for the Tesco store was approved a Greenfield runoff rate for the site of 9.47 l/s/ha was agreed by the Local Drainage Authority (Oxfordshire County Council).

13.78 As part of the primary infrastructure works a 150mm water main was laid under the access road and Thames Water have confirmed that this has sufficient capacity to meet the water demand requirements of the Proposed Development covered by the new outline planning application. However, it is anticipated that rainwater harvesting will be suitable for the Proposed Development and this would allow the water demand to be reduced as well providing attenuation in accordance with BS 8515:2009+A1 2013.

On-site Flood Risk

13.79 The FRA and Drainage Strategy (Appendix 13.1) includes the detailed proposals for managing flood risks to the development. A summary of the proposals is provided here.

Fluvial Flooding

13.80 For the Proposed Development, ground levels within the Functional Floodplain (i.e. within the 1 in 20 year flood extent) are not to be raised in accordance with NPPF guidance and the EA's pre-application advice. At grade car parking within this zone is considered acceptable by the Environment Agency provided there is no raising of ground levels.

13.81 A sequential approach should be taken to locating development on site to areas of lower risk of flooding. The office buildings are to be located outside of the 1 in 100 + 35% climate change and set with a minimum floor level. Car parking should be located, where possible, towards areas of lower risk of flooding (i.e. away from the south-eastern boundary).

13.82 Finished floor levels for the office buildings are to be set at the 1 in 100 year + 35% climate change flood level with an additional 300mm freeboard.

13.83 During detailed design of the site, if ground raising is required between the 1 in 20 year flood extent and the 1 in 100 year + 25% climate change flood extent, then flood compensation will be required to be provided. This will need to be provided on a level for level and volume for volume basis on site in accordance with the Level 2 SFRA Table 5-3 guidance for the site.

Surface Water Flooding

13.84 The primary surface water drainage infrastructure to serve the Proposed Development has already been constructed as part of the primary infrastructure contract for the site. The drainage was designed to provide capacity to serve the development proposals covered by the 2010 outline planning application (refer to chapter 1: Introduction for more information regarding the 2007 outline planning application).

13.85 Attenuation measures for the developed site will be designed to accommodate the increased rainfall intensities in accordance with the climate change recommendations issued by the Environment Agency in February 2016.

13.86 In accordance with Policy Bicester 4, the site is not permitted to flood from surface water up to and including the 1 in 30 year event. Surface water flooding above this event up to a 1 in 100 year event with allowance for climate change is permitted provided it is safely contained within the site. During detailed design, exceedance routes will need to be agreed to route flood water away from the threshold of buildings.

Flooding from Sewers

13.87 The primary foul water drainage infrastructure to serve the Proposed Development has already been constructed as part of the primary infrastructure contract for the site in 2011. The drainage was installed with connection points to facilitate the future connection of the masterplan site. The flow rates from the Proposed Development have been estimated based on the benchmarks for B1 (office) use. The total flow rate from the completed development will be very low in comparison with the capacity of public sewer. It is not anticipated that there will be any flow restrictions placed on the connections by Thames Water.

Groundwater Flooding

13.88 The Proposed Development does not include development below ground level that could be affected by high ground water levels such as basement car parking. Although the risk of groundwater flooding to the Proposed Development is considered low, further ground investigation during detailed design should be undertaken and consideration through the design of foundations to minimise the impact of groundwater.

13.89 To minimise any risk from groundwater flooding during excavation of the Proposed Development, cut levels should be limited to at least 0.5m above groundwater level. Where this is not possible, dewatering and other groundwater control measures will be required. Any such groundwater control measures will also require pollution control measures in accordance with EA guidance.

Potential Operational Effects of the Proposed Development and their Significance

13.90 This section considers the potential effects that the Proposed Development will have on the water environment once operational.

13.91 Impacts of the Proposed Development on the water environment during operation include:

- Pollutants contained within surface water run-off contaminating water bodies through overflows / leaks to the sewer system;
- An decrease of vegetation, trees and other green areas in the Proposed Development compared with the current baseline could increase flood risk;
- Water services infrastructure may not be able to maintain the increased water demand; and
- The effect on sewerage infrastructure on increased foul discharges and waste water to the network.

Pollutants Contained in Surface Water

13.92 Pollutants, such as silts and hydrocarbons resulting from activities on-site such as vehicle storage, vehicle washing and oil / fuels leaks would be discharged to the public surface sewerage network through surface water run-off. This can increase water turbidity, deplete oxygen levels and be toxic to the aquatic environment.

13.93 The magnitude of change will depend on the activities present and their occurrence. The effect is considered permanent, although certain activities such as accidental spillages would be temporary. It is envisaged that operational effects on the Langford Brook will be negligible due to the semi-urban setting and the fact that the flow of the water course is from the direction of the town.

Changes to Flood Risk

On-site

13.94 Southern and eastern boundaries of the site are located within flood zones 3a&b which is considered at high risk of flooding, and flood zone 2 which is considered medium risk. The FRA includes designed in mitigation such as appropriate development levels for different uses to manage this residual risk. The magnitude of change and residual significant effect to site users has therefore been assessed as minor.

Off-site

13.95 Without any mitigation, the change from vegetation to building and hard standing may increase the amount of surface water being discharged into the drainage network when compared to existing conditions. However, with inbuilt attenuation and infiltration systems within the site as described in the Drainage Strategy, the effect significance is considered to be negligible.

Water Demand

13.96 As discussed within the baseline assessment, water supply within the Bicester region is considered to be stressed.

13.97 As the population on the site will increase as a result of the Proposed Development, without appropriate potable water demand management the magnitude of change on strategic water supply could be medium and the magnitude of effect major adverse.

Foul Water Drainage

13.98 Whilst there will be a significant increase in foul water drainage volumes from the site, with an increased population on site, the capacity of the foul sewerage network has been designed to manage future development on the site. In light of this, the effect significance to the foul sewer network is considered minor adverse.

13.99 A summary of potential effects and their significance prior to further mitigation is provided in Table 13.7.

Table 13.7 Summary of Potentially Significant Effects once Operational (Completed Development)

Feature		Sensitivity	Description of effect	Magnitude of change / impact	Effect significance
Langford Brook	Water Quality	Moderate	Pollutants contained in surface water	Negligible	Negligible
Water services infrastructure (surface water)	Capacity	Low	Flood risk	Negligible	Negligible
Water services infrastructure (supply)		High	Increased water demand	Medium	Major adverse
Water services infrastructure (foul)		Low	Increased foul water discharge	Medium	Minor adverse
Site users		High	Increased flood risk	Small	Minor adverse

Mitigation and Monitoring

Construction

13.100 The contractor will develop a Construction Environmental Management Plan (CEMP) to cover the construction site works. It will include mitigation measures to protect the water environment. This will set out how construction activities will be undertaken in accordance with good practice guidance, including the Pollution Prevention Guidelines (PPG) formerly published by the EA, particularly 'PPG1 General guide to the prevention of water pollution', 'PPG2 Above ground oil storage tanks', 'PPG 5 Works in, near or liable to affect watercourses', and 'PPG 6 Working at construction and demolition sites', and other good construction guidance such as CIRIA 'Guidance C532 control of water pollution from construction sites'.

Table 13.8 Summary of Supplementary Demolition and Construction Mitigation measures

Adverse effect	Mitigation measure	Means of implementation	Timing	Essential / desirable
Elevated sediment loads in surface water	Development and implementation of a Construction Environment Management Plan (CEMP) that considers the following measures: Minimise exposed surface areas by only removing vegetation and hard-standing when necessary and keep gradients of soil as shallow as possible to prevent large amounts of earth being washed away during periods of heavy rainfall. Areas which are exposed should be reseeded or surfaced as soon as practicable. Enforce tight control of site boundaries including minimal land clearance and restrictions on the use of machinery adjacent to water bodies. Where possible, do not locate stockpiles within 10m of water bodies or drainage lines. Wheel wash facilities should be provided at all entry and exits points. Water from wheel wash facilities must not be discharged into water bodies or the on-site surface water sewerage network. Capture run off from site in perimeter cut off ditches, settlement lagoons and/or settlement tanks where possible. Any dewatering required from site excavations should be pumped into a settlement tank or lagoon and not discharge direct to a water body or the on-site surface water sewerage network. Sediment should be removed from water pumped during any extractions required. Sediment should be removed prior to discharges to the surface water network through the use of a baffle tank system or equivalent. If there is a requirement for discharge to the combined sewer, this should be throttled to a flow rate that is agreed with Thames Water prior to commencement of work.	CEMP to be secured through planning condition and implemented by contractor.	Prior to construction.	Essential
Dust and debris blowing into water bodies	CEMP to include dust suppression measures such as dampening, and wheel washing.	CEMP to be secured through planning condition and implemented by contractor.	Prior to construction	Essential
Accidental release of hydrocarbons and oils into the on-site drainage system or directly to water body	Development and implementation of a CEMP that considers the following measures: Incorporation of interceptors where appropriate into the site drainage system at high risk areas, such as parking, unloading and refuelling areas, to remove hydrocarbons and oils from surface water prior to discharge. Other measures including drip trays under equipment such as generators, and wheel washing facilities should also be implemented to minimise the risk of pollutants infiltrating groundwater or the surface water drainage network.	CEMP to be secured through planning condition and implemented by contractor.	Prior to construction	Essential
Accidental leaks and spillages of significant amounts of hazardous materials migrating into the on-site drainage system or directly to water body	Development and implementation of a CEMP that considers the following measures: Provision of storage facilities and tanks and conduct refuelling of machinery within bunded areas, which should not be located within 10m of water bodies or drainage lines. Storage and bunded areas to be constructed of impervious floors and walls with the capacity for the contents of the storage tank and an additional ten per cent safety margin. As a remedial measure, spill containment equipment such as absorbent materials should be stored on site. Mixing of construction materials, such as cement, will be conducted in designated areas located away from water bodies and drainage lines.	CEMP to be secured through planning condition and implemented by contractor.	Prior to construction	Essential
Leak or breakage of temporary sewerage system causing crude sewage to migrate to water	In order to improve groundwater and any subsequent impacts on health, the CEMP should consider the following: Provision and maintenance of temporary septic tank, cesspit and/or sewerage connection for disposal of sewage from the toilet facilities to reduce the likelihood of crude sewage infiltrating groundwater or migrating towards water bodies. Any temporary toilet facilities will be positioned at least 10m away from the banks of water bodies / the on-site culvert.	CEMP to be secured through planning condition and implemented by contractor.	Prior to construction	Essential
Flood risk to site workers and downstream areas during construction	Contractor to prepare a flood emergency and contingency plan including arrangements to make safe any static plant, move any mobile plant, and to evacuate site operatives in a flood risk emergency. Contractor will need to sign up to the EA's flood warning service which covers the site and produces a construction flood and evacuation plan for managing flood risk on site during the construction phase. During construction, stockpiles of material should not be stored within the Functional Floodplain as land raising is not permitted. It is recommended that stockpiles are located outside the 1 in 1000 year flood extent in accordance with EA guidance. Construction workers should be made aware of risks associated with excess surface water caused by overland flows and standing water. For example, risks to deep excavations and damage to plant. To minimise any risk from groundwater flooding during excavation of the site, cut levels should be limited to at least 0.5m above the groundwater level. Where this is not possible, dewatering and other groundwater control measures should be employed. Any such groundwater control measures will also require pollution control measures during the construction phase, the	CEMP to be secured through planning condition and implemented by contractor.	Prior construction	Essential

Completed Development

Table 13.9 Summary of supplementary operational mitigation measures

Receptor	Adverse effect	Mitigation measure	Means of implementation	Timing	Essential / desirable
Water services infrastructure (supply)	Water demand and foul water drainage	Early engagement with TW on the potable water needs for the development and any current restrictions. Water efficiency measures that will reduce potable demand and subsequent foul flows including one or more of the following: Low flow fittings: low flush toilets, spray taps and low flow showers; Efficient water supply: Leak detection, smart meters and pressure reduction; and Water from alternative sources: greywater recycling, rainwater harvesting, inclusion of a water butt for any residential properties that has outdoor space. The advantage of demand management is not only for reducing supply but also for minimising the volume of the foul drainage element to the combined sewer.	Through the development of potable water between now and construction of the Proposed Development	Through future development of potable water utilities strategy	Essential

Residual Effects

Table 13.10 Summary of Residual Effects

Intended End Use		Likely Effect, Geographic Scale and Duration (Pre Mitigation)	Residual Effect, Geographic Scale and Duration (Post Mitigation)	Residual Effect Significance
Construction				
Garden Centre Pond – water quality	Dust and debris	Localised minor, temporary	Negligible	**Negligible**
Langford Brook – water quality	Increased sediment loads	Localised moderate, temporary	Minor	**Minor adverse**
	Accidental release of hydrocarbons	Localised moderate, temporary	Negligible	**Negligible**
	Accidental release of hazardous materials	Localised moderate, temporary	Negligible	**Negligible**
	Dust and debris	Localised minor, temporary	Negligible	**Negligible**
	Leak or breakage of the temporary sewerage system	Localised moderate, temporary	Negligible	**Negligible**
Water services infrastructure – drainage sewer	Increased sediment loads	Localised minor, temporary	Negligible	**Negligible**
(surface water capacity)				
Site users (construction workers and plant	Flood risks to site workers	Major – site wide, temporary.	Negligible	**Negligible**
Completed Development				
Langford Brook – water quality	Pollutants contained in surface water	Localised minor, permanent	Negligible	**Negligible**
Water services infrastructure (surface water) - capacity	Decreased flood risk	Localised minor, permanent	Minor	**Minor adverse**
Water services infrastructure (supply)	Increased water demand	Localised major, permanent	Minor	**Minor adverse**
Water services infrastructure (foul)	Increased foul water discharge	Localised minor, permanent	Minor	**Minor adverse**
Site users	Increased flood risk	Localised minor, permanent	Negligible	**Minor adverse**

Cumulative Effects Assessment

13.101 Possible in-combination cumulative effects include demand on foul water, changes to the capacity of the sewer network / operation of combined sewer overflows and water supply and changes in water quality downstream. Any consented nearby development sharing water infrastructure will have the potential to contribute towards a cumulative effect with the Proposed Development.

13.102 There is potential for in-combination cumulative effects during demolition and construction with pollutant loading potentially affecting Langford Brook through runoff from the site into the surface drainage network. This is, however, not expected to be significant with compliance and implementation of the mitigation outlined within this assessment through a Construction Environmental Management Plan (CEMP).

13.103 The flood risk and drainage strategies implemented in line with the NPPF will in turn support the improvement of water quality and help Langford Brook improve ecological status.

Conclusions

13.104 Construction activity could potentially cause temporary but significant effects on water quality. With the suggested mitigation, the effects to all nearby water bodies that could be affected are considered to be non-significant (negligible and minor adverse).

13.105 Although there will be an increase in water demand and capacity required for foul drainage, the Proposed Development will need to meet water efficiency standards through a number of measures. This will assist in reducing potable water and foul water demand, through design and construction. Furthermore, the foul water sewerage system passing through the site has been designed with consideration of development on the proposed site, so has sufficient capacity to manage the needs of the Proposed Development.

Effect Interactions

14

Introduction

14.1 This chapter of the ES summarises the likelihood for intra-project effects. Note that inter-project effects have been discussed within each technical ES chapter, as appropriate, and have not been re-iterated within this ES chapter to avoid repetition.

14.2 There is no established EIA methodology for assessing and quantifying the intra- and inter- cumulative effects on sensitive receptors. However, the European Commission[1] (EC) has produced guidelines to assist EIA practitioners in developing an approach which is appropriate to a project. These guidelines have been used and an approach has been developed which uses the defined residual effects of the Proposed Development to determine the potential for intra- and inter-cumulative effects (refer to Chapter 2: EIA Methodology for further information on inter- and intra-project effects, and how these have been assessed within this ES).

14.3 Residual effects of beneficial or adverse significance that are minor, moderate or major in scale have been considered within this intra-cumulative assessment of effects; residual effects of negligible and neutral significance have been omitted, as these effects are, by definition, unnoticeable in their nature.

14.4 Table 14.1 and 14.2 present the assessment of the intra-cumulative effects respectively arising from the construction phase and the complete and occupied phase of the Proposed Development.

Effect Interactions of Individual Effects – Construction

14.5 Table 14.1 presents the inter-project cumulative effects assessment throughout the construction stage of the Proposed Development, and the potential for effect interactions. The results presented in the table are discussed in more detail below.

Table 14.1: Effect Interactions of Individual Effects – Construction

Sensitive Receptor Group	Residual Effects	Potential for Effect Interactions and so Combined Effects?
Occupants of Neighbouring and Local Residential Properties	**Landscape and Visual** (Short Distance Views from in and around the Site (Views 1-3) – Residents): **moderate adverse** **Landscape and Visual** (Medium Distance Views around the Site (Views 4,5,7-8) (construction/farm/land workers, and residents with a view from the completed Kingsmere Estate)): **minor to moderate adverse**	**No** The effects relating to views from residents during the construction period do not interact with each other, and there is therefore no potential for effect interactions between landscape and visual on occupants of neighbouring and local residential properties
Occupants of Neighbouring and Local Commercial Properties and Businesses	**Socio-Economics** (gross value added from construction workforce spending): **moderate beneficial** **Landscape and Visual** (Medium Distance Views around the Site (Views 4,5,7-8) (construction/farm/land workers, and residents with a view from the completed Kingsmere Estate)): **minor to moderate adverse**	**No** Construction workforce spending and views experienced by workers/occupants of neighbouring and local commercial properties and business, do not interact with each other, and there is therefore no potential for effect interactions between landscape and visual and socio-economics on occupants on neighbouring and local commercial properties and businesses
	Landscape and Visual (Long Distance Views around the Site (Views 6,9-10) (farm/land workers and recreational walkers)): **negligible to minor adverse**	
Demolition and Construction Site Workers	**Socio-Economics** (construction employment): **moderate beneficial** **Socio-economics** (construction training): **minor to moderate beneficial** **Landscape and Visual** (Short Distance Views from in and around the site (views 1-3) – workers): **minor to moderate adverse**	**YES** in terms of Socio-Economics effects on demolition and construction site workers
Flora and Fauna	**Ecology** (field margins): **adverse** **Ecology** (ditches): **adverse** **Ecology** (log pile): **adverse** **Ecology** (reptiles): **adverse** **Ecology** (birds nesting in hedgerows): **adverse** **Ecology** (birds - skylark): **adverse** **Ecology** (birds – red kite): **adverse** **Ecology** (bats): **adverse**	**YES** in terms of Ecology effects on flora and fauna
Local Highway Network	No effects of minor, moderate or major significance identified	**N/A**
Public Transport Network and Pedestrians	**Landscape and Visual** (Short Distance Views from in and around the Site (Views 1-3) – Pedestrians): **minor to moderate adverse**	**No** No effects to interact with
Local Air Quality	No effects of minor, moderate or major significance identified	**N/A**
Water Resources	**Water Resources and Flood Risk** (Langford Brook – Water Quality (Increased Sediment Load)): **minor adverse**	**No** No effects to interact with.
Buried Heritage (Archaeology) and Built Heritage	No effects of minor, moderate or major significance identified	**N/A**

[1] European Community (1999); Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions.

Effect Interactions

Sensitive Receptor Group	Residual Effects	Potential for Effect Interactions and so Combined Effects?
Landscape	**Landscape and Visual** (landscape character): **minor to moderate** **Landscape and Visual** (topography and drainage): **minor to moderate** **Landscape and Visual** (vegetation): **minor to moderate adverse**	**YES** in terms of landscape and visual effects on the landscape character/topography and drainage and vegetation
Local and Long Distance Views	**Landscape and Visual** (Short Distance Views from in and around the Site (Views 1-3) – Residents): **moderate adverse** **Landscape and Visual** (Medium Distance Views around the Site (Views 4,5,7-8) (construction/farm/land workers, and residents with a view from the completed Kingsmere Estate)): **minor to moderate adverse** **Landscape and Visual (**Long Distance Views around the Site (Views 6,9-10) (farm/land workers and recreational walkers)): **negligible to minor adverse**	**YES** with respect to all Landscape and Visual effects on local and long distance views experienced by residents/construction/farm/land workers and recreational walkers).
Existing Utilities Infrastructure	No effects of minor, moderate or major significance identified	**N/A**

14.6 Table 14.1 identifies that there is potential for effect interactions to take place during the construction phase of the Proposed Development, for the following resources / receptors / receptor groups:

- Demolition and Construction Site Workers;
- Flora and Fauna
- Landscape; and
- Local and Long Distance Views

Explanation of the Potential for and Significance of Combined Cumulative Effects

14.7 The moderate beneficial effect on construction employment and the minor to moderate beneficial effect on construction training (Socio-Economic effects) have the potential to interact to create a beneficial environment for demolition and constriction workers. The increased skills gained by the workers from the construction training will in turn have a beneficial effect on employability.

14.8 There is the potential for adverse Ecology effects on flora and fauna to interact with each other during the demolition and construction period. The adverse effects on the field margins, ditches and log pile will in turn have an effect on the flora and fauna on site. Mitigation measures are proposed, which will help to minimise adverse effects. These include the clearing of any areas that may support reptiles in a staged manner (arable margins, log piles, any other ruderal, scrub or tall grassland habitats other than arable crop) prior to the commencement of any works in these areas. 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). Such mitigation will help to minimise effects on flora and fauna.

14.9 There is the potential for effects on short, medium and long distance views (Landscape and Visual effects) to interact to cause a nuisance to sensitive receptors (residents/construction/farm/land workers and recreational walkers). It is anticipated that there will be effects to short and medium distance views on residents, and effects to medium and long distance views experienced by construction/farm/land workers and recreational walkers. Where crossovers in effects experienced by sensitive receptors occur, it is likely that these receptors will be experience nuisance by the effects to the views. These effects are temporary in nature, and upon construction of the Proposed Development (aftertime), the landscape setting around the Proposed Development and additional native screen planting will mature overtime so that views of the buildings and structures will be limited if not obscured, therefore minimising adverse effects experienced by sensitive receptors

Combined Effects of Individual Effects – Once the Proposed Development is Completed and Occupied

14.10 Table 14.2 presents a review of the potential for intra-cumulative effects arisings once the Proposed Development is completed and operational. The potential effect interactions are then discussed further, below Table 14.2.

Table 14.2: Effect Interactions of Individual Effects – Operation

Sensitive Receptor Group	Residual Effects	Potential for Effect Interactions and so Combined Effects?
Occupants of Neighbouring and Local Residential Properties	**Air Quality** (road traffic impacts on air quality at existing receptors): **negligible to minor adverse** **Landscape** ((Short Distance Views from in and around the Site (Views 1-3) – Residents (0-15 years)): m**inor to moderate adverse** **Landscape** ((Short Distance Views from in and around the Site (Views 1-3) – Residents (after 15 years)): m**inor adverse**	**YES** Air quality and landscape and visual effect have the potential to interact to have an effect on occupants of neighbouring and local residential properties.
Occupants of Neighbouring and Local Commercial Properties and Businesses	**Socio-Economics** (gross value added): **major beneficial** **Socio-Economics** (permanent jobs): **major beneficial** **Socio-Economics** (net additional permanent jobs): **major beneficial** **Socio-economics** (training and skills development opportunities): **moderate beneficial** **Landscape** ((Short Distance Views from in and around the Site (Views 1-3) – Workers (0-15 years)): **minor adverse**	**YES** There is the potential for Socio-Economic effects to interact with each other, and for Socio-Economic effects and Landscape and Visual effects to interact to have an effect on the occupants of neighbouring and local commercial properties and businesses
Flora and Fauna	**Ecology** (birds nesting in hedgerows): **adverse**	**No** No effects to interact with
Local Highway Network	**Air Quality** (road traffic impacts on air quality at existing receptors): **negligible to minor adverse**	**No** No effects to interact with
Public Transport Network	**Landscape** ((Short Distance Views from in and around the Site (Views 1-3) – Pedestrians, motorists and cyclists (0-15 years)): m**inor adverse**	**No** Due to the differing time periods in which the landscape and visual effects occur, there is no potential for these effects to interact to have an effect on the pubic transport network.

Effect Interactions

Sensitive Receptor Group	Residual Effects	Potential for Effect Interactions and so Combined Effects?
	Landscape ((Short Distance Views from in and around the Site (Views 1-3) – Pedestrians, motorists and cyclists (after 15 years)): m**inor adverse**	
Local Air Quality	**Air Quality** (road traffic impacts on air quality at existing receptors): **negligible to minor adverse**	**No** No effects to interact with
Built Heritage	No effects of minor, moderate or major significance identified	**N/A**
Landscape	**Landscape** (landscape character 0 -15 years): **moderate adverse** **Landscape** (vegetation 0-15 years): **moderate adverse** **Landscape** (vegetation after 15 years): **moderate adverse**	**No** These landscape and visual effects have the potential to interact to have an effect on the landscape.
Existing Utilities and Infrastructure	**Water Resources and Flood Risk** (water services infrastructure (supply) – increased water demand): **minor adverse** **Water Resources and Flood Risk** (water services infrastructure (surface water) – capacity – (decreased flood risk)): **minor adverse** **Water Resources and Flood Risk** (water services infrastructure (foul) – increased foul water drainage)): **minor adverse**	**YES** there is the potential for water resources effects (water services infrastructure, surface water and increased foul water drainage) to interact to have an effect on existing utilities

14.11 Table 14.2 shows that there is potential for a series of potential effect interactions to take place once the Proposed Development is complete and occupied, for the following resources / receptors / receptor groups:

- Occupants of Neighbouring and Local Residential Properties;
- Occupants of Neighbouring and Local Commercial Properties and Businesses; and
- Existing Utilities and Infrastructure

14.12 When the potential for combined effects is considered, the receptor groups identified above are potentially affected by intra-cumulative effects.

Explanation of the Potential for and Significance of Combined Cumulative Effects

14.13 There is the potential for the negligible to minor adverse air quality effect and the landscape (short distance view from in and around the site on residents) effects on occupants of neighbouring and local residential properties to interact. There is the potential for these effects to interact to cause a nuisance to residents, who are anticipated to be adversely affected both visually and by adverse road traffic impacts on air quality. The negligible to minor adverse air quality effect is not considered to be significant, and therefore any effect interactions experienced by occupants of neighbouring and local residential properties will be minimal. Additionally, 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). These measures will help to minimise any adverse effects effect interactions experienced by these sensitive receptors.

14.14 The major beneficial effects on permanent jobs, net additional permanent jobs and gross value added, and the moderate beneficial effect on training and skills development (Socio-Economic effects), have the potential to interact. The increased skills gained by the workers from the training will have an effect on employability. Additionally, any negative effects experienced by workers with regards to short distance views from in and around the site (Landscape and Visual effect on workers views) will be improved by the beneficial socio-economic effects experienced by the workers.

14.15 There is the potential water resources effects on existing utilities and infrastructure to interact. These water resources effects include: a minor adverse effects on increased water demand; a minor adverse effect on surface water capacity and flood risk; and a minor adverse effect on foul water drainage.

14.16 Mitigation measures suggested to minimise these effects include: early engagement with the water provider on the potable water needs for the development and any current restrictions; water efficiency measures that will reduce potable demand and subsequent foul flows including low flow fittings: low flush toilets, spray taps and low flow showers.

14.17 These mitigation measures will help to minimise water resources effects on existing utilities and infrastructure.

Cumulative Effects of the Proposed Development with Other Development Schemes

14.18 As highlighted within the introduction to this ES chapter, the review of the combined effect of the Proposed Development with other developments is presented within each of the technical chapters of this ES.

Residual Effects and Conclusions

15

Introduction

15.1 This chapter of the ES presents a summary of the residual effects and the conclusions of the EIA, which has been undertaken in order to ascertain the likely significant effects of the Proposed Development during the construction works, and once completed and operational. Residual Effects are those remaining following the adoption and inclusion of mitigation measures detailed within each technical chapter within this ES.

15.2 For a detailed description of residual and likely significant environmental effects, reference should be made to individual technical chapters (Chapters 6 – 13) of the ES.

Summary of Residual Effects

15.3 For details of the methodology used to define the geographic scale, nature, duration and significance of effects, refer to Chapter 2: EIA Methodology. Table 15.1 and 15.2 of this ES chapter respectively outline the residual effects resulting from the constructions works associated with the Proposed Development, and the Proposed Development once it is complete and operational.

Residual Effects during Construction

15.4 Table 15.1 below provides a summary of the residual effects likely to arise as a result of the construction of the Proposed Development. Those effects which are considered to be 'Significant' in the context of the EIA Regulations[1] (moderate and major effects) are in **bold** and shaded **yellow**.

Table 15.1: Residual Effects during the Construction Phase of the Proposed Development

Topic Area	Description of Residual Effect	Geographic Scale of the Effect	Scale and Nature of Effect	Significance of Residual Effect	Duration of Effect
Socio-Economics	Construction Employment	Local	Moderate beneficial	**Significant**	Short term
	Gross Value Added	Local	Moderate beneficial	**Significant**	Short Term
	Construction training	Local	Minor to moderate - beneficial	**Significant**	Short term
Transportation and Access	Severance (Lakeview Drive)		Negligible	Not significant	N/A
Noise and Vibration	Construction Activity	Local	Negligible	Not significant	N/A
	Construction Traffic	Local	Negligible	Not significant	N/A
Air Quality	Dust Soiling	Local	Negligible	Not significant	N/A
	Dust Impacts on Human Health	Local	Negligible	Not significant	N/A
Buried Heritage (Archaeology) & Built Heritage	Site no. 180 (Mesolithic Flint scatter with Later Prehistoric and Roman features)	Local	Negligible	Not significant	N/A
	Site no. 285 (Ridge and Furrow)	Local	Negligible	Not significant	N/A
	Site no. 286 (Circular cropmark from aerial photography)	Local	Negligible	Not significant	N/A
	Site no. 287 (Field boundaries (extant and buried)	Local	Negligible	Not significant	N/A
Ecology	Field Margins	Local	Adverse	Significant	Temporary
	Hedgerows	Local	Negligible	Not significant	Temporary
	Trees	Local	Negligible	Not significant	Temporary
	Ditches	Local	Adverse	Significant	Temporary
	Log pile	Local	Adverse	Significant	Temporary
	Reptiles	Local	Adverse	Significant	Temporary
	Birds – nesting in hedgerows	Site level	Adverse	Significant	Temporary
	Birds – skylark	Local	Adverse	Significant	Temporary
	Birds – Red kite	Site level	Adverse	Significant	Temporary
	Badgers	Site level	Negligible	Not significant	Temporary
	Bats	Site level	Adverse	Significant	Permanent
Landscape and Visual Impact Assessment	Landscape Effects				
	Landscape Character	Local	Minor to moderate - adverse	**Significant**	Temporary
	Topography and Drainage	Local	Minor to moderate - adverse	**Significant**	Temporary
	Vegetation	Local	Minor to moderate - adverse	**Significant**	Temporary
	Visual Effects				
	Short Distance Views from in and around the Site (Views 1-3) – Workers	Local	Minor to moderate - adverse	**Significant**	Temporary
	Short Distance Views from in and around the Site (Views 1-3) – Pedestrians	Local	Minor to moderate - adverse	**Significant**	Temporary

[1] HM Government. The Town and Country Planning (Environmental Impact Assessment) Regulations 2017. London: HMSO, 2017

Residual Effects and Conclusions

Table 15.1: Residual Effects during the Construction Phase of the Proposed Development					
Topic Area	**Description of Residual Effect**	**Geographic Scale of the Effect**	**Scale and Nature of Effect**	**Significance of Residual Effect**	**Duration of Effect**
	Short Distance Views from in and around the Site (Views 1-3) – Residents	Local	Moderate - adverse	**Significant**	Temporary
	Medium Distance Views around the Site (Views 4,5,7-8) (construction/farm/land workers, and residents with a view from the completed Kingsmere Estate)	Local	Minor to moderate - adverse	**Significant**	Temporary
	Long Distance Views around the Site (Views 6,9-10) (farm/land workers and recreational walkers)	Local	Negligible to minor - adverse	Not significant	Temporary
Water Resources and Flood Risk	Garden Centre Pond – Water quality (Dust and Debris)	Local	Negligible	Not significant	Temporary
	Langford Brook – Water Quality (Increased Sediment Load)	Local	Minor Adverse	Not significant	Temporary
	Langford Brook – Water Quality (Accidental Release of Hydrocarbons)	Local	Negligible	Not significant	Temporary
	Langford Brook – Water Quality (Accidental Release of Hazardous Materials	Local	Negligible	Not significant	Temporary
	Langford Brook – Water Quality (Dust and Debris)	Local	Negligible	Not significant	Temporary
	Langford Brook – Water Quality (Leak or Breakage of the Temporary Sewerage System)	Local	Negligible	Not significant	Temporary
	Water Services Infrastructure – Drainage Sewer (Surface Water Capacity)	Local	Negligible	Not significant	Temporary
	Site Users (Construction Workers and Plant) – Flood Risk to Site Workers	Local	Negligible	Not significant	Temporary

Residual Effects Once the Proposed Development is Completed and Operational

15.5 Table 15.2 below summarises the residual effects which have been identified by the individual technical assessments as likely to arise as a result of the operation of the Proposed Development. Those effects which are considered to be 'Significant' in the context of the EIA Regulations[1] are in bold.

Table 15.2: Residual Effects once the Proposed Development is Complete and Occupied					
Topic Area	**Description of Residual Effect**	**Geographic Scale of the Effect**	**Scale and Nature of Effect**	**Significance of Residual Effect**	**Duration of Effect**
Socio-Economics	Employment Effects				
	Permanent jobs	Regional	Major beneficial	**Significant**	Long-term
	Net additional permanent jobs	Regional	Major beneficial	**Significant**	Long-term
	Economic Effects				
	Gross value added	Regional	Major Beneficial	**Significant**	Long-term
	Training Opportunities				
	Training and skills development opportunities	Local	Moderate Beneficial	**Significant**	Long-term
Transportation and Access	Severance (Lakeview Drive)	Local	Negligible	Not significant	Permanent
	Delay	Local	Negligible	Not significant	Permanent
	Amenity	Local	Negligible	Not significant	Permanent
	Fear and Intimidation	Local	Negligible	Not significant	Permanent
	Accidents and Safety	Local	Negligible	Not significant	Permanent
Noise and Vibration	Site Activity	Local	Negligible	Not significant	Permanent
	Mechanical Services Plant	Local	Negligible	Not significant	Permanent
	Road Traffic	Local	Negligible	Not significant	Permanent
Air Quality	Road traffic impacts on air quality at existing receptors	Local	Negligible to Minor Adverse	Not significant	Permanent
Ecology	Field Margins	Local	Negligible	Not significant	Permanent
	Hedgerows	Local	Negligible	Not significant	Permanent
	Trees	Local	Negligible	Not significant	Permanent
	Ditches	Local	Negligible	Not significant	Permanent

Residual Effects and Conclusions

	Log pile	Local	Negligible	Not significant	Permanent
	Reptiles	Local	Negligible	Not significant	Permanent
	Birds – nesting in hedgerows	Site level	Adverse	**Significant**	Permanent
	Birds – skylark	Local	Negligible	Not significant	Permanent
	Birds – Red kite	Site level	Negligible	Not significant	Permanent
	Badgers	Site level	Negligible	Not significant	Permanent
	Bats	Site level	Negligible	Not significant	Permanent
Landscape and Visual Impact Assessment	Landscape Effects				
	Landscape Character (0-15 years)	Local	Moderate adverse	**Significant**	Temporary (up to 15 years)
	Landscape Character (after 15 years)	Local	Neutral adverse	Not significant	Long-term
	Topography and Drainage (0-15 years)	Local	Minor / neutral adverse	Not significant	Temporary (up to 15 years)
	Topography and Drainage (after 15 years)	Local	Minor / neutral adverse	Not significant	Long-term
	Vegetation (0-15 years)	Local	Minor adverse	Not significant	Temporary (up to 15 years)
	Vegetation (after 15 years)	Local	Neutral to minor - beneficial	Not significant	Long-term
	Visual Effects				
	Short Distance Views from in and around the Site (Views 1-3) – Workers (0-15 years)	Local	Minor adverse	Not significant	Temporary (up to 15 years)
	Short Distance Views from in and around the Site (Views 1-3) – Workers (after 15 years)	Local	Neutral beneficial	Not significant	Long-term
	Short Distance Views from in and around the Site (Views 1-3) – Pedestrians, motorists and cyclists (0-15 years)				
	Short Distance Views from in and around the Site (Views 1-3) – Pedestrians, motorists and cyclists (after 15 years)	Local	Minor adverse	Not significant	Long-term
	Short Distance Views from in and around the Site (Views 1-3) – Residents (0-15 years)	Local	Minor to moderate - adverse	**Significant**	Temporary (up to 15 years)
	Short Distance Views from in and around the Site (Views 1-3) – Residents (after 15 years)	Local	Minor adverse	Not significant	Long-term
	Medium Distance Views around the Site (Views 4,5,7-8) Workers (0-15 years)	Local	Neutral	Not significant	Temporary (up to 15 years)
	Medium Distance Views around the Site (Views 4,5,7-8) Workers (after 15 years)	Local	Neutral - beneficial	Not significant	Long-term
	Medium Distance Views around the Site (Views 4,5,7-8) Pedestrians, motorists and cyclists (0-15 years)	Local	Neutral	Not significant	Temporary (up to 15 years)
	Medium Distance Views around the Site (Views 4,5,7-8) Residents (0-15 years)	Local	Neutral	Not significant	Temporary (up to 15 years)

	Long Distance Views around the Site (Views 6,9-10) - Workers (0-15 years)	Local	Neutral	Not significant	Temporary (up to 15 years)
	Long Distance Views around the Site (Views 6,9-10) – Pedestrians, motorists and cyclists (0-15 years)	Local	Neutral	Not significant	Temporary (up to 15 years)
	Long Distance Views around the Site (Views 6,9-10) - Residents (0-15 years)	Local	Neutral	Not significant	Temporary (up to 15 years)
Water Resources and Flood Risk	Langford Brook – Water Quality (Pollutants Contained in Surface Water)	Local	Negligible	Not significant	Permanent
	Water Services Infrastructure (Surface Water) Capacity (Decreased Flood Risk)	Local	Minor Adverse	Not significant	Permanent
	Water Services Infrastructure (Supply) – Increased Water Demand	Local	Minor Adverse	Not significant	Permanent
	Water Services Infrastructure (Foul) – Increased Foul Water Drainage	Local	Minor Adverse	Not significant	Permanent
	Site Users – Increased Flood Risk	Local	Negligible	Not significant	Permanent

Summary of Likely Significant Environmental Effects

Construction

15.6 Likely significant adverse effects identified during the construction phase of the Proposed Development relate to the impact on townscape views, heritage assets and ecological features. These include landscape related effects on landscape character, topography and drainage and vegetation, visual effects pertaining to short and medium distance views and ecological effects relating to habitats and protected species.

15.7 Likely significant beneficial effects identified during the construction phase of the Proposed Development are socio-economic in nature. There are likely significant (moderate beneficial) effects on construction employment and cross value added, and likely significant (minor-moderate beneficial) effects on construction training, during the construction period. The remaining construction effects are considered to be not significant.

15.8 It should be noted that the construction phase effects are short-term in nature and temporary. For development to take place these effects are unavoidable. A series of management and control measures have been committed to ensure that impacts from the construction works are reduced as far as reasonably practicable.

Completed Development

15.9 The most likely significant beneficial environmental effects identified for the Proposed Development once it is completed and operational are those relating to the socio-economic components. These effects include employment effects from permanent jobs and net additional permanent jobs, economics effects from gross value added, and training and skills development opportunities.

15.10 There are however a very small number of likely significant adverse environmental effects (three in total) likely to be experienced once the Proposed Development is completed and operational. These are effects pertaining to landscape and visual, with a likely significant (moderate adverse) effect on landscape character within the first 15 years of operation. A likely significant (minor to moderate adverse) effect on short distance views (views 1-3), experienced within the first 15 years of occupation, and a permanent significant adverse effect on birds nesting in hedgerows. Note that the first two of these effects are temporary in nature. The mature landscape setting around the Proposed Development and additional native screen planting will mature overtime so that views of the buildings and structures will be limited if not obscured, therefore minimising adverse effects experienced by sensitive receptors. In addition, the principle of this development has been established through the 2010 consent and is supported, in principle, by the Local Plan allocation, Bicester 4.

Glossary of Terms and Abbreviations

ADMS Roads	Atmospheric Dispersion Modelling System Roads is a line-source Gaussian dispersion model with the capability to model 3 point sources.
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near (LA_{Feq},T).
Amenity	A pleasant or advantageous aspect of the environment.
Aquifer	A below ground, water-bearing layer of soil or rock.
Alluvium	Sediment laid down by a river. Can range from sands and gravels deposited by fast flowing water and clays that settle out of suspension during overbank flooding. Other deposits found on a valley floor are usually included in the term alluvium (e.g. peat).
Arisings	Material (often spoil) derived from the ground through excavation
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Baseline Studies	Studies of existing environmental conditions which are designed to establish the baseline conditions against which any future changes can be measured or predicted.
Biodiversity	The diversity, or variety of plants and animals and other living things in a particular area of region. It encompasses landscape diversity, ecosystem diversity, species diversity and genetic diversity.
Borehole	A deep hole bored into the ground as part of intrusive geological investigations.
Carbon Dioxide (CO_2)	Carbon dioxide is a naturally occurring gas comprising 0.04% of the atmosphere. The burning of fossil fuels releases carbon dioxide fixed by plants many millions of years ago, and this has increased its concentration in the atmosphere by some 12% over the past century. It contributes about 60 per cent of the potential global warming effect of manmade emissions of greenhouse gases.
Completed Development	A development scheme which has been build out.
Conservation Area	An area designated by the Local Authority as being of special architectural or historic interest under the provisions of the Planning (Listed Buildings and Conservation Areas 1990) Act, the character or appearance of which it is desirable to preserve or enhance.
Construction Environmental Management Plan	A documented management system with environmental procedures to monitor residual impacts of the construction phase of a development.
Construction Logistics Plan	A documented travel plan specific for a construction site.
Cumulative Schemes	Developments that have received planning permission and have a signed legal agreement in place. They are assumed to be in place by the time the Development being assessed is completed.
Decibel	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
Desk-top Study	A non-intrusive study and review of all available information pertaining to a site, including historical records, collated and monitored data, and consultation with relevant stakeholders.
Directive	European Union (EU) Directives impose legal obligations on European Member States. They are binding as to the results to be achieved, but allow individual states the right to decide the form and methods used to achieve the results. An example of this is the EU Air Quality Framework Directive (1996) that is brought into legal effect in the UK by the Air Quality (England) Regulations (2000).
Displacement	An estimate of economic factors that may have reasonably been attained by other competitors in the absence of the development.
EIA Scoping	An initial stage in determining the nature and potential scale of the environmental impacts arising from a proposed development, and assessing what further studies are required to establish their significance.
EIA Scoping Opinion	A written statement of the opinion of the relevant planning authority as to the information to be provided in the Environmental Statement which specifically requires an local planning authority to respond or consult with consultees within a statutory period.
EIA Screening	An initial stage in which the need for EIA is considered in respect of a development. Some developments are automatically subject to EIA by means of their inevitable size, nature and effects (Schedule 1 developments). Other projects are made subject to EIA because it is anticipated that they are likely to have significant environmental effects (Schedule 2 developments).
Emission	A material that is expelled or released to the environment. Usually applied to gaseous or odorous discharges to the atmosphere.
Environmental Impact Assessment	A process by which information about the environmental effects of a development is collected and taken into account by the relevant decision-making body before a decision is given on whether the development should go ahead.
Environmental Statement	A statement that includes such information that is reasonably required to assess the environmental effects of a development.
Fit-out	Installation of all non-substructure and non-superstructure items such as electrical water services, as well as final internal finishings.
Floodplain	Land adjacent to a watercourse over which water flows, or would flow but for defences in place, in times of flood.
Geotechnical	Ground investigation, typically in the form of boreholes and/or trial/test pits, carried out for engineering purposes to determine the nature of the subsurface deposits.
Grade I Listed Building	A listed building that is of exceptional interest.
Grade II Listed Building	A listed building that is of special interest.
Grade II* Listed Building	A listed building that is of particular importance and of more than special interest.
Gross External Area	A measure of floor space calculated in accordance with the Royal Institution of Chartered Surveyors (RICS) Code of Measuring Practice.
Gross Internal Area	A measure of the area of a building measured to the internal face of the perimeter walls at each floor level.

Glossary of Terms and Abbreviations

Heritage Asset	A building, area or scene which makes a positive contribution of special architectural, historic or environmental interest.
Hoarding	A temporary board fence set up on the perimeter of a building site.
Hydrogeology	The study of geological factors relating to the Earth's water.
In-situ	In the natural, original or appropriate position.
Intrusive Investigation	An in-depth investigation involving further sampling and analysis, such as the gathering of samples from the ground, walls, ceilings for the detection of contamination, asbestos and or archaeological remains.
$L_{AFeq,T}$	The A-weighted noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{AFmax,T}$	The A-weighted noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
Listed Building	A building or structure of special architectural or historic interest which is included in a list made by the Secretary of State.
Local Plan	A series of documents which contains the vision, policies and proposals for planning in the CDC. The Local Plan comprises a series of documents that are separately prepared and together set out CDC's planning strategy.
Made Ground	Soils or other material which has been deposited by man rather than natural processes, for example to make up ground levels.
Mitigation	Any process, activity of thing designed to avoid, reduce or remedy adverse environmental impacts likely to be caused by a development project.
Mitigation Measure	Measure aiming at reducing an adverse environmental effect.
National Planning Policy Framework	Came into force on 27 March 2012. It sets out the Government's economic, environmental and social planning policies for England and summarises, in a single document, all previous national planning policy advice (Planning Policy Statements and Planning Policy Guidance notes).
Nitrogen dioxide	Road transport and the burning of fossil fuels for power are the main sources of Nitrogen dioxide. In addition to being a greenhouse gas it also contributes to photochemical smog formation. It is an irritant to the respiratory system.
Non-Technical Summary	A summary of the Environmental Statement in 'non-technical language'.
Ordnance Datum	Land levels are measured relative to the average sea level at Newlyn, Cornwall. This average level is referred to as 'Ordnance Datum'.
Particulate Matter	Discrete particles in ambient air, sizes ranging between nanometres (nm, billionths of a metre) to tens of micrometres (µm, millionths of a metre).
Pathways	The routes by which impacts are transmitted through air, water, soils or plants and organisms to their receptors.
Pile	A timber, steel or concrete post which is driven, jacked or cast (bored) into the ground to carry vertical or horizontal loads.
Plant	A building's generator, heating, ventilation, and/or electricity-production system.
Planning Practice Guidance	A web-based resource that came into force in 2014. It seeks to consolidate existing technical guidance into a consolidated online format and provides further detail on the policies contained within the NPPF.
Receptor (Sensitive)	A component of the natural, created, or built environment such as human being, water, air, a building, or a plant that is affected by an impact.
Residual Effects	Those effects of a development following implementation of any relevant mitigation proposals.
Risk Assessment	An assessment of the likelihood and severity of an occurrence.
Setting	The context in which a building or area can be appreciated.
Severance	The perceived divisions that can occur within a community when it becomes separated by a traffic route.
Site of Importance for Nature Conservation	A non-statutory site identified as being areas of importance for wildlife and geology.
Statutory Consultees	Groups or bodies that, by law, must be consulted as part of the planning application process for EIA development.
Superstructure	Elements of a development above ground principally the mega frame, supporting northern core and outer shell cladding.
Supplementary Planning Document	Documents which seek to give guidance and support on the Council's planning processes and are one of the material considerations in determining planning applications.
The Applicant	The persons or entities making the planning application.
The site	The extent of the development site, as defined by the red-line boundary plan.
Topography	The natural and man-made features of an area collectively
Transport Assessment	Prepared and submitted alongside planning applications for developments likely to have significant transport implications. For major proposals, assessments should illustrate the following: accessibility to the site by all modes, the likely modal split of journeys to and from the site and proposed measures to improve access by public transport, walking and cycling. Statutory plans produced by each borough which integrate strategic and local planning responsibilities through policies and proposals for the development and use of land in their area.
Travel Plan	A document which puts measures in place that will encourage sustainable travel and reduce reliance on single occupancy cars.
Watching Brief (archaeological)	An archaeological watching brief is 'a formal programme of observation and investigation conducted during any operation carried out for non–archaeological reasons.'

Glossary of Terms and Abbreviations

Abbreviations

μgm^{-3}	Micrograms per cubic metre
µm	Micrometres
AADT	Annual Average Daytime Traffic Flows
AAWT	Annual Average Weekly Traffic Flows
AD	Anno Domini
ADMS	Atmospheric Dispersion Modelling System
AOD	Above Ordnance Datum
AQ	Air Quality
AQAL	Air Quality Assessment Level
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
ATC	Automatic Traffic Counters
BAP	Biodiversity Action Plan
BC	Before Christ
bgl	Below Ground Level
BRE	Building Research Establishment
BS	British Standard
BSI	British Standard Institute
CA	Conservation Area
CDC	Cherwell District Council
CEMP	Construction Environmental Management Plan
CIL	Community Infrastructure Levy
CLP	Construction Logistics Plan
CO	Carbon monoxide
CO_2	Carbon dioxide
CoP	Code of Practise
CoPA	Control of Pollution Act
COSHH	Control of Substances Hazardous to Health
CRTN	Calculation of Road Traffic Noise
DAS	Design and Access Statement
dB	Decibel
DBA	Desk Based Assessment
DCLG	Department for Communities and Local Government
DEFRA	Department of Environment, Food and Rural Affairs
DMP	Dust Management Plan
EA	Environment Agency
EC	European Commission
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act
ES	Environmental Statement
FRA	Flood Risk Assessment
FTE	Full Time Equivalent
FTP	Framework Travel Plan
FWMA	Flood Water Management Act
GEA	Gross External Area
GIA	Gross Internal Area
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GP	General Practitioner
Ha	Hectare
HE	Historic England
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
IEMA	Institute of Environmental Management and Assessment
Kg	Kilograms
km	Kilometres
KPI	Key Performance Indicators
kWh	Kilowatt hour
l/s	Litres per second
LAQM	Local Air Quality Management
LLFA	Lead Local Flood Authority
m	Metre

Glossary of Terms and Abbreviations

m^2	Square metre
m^3	Cubic metre
mAOD	Metres Above Ordnance Datum
mm/s	Millimetres per second
m/s	Meters per Second
NAQO	National Air Quality Objectives
N/A	Not applicable
NHS	National Health Service
NIA	Net Internal Area
NO_2	Nitrogen Dioxide
Nox	Nitrogen Oxides
NTS	Non-Technical Summary
NPPF	National Planning Policy Framework
NRMM	Non-Road Mobile Machinery
OCC	Oxford County Council
OD	Ordnance Datum
ONS	Office of National Statistics
OS	Ordnance Survey
PAN	Public Admission Numbers
PFRA	Preliminary Flood Risk Assessment
$PM_{2.5}/PM_{10}$	Particulate Material of a particular size fraction
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
PPG	Pollution Prevention Guidelines
ppm	Parts per million
PRA	Preliminary Risk Assessment
RFRA	Regional Flood Risk Assessment
SFRA	Strategic Flood Risk Assessment
SI	Site Investigation
SINC	Site of Importance for Nature Conservation
SoS	Secretary of State
SO_2	Sulphur Dioxide
SPG	Supplementary Planning Guidance
SPZ	(Groundwater) Source Protection Zone
SSSi	Site of Special Scientific Interest
SuDS	Sustainable Urban Drainage Systems
TA	Transport Assessment
LVIA	Landscape and Visual Impact Assessment
UDP	Unitary Development Plan
UK	United Kingdom
WHS	World Heritage Site
WSI	Written Scheme of Investigation

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