Oxford to Cambridge Expressway
Appendix E: Supplementary Environmental Information
PCF Stage 1

September 2018
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Annex A: Figures

Annex B: Constraints mapping NN NPS justification

Annex C: Materials and waste note

List of acronyms relevant to Appendix E

AADT  Annual Average Daily Traffic
AALs Areas of Attractive Landscape
AEP Annual Exceedance Probability
AONB Area of Outstanding Natural Beauty
AQMAs Air Quality Management Areas
AQOs Air Quality Objectives
ASTGWF Area Susceptible to Groundwater Flooding
AW Ancient Woodland
BGS British Geological Survey
BMV Best and Most Versatile
CAZ Clean Air Zone
COMAH Control of Major Accident Hazards
Defra Department for Environment, Food and Rural Affairs
DMRB Design Manual for Roads and Bridges
EA Environment Agency
GIS Geographical Information System
GWDTE Groundwater Dependent Terrestrial Ecosystem
LAQM Local Air Quality Management
LGS Local Geological Sites
LLA Local Landscape Areas
LNR Local Nature Reserve
LVIA Landscape and Visual Effects Assessment
LWS Local Wildlife Sites
MSGA Mineral Safeguarding Areas
NIA Noise Important Areas
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIHHS</td>
<td>Notification of Installations Handling Hazardous Substances</td>
</tr>
<tr>
<td>NNR</td>
<td>National Nature Reserve</td>
</tr>
<tr>
<td>NN NPS</td>
<td>National Networks National Policy Statement</td>
</tr>
<tr>
<td>NPPF</td>
<td>National Planning Policy Framework</td>
</tr>
<tr>
<td>PCM</td>
<td>Pollution Climate Mapping</td>
</tr>
<tr>
<td>PRoW</td>
<td>Public Right of Way</td>
</tr>
<tr>
<td>RoFSW</td>
<td>Risk of Flooding from Surface Water</td>
</tr>
<tr>
<td>RPG</td>
<td>Registered Park and Garden</td>
</tr>
<tr>
<td>RSPB</td>
<td>Royal Society for the Protection of Birds</td>
</tr>
<tr>
<td>SAC</td>
<td>Special Area of Conservation</td>
</tr>
<tr>
<td>SFRA</td>
<td>Strategic Flood Risk Assessment</td>
</tr>
<tr>
<td>SPA</td>
<td>Special Protection Area</td>
</tr>
<tr>
<td>SPZ</td>
<td>Source Protection Zone</td>
</tr>
<tr>
<td>SSSI</td>
<td>Site of Specific Scientific Interest</td>
</tr>
<tr>
<td>WFD</td>
<td>Water Framework Directive</td>
</tr>
</tbody>
</table>
1. Introduction

1.1 Overview of Stage 1A assessment

The purpose of the Stage 1A environment evaluation of the corridors is to:

- identify possible significant effects that could arise, as far as this is appropriate and proportionate at this stage; and
- understand and categorise any identified possible significant effects to support of a comparison of likely performance of the corridors against the project objectives.

1.2 Environment project objectives

The strategic objective for environment for the project is:

“To provide a healthy, natural environment by reducing congestion and supporting sustainable travel modes and promoting equality and opportunity”.

Three intervention objectives were subsequently defined for environment as summarised in Table 1-1.

Table 1-1 Environment intervention objectives

<table>
<thead>
<tr>
<th>Intervention objective</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Improve the net environmental impact of transport on communities</td>
<td>An overall improvement, at the community level, of effects from transport having regard for noise and vibration, air quality and other impacts on people and communities. This has regard for changes to transport on existing travel routes in conjunction with effects from transport on new highways infrastructure.</td>
</tr>
<tr>
<td>2. Reduce the impact of new infrastructure on natural &amp; historic</td>
<td>This sets out a requirement for careful route planning and design to mitigate potential effects on landscape and visual amenity, nature conservation, road drainage and water, materials, geology and soils, and cultural heritage assets.</td>
</tr>
<tr>
<td>environment by design</td>
<td></td>
</tr>
<tr>
<td>3. No net ecology loss</td>
<td>No overall loss in biodiversity.</td>
</tr>
</tbody>
</table>
2. Methodology

2.1 Study area

The environmental assessment has assessed the following corridors:

- Corridor A (southern route via Aylesbury)
- Corridor B (central route via a shared East-West rail corridor):
  - Variation B1 (west of Oxford)
  - Variation B2 (offline route east of Oxford)
  - Variation B3 (M40 online route east of Oxford)
- Corridor C (northern route via Buckingham):
  - Variation C1 (west of Oxford)
  - Variation C2 (offline route east of Oxford)
  - Variation C3 (M40 online route east of Oxford)

For the purpose of the environmental assessment, each of the above corridors was broken down into a series of ‘sections’ as shown within location plan Figures E1.01 to E1.09 presented in Annex A and as summarised in Table 2-1.

The ‘common corridor’ has not been assessed as it lies beyond the ‘missing link’ which is the focus of this report, which is to support a decision on preferred corridor. Whilst the common corridor is not assessed, available baseline data has been reviewed to provide context.

No information is provided for the common section CS-3 as this section is being assessed separately within the A428 Black Cat to Caxton Gibbet study.

The purpose of breaking the corridors down is:

- to allow the environment appraisal to be undertaken on a manageable scale.
- to allow focussed consideration to be given to key problem sections and whether those problems could be mitigated.

Table 2-1 Corridor sections for environment

<table>
<thead>
<tr>
<th>Corridor</th>
<th>M4 to Abingdon (common corridor)</th>
<th>Abingdon to Milton Keynes (missing link)</th>
<th>Milton Keynes to the M11 (common corridor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CS-1</td>
<td>A-1 + A-2 + A-3</td>
<td>CS-2 (+ CS-3) + CS-4</td>
</tr>
<tr>
<td>B1</td>
<td>CS-1</td>
<td>B1-1 + B1-2 + B1-3 + B1-4</td>
<td>CS-2 (+ CS-3) + CS-4</td>
</tr>
<tr>
<td>B3</td>
<td>CS-1</td>
<td>B3-1 + B3-2 + B3-3 + B3-4</td>
<td>CS-2 (+ CS-3) + CS-4</td>
</tr>
<tr>
<td>C1</td>
<td>CS-1</td>
<td>C1-1 + C1-2 + C1-3 + C1-4</td>
<td>CS-2 (+ CS-3) + CS-4</td>
</tr>
<tr>
<td>C2</td>
<td>CS-1</td>
<td>C2-1 + C2-2 + C2-3 + C2-4</td>
<td>CS-2 (+ CS-3) + CS-4</td>
</tr>
</tbody>
</table>
2.2 Development of constraints mapping criteria

To support the assessment process, as well as subsequent more detailed environmental assessment work, a large body of information on environmental features and constraints within the study area has been collated and is stored on a project Geographical Information System (GIS).

As part of the Stage 1A assessment, the GIS has been interrogated and used to develop constraints maps. These maps are contained in Appendix A - Constraints and Opportunities Figures.

Constraints mapping criteria were developed to assist with the definition of corridor boundaries and to supplement detailed assessments undertaken for each environmental discipline. The criteria are primarily based on constraints highlighted in the National Networks National Policy Statement (NN NPS) as being important to decision making. For reasons of practicality, only those constraints that are amenable to mapping using robust data from reliable sources were included. It is important to note that the constraints maps generated are intended as a pragmatic visual aid. They do not show all constraints taken into consideration for the purposes of evaluating and comparing the corridor options. The constraints mapping criteria are shown in Table 2-2 and the rationale for these, in the context of the NN NPS, is explained in Annex B.

Three categories of constraints are identified under the headings of Tier I, Tier II and Tier III constraints. Tier I constraints are considered to be those constraints given the highest level of protection within the NN NPS, such as World Heritage Sites, Special Areas of Conservation and Areas of Outstanding Natural Beauty.

The criteria were applied using professional judgement by suitably experienced assessment specialists for input to corridor sifting purposes to avoid unnecessarily discounting corridors for which significant effects could be avoided in detailed design.

<table>
<thead>
<tr>
<th>Corridor</th>
<th>M4 to Abingdon (common corridor)</th>
<th>Abingdon to Milton Keynes (missing link)</th>
<th>Milton Keynes to the M11 (common corridor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3</td>
<td>CS-1</td>
<td>C3-1 + C3-2 + C3-3 + C3-4</td>
<td>CS-2 (+ CS-3) + CS-4</td>
</tr>
</tbody>
</table>

### Table 2-2 Environmental constraints mapping criteria

<table>
<thead>
<tr>
<th>Tier I</th>
<th>Tier II</th>
<th>Tier III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air quality</td>
<td>Air Quality Management Area*: and/or SPA, SAC, SSSI and Ramsar sites designated for the conservation of protected species and habitats**. (* where the option may lead to increased emissions locally)</td>
<td>Residential properties and other sensitive human receptor sites*</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Tier I</th>
<th>Tier II</th>
<th>Tier III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxford to Cambridge Expressway</td>
<td><strong>“where the option may lead to increased emissions locally”</strong></td>
<td>Non-designated heritage assets of archaeological interest (not considered in Stage 1A for reasons of proportionality)</td>
</tr>
<tr>
<td>Cultural heritage</td>
<td>World Heritage Site; Scheduled Monument; Grade I and Grade II* listed building; Grade I and Grade II* Registered Park and Garden; and/or Registered battlefield</td>
<td>Grade II listed building; Grade II Registered Park and Garden; and/or Conservation Area</td>
</tr>
<tr>
<td>Landscape</td>
<td>National Parks; and/or Areas of Outstanding Natural Beauty</td>
<td>Setting of National Parks and/or Areas of Outstanding Natural Beauty</td>
</tr>
<tr>
<td>Nature conservation</td>
<td>Special Areas of Conservation; Special Protection Areas; Ramsar sites; Sites of Special Scientific Interest; National Nature Reserves; Ancient Semi-Natural Woodland; and Aged or veteran trees</td>
<td></td>
</tr>
<tr>
<td>Geology and soils</td>
<td>Sites of Special Scientific Interest</td>
<td></td>
</tr>
<tr>
<td>Materials</td>
<td>Not used</td>
<td>Not used</td>
</tr>
<tr>
<td>Noise and vibration</td>
<td>Noise Important Area* (* where the option is either likely to result in: • carriageway moving closer to the receptors; or • speeds or flows increasing on existing roads; and where • no additional mitigation is feasible (such as noise barriers))</td>
<td>Noise sensitive premises* (* where the option is either likely to result in: • carriageway moving closer to the receptors; or • speeds or flows increasing on existing roads; and where • no additional mitigation is feasible (such as noise barriers))</td>
</tr>
<tr>
<td>People and communities</td>
<td>Communities (where the highway would introduce direct severance)</td>
<td>Existing open space, sports and recreational buildings and land, including country parks and war cemeteries</td>
</tr>
</tbody>
</table>
## 2.3 Scoring criteria

The methodology used to evaluate the corridors in Stage 1A was centred on identifying possible significant effects, as far as that is appropriate and proportionate at this stage; and then further seeking to understand and categorise the extent to which any identified possible significant effects are a consideration in the comparison of corridors.

A description of what constitutes a significant effect, where this can be appraised at this stage, is given in each of the discipline Stage 1A methodologies provided in Section 2.5. In general terms, for the purpose of this assessment, effects characterised using Design Manual for Roads and Bridges (DMRB) methodologies as being ‘very large’, ‘large’ or ‘moderate’ are considered to be significant. Effects characterised as ‘slight’ are not considered to be significant.

The findings of the discipline appraisals were then summarised using a 7-point categorisation scale that was adopted at a project level to allow consistent consideration of all topics relevant to the appraisal of project objectives. This 7-point scale was defined for each of the environmental intervention objectives as explained below.

### Intervention objective 1: Improve the net environmental impact of transport on communities

Potential significant effects were characterised for the following environmental topics:

- Noise and Vibration
- Air Quality
- People and Communities

The scoring was undertaken with reference to the 7-point scale as described in Table 2-3.

### Table 2-3 7-point effect scale for environment intervention objective 1

<table>
<thead>
<tr>
<th>Score colour code</th>
<th>7 point effect scale (likelihood of significant effect)</th>
</tr>
</thead>
</table>
| Red               | Highly disadvantageous  
Highly adverse effect – unlikely to be able to mitigate, potentially not compliant with NN NPS policies (Tier I constraints only) |
| Amber             | Moderately disadvantageous  
Significant net adverse effects – unlikely to be able to mitigate (Tier II, III and any other constraint) |
| Yellow            | Slightly disadvantageous  
Potential significant net adverse effects – mitigation may be possible |
| Grey              | Neutral case  
No effect or net neutral effects due to the balancing out of positive and negative effects |
| Light green       | Slightly advantageous  
Potential net beneficial effects (opportunity) |
| Green             | Moderately advantageous  
Significant net beneficial effects (likely) |
| Dark green        | Highly advantageous  
Full compliance with the intervention objective |

The rationale for each of the score colour codes is provided below.

- Significant adverse effect (red) – where it is likely that there would be significant adverse effects on Tier I constraints.

- Significant net adverse effect (amber) – where it is likely that there would be significant net adverse effects on environmental constraints (other than Tier I constraints) that would be unavoidable, could not be designed out and outweigh the potential beneficial effects.

- Potential significant net adverse effect (yellow) – where there is the potential for significant net adverse effects but the adoption of well proven effective mitigation could avoid a significant effect. At this stage, possible mitigation would include avoiding constraints through careful route alignment.

- Neutral (grey) - where there would be no effect, a balancing out of positive and negative effects, or where there may be a slight adverse effect that is considered insignificant to making a corridor decision at Stage 1A.
- Potential net beneficial effect (light green) – where there may be an opportunity for potential net beneficial effects on the environment.

- Significant net beneficial effect (mid-green) – where there would likely be significant net beneficial effects on the environment. This category cannot be meaningfully used at corridor level at Stage 1A, but would be considered at Stage 1B when there is better understanding of likely route alignments.

- Full compliance with the intervention objectives (dark green) – where it is considered the scheme would fully comply with the relevant environment intervention objectives. This category cannot be meaningfully used at corridor level assessment at Stage 1A, but will be considered at Stage 1B when more detailed appraisal can be undertaken for better defined route options.

**Intervention objective 2: Reduce the impact of new infrastructure on natural & historic environment by design**

Potential significant effects were characterised for the following environmental topics:

- Landscape
- Cultural heritage
- Nature conservation
- Geology & soils
- Road drainage and the water environment

The scoring is made with reference to the 7-point scale as described in Table 2-4.

**Table 2-4 7-point effect scale for environment intervention objective 2**

<table>
<thead>
<tr>
<th>Score colour code</th>
<th>7 point effect scale (likelihood of significant effect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Highly disadvantageous</td>
</tr>
<tr>
<td></td>
<td>Significant adverse effect – unlikely to be able to mitigate and potentially not compliant with NN NPS policies (Tier I constraints only)</td>
</tr>
<tr>
<td>Amber</td>
<td>Moderately disadvantageous</td>
</tr>
<tr>
<td></td>
<td>Significant adverse effect – unlikely to be able to mitigate (Tier II, III and any other constraint)</td>
</tr>
<tr>
<td>Yellow</td>
<td>Slightly disadvantageous</td>
</tr>
<tr>
<td></td>
<td>Potential significant adverse effect – mitigation may be possible</td>
</tr>
<tr>
<td>Grey</td>
<td>Neutral case</td>
</tr>
<tr>
<td></td>
<td>No effect or slight adverse effect that is not material to a corridor decision at this stage</td>
</tr>
<tr>
<td>Light green</td>
<td>Slightly advantageous</td>
</tr>
<tr>
<td></td>
<td>Potential beneficial effect (opportunity)</td>
</tr>
</tbody>
</table>
A discussion on the rationale for each of the score colour codes is provided below.

- **Significant adverse effect (red)** – where it is likely that there would be significant adverse effects on Tier I constraints that would be unavoidable and could not be designed out.

  For example, where a corridor is heavily constrained with ancient woodland, Sites of Special Scientific Interest and Special Areas of Conservation and where mitigation could not alleviate significant damage to the integrity of these receptors. This category is reserved for significant effects on constraints that could not be mitigated where the NN NPS uses phrases such as ‘substantial harm or loss of… should be wholly exceptional’, ‘the Secretary of State should refuse consent for development in… except in exceptional circumstances’, ‘the Secretary of State should not grant consent for any development that…’, ‘…development consent should not normally be granted’, ‘there is a strong presumption against… unless it can be demonstrated that…’ etc.

- **Significant adverse effect (amber)** – where it is likely that there would be significant adverse effects on environmental constraints (other than tier I constraints) that would be unavoidable and could not be designed out.

  For example, where a corridor is heavily constrained with local landscape designations and Local Wildlife Sites and where mitigation could not alleviate significant damage to the integrity of these assets. In these cases, the NN NPS still gives substantial weight to the protection of these assets using phrases such as ‘substantial harm or loss of… should be exceptional’.

- **Potential significant adverse effect (yellow)** – where there is the potential for significant adverse effects but the adoption of well proven effective mitigation could avoid a significant effect. Possible mitigation would include avoiding constraints through route alignment.

- **Neutral (grey)** – where there would be no effect, a balancing out of positive and negative effects, or where there may be a slight adverse effect that is not considered to be material to making a corridor decision at Stage 1A.

- **Potential beneficial effect (light green)** – where there may be an opportunity for potential beneficial effects on the environment.

- **Significant beneficial effect (mid-green)** – where there would likely be significant beneficial effects on the environment. This category cannot be used at corridor level.
at Stage 1A, but would be considered at Stage 1B when there is better resolution on likely route alignments.

- Full compliance with relevant intervention objectives (dark green) – where it is considered the scheme would fully comply with the relevant environment intervention objectives. This category cannot be meaningfully used at corridor level at Stage 1A but will be considered at Stage 1B when more detailed appraisal can be undertaken.

**Intervention objective 3: No net ecology loss**

The objective around no net ecology loss is about seeking to avoid impacts on ecology through the mitigation hierarchy (avoid, minimise and restore) and then providing compensatory habitat to balance any residual negative effects on biodiversity with at least equivalent gains.

A high-level assessment of all corridors was undertaken and concluded that offsetting is viable for all corridors. This is because there are extensive opportunities for biodiversity gain across each corridor that could be used to offset any loss of habitat. Therefore, at Stage 1A all corridor options are assessed equally and scored as neutral (grey). Further work will be undertaken at Stage 1B, to provide quantitative estimates for the potential gains which will be used to inform route identification.

### 2.4 Environment workshops

A series of collaborative environmental assessment workshops were held and were attended by a representative from each environmental discipline, along with a representative from the highway engineering team. At these workshops, the emerging scores for each topic were discussed as part of the iterative assessment and design process.

### 2.5 Environmental assessment methodologies

#### 2.5.1 Air quality

The Air Quality Stage 1A assessment is based on the relevant elements of the “Scoping Assessment” method within the Design Manual for Roads and Bridges, Volume 11, Section 3 Part 1 (HA 207/07 – Air Quality) that are considered proportionate at this stage.

It considers local air quality in relation to oxides of nitrogen (NO\(_x\)), nitrogen dioxide (NO\(_2\)) and particulate matter (PM\(_{10}\)); with the potential to affect human health; and ecosystems.

Only limited and draft traffic modelling information is available and thus the assessment is largely qualitative at this early stage.

The potential for significant impacts from emissions from construction activity is likely to be low as application of best-practice mitigation controls (through Institute of Air Quality Management (“IAQM”) would be expected to reduce impacts to acceptable levels. As such, potential significant impacts from emissions from construction activity is scoped out at this stage. Data relating to traffic movements during construction will not be available until later in the project programme; consequently, assessment of potential impacts from this source is deferred until such time that suitable data is available to facilitate a meaningful assessment can be made.

The Stage 1A assessment identifies the following for each route corridor:
Receptors and areas of potential constraint with the potential to experience adverse and beneficial impacts within each route corridor.

Areas of potential constraint include:
  - Existing sensitive receptors relevant to air quality objectives (AQOs) for human health (for example residential homes, schools, hospitals, care homes etc.), vegetation and ecosystems.
  - Existing and potential future air quality management areas (AQMAs).
  - Locations where existing local air quality monitoring indicate a potential for exceedance of AQOs (concentrations above 36 µg/m³) in the opening year.
  - Locations indicative of potential CAZ implementation.
  - 2017 Air Quality Plan (without CAZ) PCM model links which indicate a potential for exceedance of AQOs (concentrations above 36 µg/m³) in the opening year (or nearest year if the opening year is not available).
  - The Defra background map concentrations for baseline year (2018) and opening year (2025) for oxides of nitrogen (NOx), nitrogen dioxide (NO₂) and particulate matter (PM₁₀). These data include sector removal processing in line with Local Air Quality Management (LAQM) processing tools.

The existing information is assessed against the Air Quality Strategy AQOs. These are as follows:

- Annual mean for oxides of nitrogen (NOx) = 30 µg/m³ (relevant to designated sites)
- Annual mean for nitrogen dioxide (NO₂) = 40 µg/m³
- Annual mean for particulate matter (PM₁₀) = 40 µg/m³

Provisional traffic data is used to undertake basic air quality screening calculations, whereby the changes in Annual Average Daily Traffic ("AADT") for Light and Heavy vehicles are determined between the Do Minimum ("DM") and Do Something ("DS") scenarios for each Corridor. This helped identify which links would meet the HA207/07 screening criteria, and subsequently be classed as an ‘affected link’. The relevant qualifying criteria are as follows:

- Road alignment will change by 5 metres or more
- Daily traffic flows will change by more than 1,000 Annual Average Daily Traffic (AADT)
- Heavy Duty Vehicle (HDV) flows will change by more than 200 AADT

The road links where the change in traffic meets the HA207/07 screening criteria, are determined as 'affected links', and will help to determine the impact area of possible route options within that corridor as far as that is appropriate, given considerable uncertainty in the provisional traffic data available at this early stage.

Definition of Significant Effects: It is not possible to determine the potential for significant effects during the Stage 1A assessment; however, route corridors are evaluated for their relative risk of causing or affecting exceedances of local AQOs in the opening year.

The following data sources are used to inform the Stage 1A assessment:
2.5.2 Noise and vibration

The Noise and Vibration assessment is based on Section 3 of HD 213/11 – Revision 1 of the DMRB. At this stage only the relevant and proportionate elements of DMRB are used for this assessment as explained below.

Construction

The assessment of the potential construction noise and vibration impacts is undertaken on a qualitative basis. In doing so, potential significant noise and vibration effects from each option are identified. This is undertaken through consideration of the likely construction techniques that would be employed and the potential proximity to sensitive receptors.

Consideration is given to the likelihood that noise and vibration would give rise to significant impacts when considered against the guidance contained within BS 5228: 2009+A1:2014 - Code of Practice for noise and vibration control on construction and open sites, Part 1: Noise and Part 2: Vibration. The evaluation is made on the basis of professional judgement.

Operation

At Stage 1A, the wide route corridors necessitate that the noise and vibration assessment is largely qualitative. Available traffic and sensitive receptor information is used to suggest the potential impacts of each corridor. For this assessment, it is not possible to establish whether potential adverse and beneficial impacts could be considered significant, ahead of route option alignments having been refined and with available traffic data being provisional and thus indicative only. However, where possible, professional judgement is used to suggest where such impacts have the potential to occur under a given scenario.

The assessment of potential significant impacts will be refined in Stage 1B when route option alignments are defined and updated traffic model data are available.
Section 3 of HD 213/11 – Revision 1 of DMRB provides instruction on how the definition of a study area. HD 213/11 defines the study area as a 1 kilometre boundary around the start and end points of the physical works associated with the road project and any improved or bypassed routes as part of the scheme. With the use of route corridors at this stage, the study area would include a 1 kilometre ‘buffer’ from the edge of the project-wide defined route corridors. Given the very wide corridors used, it has been considered impracticable to define ‘bypassed routes’. Therefore, at this early stage, the assessment only focusses on the route corridors.

Sensitive receptors include residential dwellings, hospitals, churches, schools, public parks, wildlife conservation areas, Site of Specific Scientific Interest (SSSIs) and Area of Outstanding Natural Beauty (AONB). The existing noise climate within the route corridors will vary considerably, primarily influenced by the proximity of the receptors to main roads. However, there are a number of railway lines within the study areas as well as a number of small airfields and aircraft flight paths, which will contribute to existing noise levels, depending on proximity. The noise climate for receptors located away from such existing major sources of noise would likely consist of noise from local roads, distant major roads, birdsong, farming activities and other general local sources.

In their Noise Action Plan for Roads, Defra identify a number of Noise Important Areas (NIAs) that exist within the route corridor study areas. NIAs are designated for the 1% of the population that are affected by the highest noise levels from major roads in England. Therefore, residential receptors located within NIAs are particularly sensitive to any increase in noise.

The environmental assessment of each corridor is high level only, taking into account the available information at this early stage. Based on the available information, the Stage 1A assessment identifies the following for each route corridor:

- The number of residential dwellings and other sensitive receptors within the study area.
- The number and location of NIA within the study area.
- The existing noise environment based on the proximity of major roads, railways, and flight paths from Heathrow, Luton and other local airports/airfields.
- Sensitive receptors with the potential to experience adverse and beneficial impacts as a result of the route corridor. Such receptors may be within the study area of the route corridor, or when considering indicative traffic data, may exist on the wider road network.

The project traffic assessment team provided draft traffic information, including 18-hour Annual Average Weekday Traffic (AAWT), for the Do Minimum (DM) and Do Something (DS) scenarios for each corridor for the years 2031 and 2041. Roads links that have the potential to result in perceptible changes in noise, that is an ‘affected’ link, has been based on traffic changes between the DM and DS scenarios. This provides indicative information on the noise impacts for road links within each corridor. It should be noted that the traffic model necessarily makes assumptions on a defined route alignment; highlighting the indicative nature of the data used.

Affected road links are classed as affected based on changes in:

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September 2018
- Total 18-hour AAWT traffic flow
- Percentage of Heavy Vehicles (%HVs)
- Inter-peak traffic speed (kph)

The traffic data are only provisional at this early stage. Nevertheless, they provide an indication on how traffic flows may alter on the road network as a result of each route corridor.

The following data sources are used to inform the Stage 1A assessment:

- The National Planning Policy Framework, (Department for Communities and Local Government, 2012)
- Department of Environment, Food and Rural Affairs (Defra), Noise Policy Statement for England (NPSE), 2010
- National Planning Practice Guidance - Noise, Department for Communities and Local Government [link](http://planningguidance.communities.gov.uk/blog/guidance/noise/)
- BS 7385-2:1993 Evaluation and measurement for vibration in buildings — Part 2: Guide to damage levels from ground borne vibration
- Department of Transport and Welsh Office, Calculation of Road Traffic Noise, 1988, Her Majesty’s Stationery Office
- Extrium Noise Map Viewer: [http://extrium.co.uk/noiseviewer.html](http://extrium.co.uk/noiseviewer.html)

2.5.3 **People and communities**

The People and Communities assessment covers potential effects on land use, population and human health. The assessment considers the following:

- Location and composition of existing population and settlements.
- Presence and extent of community, residential, employment and recreational land uses and property (including land allocated for development).
- Number and extent of locations where vulnerable or sensitive groups are located (for example schools, hospitals, care homes).
- Extent of sustainable transport networks, including bus routes, cycle routes, pedestrian routes, bridleways and other public rights of way.
- Extent of best and most versatile agricultural land.

The topic of ‘People and Communities’ was introduced through Interim Advice Note (IAN) 125/15 however, the DMRB has not been updated to provide specific guidance. IAN 125/15 refers to existing guidance in the DMRB Volume 11, Section 3, Parts 6, 8 and 9. Since this DMRB guidance is somewhat dated, more recent guidance from the Department for Transport has also been used (Table 2-5) and professional judgement applied in determining the sensitivity and significance of issues against national policy priorities, particularly in relation to health effects and active travel.

**Table 2-5 Guidance to Inform People and Communities Assessment**

<table>
<thead>
<tr>
<th>Guidance</th>
<th>Notes and application to the appraisal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAN 125/15 (Highways England, October 2015)</td>
<td>Introduces topic of ‘People and Communities’ to environmental assessment of highway projects. Includes a screening checklist which sets out aspects to be considered for People and Communities. These aspects have been considered as part of the corridor appraisal.</td>
</tr>
<tr>
<td>DMRB Volume 11, Section 3, Part 6 – Land Use (Highways England, August 2001)</td>
<td>Stage 1 of this guidance has informed consideration of effects on land use.</td>
</tr>
<tr>
<td>DMRB Volume 11, Section 3, Part 8 – Pedestrians, Cyclists, Equestrians and Community Effects (June 1993)</td>
<td>Stage 1 of this guidance has informed consideration of effects where relevant. The guidance dates back to 1993 and does not include sensitivity criteria nor guidance on severance for cycle journeys (only pedestrian).</td>
</tr>
<tr>
<td>DMRB Volume 11, Section 3, Part 9 – Vehicle Travellers (June 1993)</td>
<td>This guidance covers ‘views from the road’ and ‘driver stress’. It is not considered that either of these can be assessed at this corridor options stage and therefore these issues have not been considered within the scope of the Stage 1A appraisal.</td>
</tr>
<tr>
<td>Department for Transport, April 2017, Local Cycling and Walking Infrastructure Plans, Technical Guidance for Local Authorities. (Department for Transport, April 2017)</td>
<td>This guidance is aimed at those preparing Local Cycling and Walking Infrastructure Plans (LCWIPs), as set out in the Government’s Cycling and Walking Investment Strategy. However, it provides up-to-date guidance on evidence and data sources and also indicates the distances over which active travel journeys on foot or by bicycle can be considered reasonable. The guidance has been used to inform the study area and identify potential local travel patterns.</td>
</tr>
</tbody>
</table>
The approach is informed by mapping relevant ‘People and Communities’ constraints. The constraints identified for the purpose of corridor appraisal have been categorised into 3 tiers as set out in Table 2.6 below. These categories take into account of the NN NPS.

**Table 2-6: People and Community Constraints for Corridor Appraisal**

<table>
<thead>
<tr>
<th>Category of constraint</th>
<th>Receptors included</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1</td>
<td>Communities (where the expressway would introduce severance)</td>
<td>Para 3.22 of the NPS states “Where appropriate applicants should seek to deliver improvements that reduce community severance and improve accessibility.” While there is no specific decision making criteria within the NPS to avoid creating new severance, it is considered that such outcomes would be contradictory to the spirit of the NPS as evidenced in paragraph 3.22.</td>
</tr>
<tr>
<td>Tier 2</td>
<td>Existing open space, sports and recreational buildings and land, including country parks and cemeteries</td>
<td>Para 5.166 of the NPS states “Existing open space, sports and recreational buildings and land should not be developed unless the land is surplus to requirements or the loss would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location.”</td>
</tr>
<tr>
<td>Tier 3</td>
<td>Best and most versatile agricultural land (grade 1 – 3a)</td>
<td>Para 5.168 of the NPS states “Applicants should take into account the economic and other benefits of the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification). Where significant development of agricultural land is demonstrated to be necessary, applicants should seek to use areas of poorer quality land in preference to that of a higher quality.”</td>
</tr>
</tbody>
</table>

### 2.5.4 Cultural heritage

During Stage 1A, the cultural heritage baseline focused on designated heritage assets. This is for reasons of proportionality, having regard for the exceedingly high numbers of undesignated cultural heritage assets within the study area and the greater emphasis given in NN NPS to designated assets.

NN NPS (2014) paragraph 5.131 states that “substantial harm to or loss of a grade II Listed Building or a grade II Registered Park or Garden should be exceptional. Substantial harm to or loss of designated assets of the highest significance, including World Heritage Sites, Scheduled Monuments, grade I and II* Listed Buildings, Registered Battlefields, and grade I and II* Registered Parks and Gardens should be wholly exceptional.”

Whilst the current focus is on designated assets it is nevertheless noted that undesignated cultural heritage assets have the potential to be of High or Very High value. Subsequent assessments of potential route options in Stage 1B will expand the baseline through the inclusion of all designated and undesignated assets to inform the preferred route selection.
This chapter has been prepared based on the guidance contained in DMRB (Highways Agency et al., 2007). The assessment of the value, magnitude of impact and significance of effect at Stage 1A and Stage 1B will be assessed using professional judgement based on the guidance provided by DMRB Volume 11, Section 3 Part 2 Cultural Heritage. Criteria to inform the assessment of the value of cultural heritage assets and the magnitude of impact are presented in Table 2-7, Table 2-8 and Table 2-9 below.

### Table 2-7: The value of cultural heritage assets

<table>
<thead>
<tr>
<th>Value</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Archaeological Remains</strong></td>
<td></td>
</tr>
<tr>
<td>Very High</td>
<td>World Heritage Sites (including nominated sites)</td>
</tr>
<tr>
<td></td>
<td>Assets of acknowledged international importance</td>
</tr>
<tr>
<td></td>
<td>Assets that can contribute significantly to acknowledged international research objectives</td>
</tr>
<tr>
<td>High</td>
<td>Scheduled Monuments (including proposed sites)</td>
</tr>
<tr>
<td></td>
<td>Undesignated assets of schedulable quality and importance</td>
</tr>
<tr>
<td></td>
<td>Assets that can contribute significantly to acknowledged national research objectives</td>
</tr>
<tr>
<td>Medium</td>
<td>Designated or undesignated assets that contribute to regional research objectives</td>
</tr>
<tr>
<td>Low</td>
<td>Designated and undesignated assets of local importance</td>
</tr>
<tr>
<td></td>
<td>Assets compromised by poor preservation and/or poor survival of contextual associations</td>
</tr>
<tr>
<td></td>
<td>Assets of limited value, but with potential to contribute to local research objectives</td>
</tr>
<tr>
<td>Negligible</td>
<td>Assets with very little or no surviving archaeological interest</td>
</tr>
<tr>
<td>Unknown</td>
<td>The value of the site has not been ascertained</td>
</tr>
<tr>
<td><strong>Historic Buildings</strong></td>
<td></td>
</tr>
<tr>
<td>Very High</td>
<td>Structures inscribed as of universal importance as World Heritage Sites</td>
</tr>
<tr>
<td></td>
<td>Other buildings of recognised international importance</td>
</tr>
<tr>
<td>High</td>
<td>Scheduled Monuments with standing remains</td>
</tr>
<tr>
<td></td>
<td>Grade I and Grade II* Listed Buildings</td>
</tr>
<tr>
<td></td>
<td>Other listed buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade</td>
</tr>
<tr>
<td></td>
<td>Conservation Areas containing very important buildings</td>
</tr>
<tr>
<td></td>
<td>Undesignated structures of clear national importance</td>
</tr>
<tr>
<td>Medium</td>
<td>Grade II Listed Buildings</td>
</tr>
<tr>
<td></td>
<td>Historic (unlisted) buildings that can be shown to have exceptional qualities in</td>
</tr>
<tr>
<td>Value</td>
<td>Criteria</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>their fabric or historical associations</td>
</tr>
<tr>
<td></td>
<td>Conservation Areas containing buildings that contribute significantly to its historic character</td>
</tr>
<tr>
<td></td>
<td>Historic Townscape or built-up areas with important historic integrity in their buildings, or built settings (for example including street furniture and other structures)</td>
</tr>
<tr>
<td>Low</td>
<td>‘Locally Listed’ buildings</td>
</tr>
<tr>
<td></td>
<td>Historic (unlisted) buildings of modest quality in their fabric or historical association</td>
</tr>
<tr>
<td></td>
<td>Historic Townscape or built-up areas of limited historic integrity in their buildings, or built settings (for example including street furniture and other structures)</td>
</tr>
<tr>
<td>Negligible</td>
<td>Buildings of no architectural or historical note; buildings of an intrusive character</td>
</tr>
<tr>
<td>Unknown</td>
<td>Buildings with some hidden (that is inaccessible) potential for historic significance</td>
</tr>
</tbody>
</table>

**Historic Landscapes**

<table>
<thead>
<tr>
<th>Value</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>World Heritage Sites inscribed for their historic landscape qualities</td>
</tr>
<tr>
<td></td>
<td>Historic landscapes of international value, whether designated or not</td>
</tr>
<tr>
<td></td>
<td>Extremely well preserved historic landscapes with exceptional coherence, time-depth, or other critical factor(s)</td>
</tr>
<tr>
<td>High</td>
<td>Designated historic landscapes of outstanding interest</td>
</tr>
<tr>
<td></td>
<td>Undesignated landscapes of outstanding interest</td>
</tr>
<tr>
<td></td>
<td>Undesignated historic landscapes of high quality and importance, and of demonstrable national value</td>
</tr>
<tr>
<td></td>
<td>Well preserved historic landscapes, exhibiting considerable coherence, time-depth or other critical factor(s)</td>
</tr>
<tr>
<td>Medium</td>
<td>Designated special historic landscapes</td>
</tr>
<tr>
<td></td>
<td>Undesignated historic landscapes that would justify special historic landscape designation, landscapes of regional value</td>
</tr>
<tr>
<td></td>
<td>Averagely well preserved historic landscapes with reasonable coherence, time-depth or other critical factor(s)</td>
</tr>
<tr>
<td>Low</td>
<td>Robust undesignated historic landscapes</td>
</tr>
<tr>
<td></td>
<td>Historic landscapes with importance to local interest groups</td>
</tr>
<tr>
<td></td>
<td>Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations</td>
</tr>
<tr>
<td>Negligible</td>
<td>Landscapes with little or no significant historical interest</td>
</tr>
</tbody>
</table>
### Value

<table>
<thead>
<tr>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Heritage Sites inscribed for their historic landscape qualities</td>
</tr>
<tr>
<td>Historic landscapes of international value, whether designated or not</td>
</tr>
<tr>
<td>Extremely well preserved historic landscapes with exceptional coherence, time-depth, or other critical factor(s)</td>
</tr>
</tbody>
</table>

### Table 2-8: Factors in the assessment of the magnitude of impact

<table>
<thead>
<tr>
<th>Magnitude of Impact</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Archaeological Remains</strong></td>
<td></td>
</tr>
<tr>
<td>Major</td>
<td>Change to most or all key archaeological materials, such that the resource is totally altered</td>
</tr>
<tr>
<td></td>
<td>Comprehensive changes to setting</td>
</tr>
<tr>
<td>Moderate</td>
<td>Changes to many key archaeological materials, such that the resource is clearly modified</td>
</tr>
<tr>
<td></td>
<td>Considerable changes to setting that affect the character of the asset</td>
</tr>
<tr>
<td>Minor</td>
<td>Changes to key archaeological materials, such that the asset is slightly altered</td>
</tr>
<tr>
<td></td>
<td>Slight changes to setting</td>
</tr>
<tr>
<td>Negligible</td>
<td>Very minor changes to archaeological materials or setting</td>
</tr>
<tr>
<td>No Change</td>
<td>No change</td>
</tr>
<tr>
<td><strong>Historic Buildings</strong></td>
<td></td>
</tr>
<tr>
<td>Major</td>
<td>Change to key historic building elements, such that the resource is totally altered</td>
</tr>
<tr>
<td></td>
<td>Comprehensive changes to setting</td>
</tr>
<tr>
<td>Moderate</td>
<td>Changes to many key historic building elements, such that the resource is significantly modified</td>
</tr>
<tr>
<td></td>
<td>Changes to setting of an historic building, such that it is significantly modified</td>
</tr>
<tr>
<td>Minor</td>
<td>Changes to key historic building elements, such that the asset is slightly different</td>
</tr>
<tr>
<td></td>
<td>Changes to setting of an historic building, such that it is noticeably changed</td>
</tr>
<tr>
<td>Negligible</td>
<td>Slight changes to historic buildings elements or setting that hardly affect it</td>
</tr>
<tr>
<td>No Change</td>
<td>No change to fabric or setting</td>
</tr>
<tr>
<td><strong>Historic Landscapes</strong></td>
<td></td>
</tr>
</tbody>
</table>

---

---
### Table 2-9: Significance of effects matrix

<table>
<thead>
<tr>
<th>Magnitude of Impact</th>
<th>No Change</th>
<th>Negligible</th>
<th>Minor</th>
<th>Moderate</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>Neutral</td>
<td>Slight</td>
<td>Moderate or Large</td>
<td>Large or Very Large</td>
<td>Very Large</td>
</tr>
<tr>
<td>High</td>
<td>Neutral</td>
<td>Slight</td>
<td>Slight or Moderate</td>
<td>Moderate or Large</td>
<td>Large or Very Large</td>
</tr>
<tr>
<td>Moderate</td>
<td>Neutral</td>
<td>Neutral or Slight</td>
<td>Slight</td>
<td>Moderate</td>
<td>Moderate or Large</td>
</tr>
<tr>
<td>Low</td>
<td>Neutral</td>
<td>Neutral or Slight</td>
<td>Neutral or Slight</td>
<td>Slight</td>
<td>Slight or Moderate</td>
</tr>
<tr>
<td>Negligible</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral or Slight</td>
<td>Neutral or Slight</td>
<td>Slight</td>
</tr>
</tbody>
</table>

For Stage 1A data are gathered from:

- The National Heritage List for information on statutorily designated heritage assets (World Heritage Sites, Scheduled Monuments, Listed Buildings, Registered Battlefields and Registered Parks and Gardens)

- Information on Conservation Areas from the District and Borough Council websites

In addition to the guidance provided by HA 208/07, the following best practice guidance is also taken into account:

- Chartered Institute for Archaeologists, 2014a, Code of Conduct
Chartered Institute for Archaeologists, 2014b, Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment

Chartered Institute for Archaeologists, 2017, Standard and guidance for Historic Environment Desk Based Assessment


Historic England, 2015a, Historic Environment Good Practice Advice in Planning; Note 2: Managing Significance in Decision-Taking


No field surveys have been undertaken at this early stage.

2.5.5 Landscape and visual

The corridor evaluations identify key highly sensitive landscape and visual constraints and considers the effects that could occur as a result of the route options potentially being developed within the corridors and their likely significance.

The assessment considers landscape and visual impacts separately:

- Landscape: changes in the fabric and character of the landscape; and
- Visual: changes in view from visual receptors such as residential properties, places of work and public areas.

As the study area is predominantly rural in character, the requirement for a separate townscape assessment has been scoped out. Where urban areas are potentially affected these are covered as part of the landscape assessment.

The methodology used in this assessment follows guidance set out in Interim Advice Note 135/10 Landscape and Visual Effects Assessment (IAN 135/10) (Highways Agency, 2010). This is a major highway scheme which would affect an extensive area of landscape, and where there are large numbers of sensitive visual receptors. This LVIA provides a proportionate assessment which focusses on likely significant effects.

Landscape

The value or sensitivity of a landscape reflects the importance of the landscape in relation to national and local designations, its perceived value to users and any intrinsic aesthetic characteristics such as its contribution to local landscape quality or sense of place.

A desk top exercise has been undertaken to identify national and local landscape designations and other key sensitive landscape constraints such as the setting of heritage assets and ancient woodland; along with key characteristics of the landscape from published landscape character assessments. Where published landscape character assessments...
provide judgments on value and sensitivity this information is used in addition to the landscape constraints and designations data to determine likely significance.

**Visual**

The sensitivity of a visual receptor depends on the viewer's familiarity with the scene, the activity or occupation that brings them into contact with the view and the nature of the view, whether full or glimpsed, near or distant. It is also determined by the importance of the receptor, the importance of the view, the perceived quality of the view and its ability to accommodate change.

For the corridor study potential visual receptors of high sensitivity are identified to focus on the most significant likely effects. These include residents and users of public rights of way, public open space, country parks and parks and gardens open to the public. As the horizontal and vertical alignment of the expressway within the corridor is yet to be determined it is not possible to assess the magnitude of effect, therefore any assessment of significance of effect relies upon common sense, experience and professional judgement, supported by substantiated reasoning.

Only visual receptors present at the time of assessment are considered. Impacts on forthcoming visual receptors including those subject to planning permission are not assessed because these developments are not all guaranteed to be built and do not have current views that would be affected. The date at which potential future development would be completed is also unknown, and details are often in outline so that the layout/number of receptors and whether they would experience an effect cannot be determined.

Assessing the value of receptors: The determination of sensitivity, or value, of landscape and visual receptors is based on the methodology set out within IAN 135/10. Table 2-10 summarises descriptors used to evaluate the value of the receptors identified within the study area.

**Table 2-10: Value of landscape and visual receptors**

<table>
<thead>
<tr>
<th>Sensitivity/value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Landscape</strong></td>
<td></td>
</tr>
</tbody>
</table>
| High             | Landscapes which by nature of their character would be unable to accommodate change of the type proposed. Typically, these would be:  
  • Of high quality with distinctive elements and features making a positive contribution to character and sense of place.  
  • Likely to be designated, but the aspects which underpin such value may also be present outside designated areas, especially at the local scale.  
  • Areas of special recognised value through use, perception or historic and cultural associations.  
  • Likely to contain features and elements that are rare and could not be replaced. |
| Moderate         | Landscapes which by nature of their character would be able to partly accommodate change of the type proposed. Typically, these would be:  
  • Comprised of commonplace elements and features creating generally |
unremarkable character but with some sense of place.

- locally designated, or their value may be expressed through non-statutory local publications.
- Containing some features of value through use, perception or historic and cultural associations.
- Likely to contain some features and elements that could not be replaced.

### Low
Landscapes which by nature of their character would be able to accommodate change of the type proposed. Typically, these would be:

- Comprised of some features and elements that are discordant, derelict or in decline, resulting in indistinct character with little or no sense of place.
- Not designated
- Containing few, if any, features of value through use, perception or historic and cultural associations.
- Likely to contain few, if any, features and elements that could not be replaced.

### Visual

#### High
- Occupants of residential properties
- Users of PRoW or other recreational trails (such as National Trails, footpaths, bridleways etc.).
- Users of recreational facilities where the purpose of that recreation is enjoyment of the countryside (such as Country Parks, National Trust or other access land etc.).

#### Moderate
Views experienced by:

- Outdoor workers
- Users of scenic roads, railways or waterways or users of designated tourist routes.
- Schools and other institutional buildings, and their outdoor areas.

#### Low
Views experienced by:

- Indoor workers
- Users of main roads (such as trunk roads) or passengers in public transport on main arterial routes.
- Users of recreational facilities where the purpose of that recreation is not related to the view (such as sports facilities).

Assessing the significance of effects: For the purposes of this evaluation, typical descriptors used to indicate the potential significance of landscape and visual effects are provided in Table 2-11 and Table 2-12 below.

### Table 2-11: Descriptors of significance of landscape effects

<table>
<thead>
<tr>
<th>Significance category</th>
<th>Typical descriptors of effect</th>
</tr>
</thead>
</table>
| Very large beneficial (positive) effect | The scheme would:
- greatly enhance the character (including quality and value) of the landscape.
- create an iconic high quality feature and/or series of elements. |
<table>
<thead>
<tr>
<th>Effect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large beneficial (positive) effect</td>
<td>The scheme would:</td>
</tr>
<tr>
<td></td>
<td>- enable a sense of place to be created or greatly enhanced.</td>
</tr>
<tr>
<td></td>
<td>- enhance the character (including quality and value) of the landscape.</td>
</tr>
<tr>
<td></td>
<td>- enable the restoration of characteristic features and elements lost as a</td>
</tr>
<tr>
<td></td>
<td>result of changes from inappropriate management or development.</td>
</tr>
<tr>
<td></td>
<td>- enable a sense of place to be enhanced.</td>
</tr>
<tr>
<td>Moderate beneficial (positive) effect</td>
<td>The scheme would:</td>
</tr>
<tr>
<td></td>
<td>- improve the character (including quality and value) of the landscape.</td>
</tr>
<tr>
<td></td>
<td>- enable the restoration of characteristic features and elements partially</td>
</tr>
<tr>
<td></td>
<td>lost or diminished as a result of changes from inappropriate</td>
</tr>
<tr>
<td></td>
<td>management or development.</td>
</tr>
<tr>
<td></td>
<td>- enable a sense of place to be restored.</td>
</tr>
<tr>
<td>Slight beneficial (positive) effect</td>
<td>The scheme would:</td>
</tr>
<tr>
<td></td>
<td>- complement the character (including quality and value) of the landscape</td>
</tr>
<tr>
<td></td>
<td>- maintain or enhance characteristic features and elements</td>
</tr>
<tr>
<td></td>
<td>- enable some sense of place to be restored.</td>
</tr>
<tr>
<td>Neutral effect</td>
<td>The scheme would:</td>
</tr>
<tr>
<td></td>
<td>- maintain the character (including quality and value) of the landscape</td>
</tr>
<tr>
<td></td>
<td>- blend in with characteristic features and elements</td>
</tr>
<tr>
<td></td>
<td>- enable a sense of place to be retained.</td>
</tr>
<tr>
<td>Slight adverse (negative) effect</td>
<td>The scheme would:</td>
</tr>
<tr>
<td></td>
<td>- not quite fit the character (including quality and value) of the landscape</td>
</tr>
<tr>
<td></td>
<td>- be at variance with characteristic features and elements</td>
</tr>
<tr>
<td></td>
<td>- detract from a sense of place.</td>
</tr>
<tr>
<td>Moderate adverse (negative) effect</td>
<td>The scheme would:</td>
</tr>
<tr>
<td></td>
<td>- conflict with the character (including quality and value) of the landscape</td>
</tr>
<tr>
<td></td>
<td>- have an adverse impact on characteristic features or elements</td>
</tr>
<tr>
<td></td>
<td>- diminish a sense of place.</td>
</tr>
<tr>
<td>Large adverse (negative) effect</td>
<td>The scheme would:</td>
</tr>
<tr>
<td></td>
<td>- be at considerable variance with the character (including quality and</td>
</tr>
<tr>
<td></td>
<td>value) of the landscape</td>
</tr>
<tr>
<td></td>
<td>- degrade or diminish the integrity of a range of characteristic features</td>
</tr>
<tr>
<td></td>
<td>and elements</td>
</tr>
<tr>
<td></td>
<td>- damage a sense of place.</td>
</tr>
<tr>
<td>Very large adverse (negative) effect</td>
<td>The scheme would:</td>
</tr>
<tr>
<td></td>
<td>- be at complete variance with the character (including quality and value)</td>
</tr>
<tr>
<td></td>
<td>of the landscape</td>
</tr>
<tr>
<td></td>
<td>- cause the integrity of characteristic features and elements to be lost</td>
</tr>
<tr>
<td></td>
<td>- cause a sense of place to be lost.</td>
</tr>
</tbody>
</table>
Table 2-12: Descriptors of significance of visual effects

<table>
<thead>
<tr>
<th>Significance</th>
<th>Typical descriptors of effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very large beneficial</td>
<td>The scheme would create an iconic new feature that would greatly enhance the view.</td>
</tr>
<tr>
<td>Large beneficial</td>
<td>The scheme would lead to a major improvement in a view from a highly sensitive receptor.</td>
</tr>
<tr>
<td>Moderate beneficial</td>
<td>The scheme would cause obvious improvement to a view from a moderately sensitive receptor, or perceptible improvement to a view from a more sensitive receptor.</td>
</tr>
<tr>
<td>Slight beneficial</td>
<td>The scheme would cause limited improvement to a view from a receptor of medium sensitivity, or would cause greater improvement to a view from a receptor of low sensitivity.</td>
</tr>
<tr>
<td>Neutral</td>
<td>No perceptible change in the view.</td>
</tr>
<tr>
<td>Slight adverse</td>
<td>The scheme would cause limited deterioration to a view from a receptor of medium sensitivity, or cause greater deterioration to a view from a receptor of low sensitivity.</td>
</tr>
<tr>
<td>Moderate adverse</td>
<td>The scheme would cause obvious deterioration to a view from a moderately sensitive receptor, or perceptible damage to a view from a more sensitive receptor.</td>
</tr>
<tr>
<td>Large adverse</td>
<td>The scheme would cause major deterioration to a view from a highly sensitive receptor, and would constitute a major discordant element in the view.</td>
</tr>
<tr>
<td>Very large adverse</td>
<td>The scheme would cause the loss of views from a highly sensitive receptor, and would constitute a dominant discordant feature in the view.</td>
</tr>
</tbody>
</table>

The following sources of baseline information have been used:

- The National Planning Policy Framework, (Department for Communities and Local Government, 2012)
- Adopted Local Plans
- Relevant National Character Area descriptions (Natural England 2013 - 2014)
- County Landscape Character Assessments
- District/Borough Landscape Character Assessments
- Interim Advice Note 135/10 Landscape and Visual Effects Assessment, (IAN 135/10) (Highways Agency, 2010)
- An Approach to Landscape Character Assessment, (Natural England, 2014)
2.5.6 Nature conservation

A high level assessment has been undertaken to determine the impacts associated with the construction and operation of the proposed expressway that could arise for each corridor section. Each section was assessed to determine the potential for significant effects on sites designated for their importance for nature conservation.

The study area for this high level assessment comprised:

- The route corridor plus a 2 kilometre buffer for non-statutory designated sites for nature conservation on either side of corridor boundary.
- The route corridor plus a 5 kilometre buffer for statutory designated sites for nature conservation on either side of corridor boundary.
- The route corridor plus a 30 kilometre buffer for any Special Areas of Conservation (SAC) with bats as a primary qualifying feature.

The desk study was completed using the following resources:

- Thames Valley Environmental Records Centre (TVERC), Bedfordshire and Luton Biodiversity Recording and Monitoring Centre, and Cambridgeshire and Peterborough Environmental Records Centre (CPERC) provided data on statutory and non-statutory designated sites within the study area. Information on sites which had formally been proposed for designation was included and, where this occurred, these sites were treated within this assessment as being formally designated.
- Multi-agency Geographic Information for the Countryside (MAGIC). [online] Available at: http://magic.defra.gov.uk/MagicMap.aspx was used to identify statutory and non-statutory sites for nature conservation and priority habitats in the study area.
- Google Maps [online] Available at http://google.com/maps was used for high-level review of land use.

The information gathered was used to undertake a high-level comparative assessment of the route corridors, based primarily on the presence and location of statutory and non-statutory designated sites within or adjacent to each section. The likelihood of the proposed expressway being able to avoid these sites, and its proximity to them, was used to assess the potential for adverse effects such as direct habitat loss, habitat degradation through changes in air quality or hydrology, and disturbance to associated species through noise and visual stimuli.

Although designated ancient woodland was included as part of this Stage 1A assessment, the presence of single aged or veteran trees within the route corridors but outside designated sites was considered to not provide a sufficient differentiator between route corridors, and is therefore not included within the baseline or assessment sections below. However, where clusters of veteran trees exist, most notably near Radley College, this is identified.

Consideration of habitat types and their potential to support protected species was also given, based on professional judgement and informed by best practice guidance including that listed below:
2.5.7 Geology and soils

Geology and soils are key factors in determining the environmental character and quality of any given geographic area. Underlying rocks are a key determinant of landform, whilst the physical and chemical properties of the rocks and the overlying soils influence the type and variety of vegetation that will grow, agricultural quality, flood risk and water storage capacity.

Major infrastructure projects such as highways can have a significant effect on geological and soil resources, whilst the nature and condition of soil and underlying rocks can be a key constraint on scheme design. Under some circumstances, construction work can also compound the environmental effects caused by previous activity, for instance by mobilising pollution left in the ground by former industrial activities.

An assessment matrix will be used based on the DMRB guidance for Geology and Soils (HMSO, 1993). The DMRB guidance defines the scope of the Soils and Geology topic but does not provide formal guidance on the assessment of impacts. No specific criteria for Soils and Geology are listed in DMRB and other good practice guidance, and therefore criteria based on professional judgement and experience on similar projects, is used.

For the purposes of the Stage 1A options evaluation, the following effects from the scheme are deemed significant:

Geology

- Harm to nationally designated geological SSSIs
Soil quality

- Rendering good quality soils unsuitable for reuse
- Rendering good quality soils unsuitable for reuse without treatment or remediation
- Loss or sterilisation of good quality soil through development
- Reduction in grade of agricultural soils

Mineral resources

- Loss of, or sterilisation of mineral resource through development
- Opportunity to use local sources of fill or recycled aggregate as an alternative to primary extraction

Land Contamination

For the purposes of the Stage 1A options evaluation the presence of the following land uses may indicate the potential for a significant effect associated with land contamination:

- Presence of hazardous waste, industrial waste or domestic waste landfill (operational or historic)
- Presence of high risk industrial site – current or former for example gasworks, chemical works, refinery, fuel storage depot
- Presence of large potentially contaminative industrial site - current or former such as manufacturing facility military establishment, works
- Presence of large commercial or public institution – for example hospital, airfield, large R&D facility

At Stage 1A given the available data, the size of the study area and the assessment being of route corridors and not potential routes it has not been possible to assess the likelihood of beneficial effects, this will be assessed further within Stage 1B.

The assessment at Stage 1A is based on third party sources of information and early engagement with limited regulatory stakeholders, as summarised by the information sources listed below:

- Metadata with the boundaries of the Authorised Landfills and Historic Landfills were available to download via Open Data (Environment Agency (EA), 2018)
- Groundsure – Historical land use mapping polygons
- Groundsure – Control of Major Accident Hazards (COMAH) sites
- Groundsure – Historical and authorised landfills
- Open Street Maps (Open Street Map, 2018)
- British Geological Survey (2018a) GeoIndex Onshore
- Regional Unexploded Bomb Risk Map (Zetica, 2018)
- British Geological Survey (2018b) BritPits data – for information relating to operational, dormant and historical mineral extraction sites
- Early engagement with Mineral Planning Authorities (MPA) for information relating to mineral safeguarding areas (MSGA)
- Local Geological Sites (LGS). It should however be noted that data were not available for each region at the time of writing. LGS data were only available from Berkshire and Oxfordshire however data for all districts will be available for Stage 1B

A baseline assessment of conditions within each Section of the Corridor has been provided within Section 3.

The assessment of the potential effects on the geology and soil characteristics including land quality of the route options are undertaken taking account of European and national legislation and planning policies such as:

- National Planning Policy Framework (DCLG, 2012)
- National Policy Statement for National Networks (Department for Transport, 2014)
- Planning Act 2008
- Interim advice note 133/10 Environmental Assessment (Highways Agency, 2010) and the Planning Act 2008
- DMRB guidance for Geology and Soils (HMSO, 1993)
- Screening, Scoping and Preliminary Environmental Information (PINS, 2015)

Geologically Sensitive Sites

Geologically sensitive or important sites, such as World Heritage Sites, may be classed as internationally important. Geo-Parks and Geological SSSIs may be classed as nationally important or sensitive sites. Geological attributes may also be important in the designation of SPAs, SACs, NNRs, National Parks etc.

Road schemes may affect Geological SSSIs if the construction requires earthworks within or immediately adjacent to the SSSI. Impacts from construction may include permanent loss of a site (or part of it), temporary loss of a site (or part of it) or enhancement though increased exposed geology or accessibility.

Impacts during operation could result from long-term changes, such as reducing or increasing the exposure, changing the environmental setting of the exposure or reducing or enhancing access or study opportunities.
The NN NPS states “where a proposed development on land within or outside a SSSI is likely to have an adverse effect on an SSSI (either individually or in combination with other developments), development consent should not normally be granted”. These sites are likely to present a constraint to development within the SSSI boundary. Further assessment would be required in order to better understand the particular features of these designated sites and whether any mitigation option could be suitable or appropriate.

No geological World Heritage Sites or Geo-Parks are present within the study area.

Local Geological Sites (LGS) are also classed as important/sensitive sites and have the potential to be affected by the construction works.

The NN NPS states that land stability should be considered in respect of new development including road schemes. The baseline data review has shown that there is evidence of mass movement and land instability within the study area. Further assessment including specialist geotechnical assessment will therefore be undertaken to understand the particular constraints associated with ground stability in the scheme area. An assessment of land stability has been completed by the geotechnical discipline as a geohazard and will inform route corridor assessment work outwith this Route Corridor Assessment Report.

Minerals

Impacts to mineral resources may arise from the potential for loss or sterilisation of part or all of the reserve or prevention or restrictions on their operation during the construction phase. Operational impacts on mineral resources may arise from the potential for loss or sterilisation of part or all of the reserve or limits on the working of future reserves due to the presence of sensitive infrastructure.

There may be the potential for current or future mineral working sites to pose a constraint to future development.

In order to provide a preliminary assessment at Stage 1A, the locations of MSGAs for each MPA have been obtained to identify potential areas in which mineral reserves are safeguarded and may therefore be impacted by the scheme.

BritPits data provided by the British Geological Survey (BGS) show locations of active, dormant and historical mineral extraction sites.

Soil

Impacts may include damage to soil quality during the construction stage, as a result of poor soil management, or as a result of pollution incidents. However, there could be opportunities to use site-won soils in landscaping or elsewhere on-site or off-site. Soil quality may also be degraded or there could be a permanent loss of soils in some areas during the operation phase. In the operational phase there may also be contamination of soils adjacent to the highway from surface water runoff containing contaminants associated with vehicle emissions and de-icing. Airborne pollutants may also impact soil quality.

The ALC system (MAFF, 1988) defines 6 grades of soils: Grade 1 (excellent quality), Grade 2 (very good quality), Subgrade 3a (good quality), Subgrade 3b (moderate quality), Grade 4 (poor quality) and Grade 5 (very poor quality). Grades 1 and 2 and Subgrade 3a are determined as Best and Most Versatile (BMV) land. BMV agricultural land is the most flexible
in terms of the range of crops that can be grown, the level and consistency of yield and the
cost of obtaining it, and offers the best prospect for both food and non-food crop production.

Agricultural soil may be classed as a receptor in respect to both the Soils and Geology, and
the Peoples and Communities disciplines, the latter in the sense that ALC may be used as an
indicator of the value/quality of agricultural land. This issue is discussed within the People
and Communities assessment and is not replicated here to avoid ‘double counting’ in the
assessment scoring.

Sensitive soils such as peat have the potential to be impacted by development; however,
Cranfield soil associations data do not indicate the presence of peat or other soils of
particularly high intrinsic value within the study area. Based on this, soils are not considered
a significant constraint for the corridor route assessment and are not discussed in any detail
further in this assessment for Stage 1A. That said, they are considered where they are of
importance as part of designated sites such as SSSIs.

**Controlled Waters**

In Stage 1A any potential constraints associated with controlled waters has been assessed
within the Road Drainage and the Water Environment section.

**Potentially contaminative land uses**

The disturbance of land contamination (including historic landfills and potentially
contaminative land uses) during construction works may result in risks to construction worker
health via acute exposure to contaminants in soils. Additionally, ground or landfill gas could
accumulate within excavations and confined spaces, presenting a potential health risk during
construction as a result of inhalation and asphyxiation or explosion of gases. There may also
be an unacceptable risk to nearby residents or adjacent land users by the creation of fugitive
dust particles and soil vapours from contaminated soils, or the mobilisation and subsurface
migration of gas or contaminated groundwater.

Maintenance workers engaged in ground disturbance activities during the operational phase
could be exposed to unacceptable risks via acute exposure to land contamination,
particularly from uncontrolled excavation within landfill materials. Additionally, ground gas
could accumulate within built development or other confined spaces, presenting a potential
health risk to maintenance workers entering or working within confined spaces.

Road schemes can impact sites affected by contamination by opening up new pathways for
migration, or by sterilising the land preventing future access and clean-up.

Road schemes within the boundary of authorised landfills, or within the immediate vicinity
have the potential to compromise the existing infrastructure and the operator’s regulatory
compliance, potentially resulting in unacceptable impact on the environment.

Sub-surface infrastructure may be at risk from aggressive ground conditions leading to
degradation or failure of building materials such as concrete. Hydrocarbons and solvents in
made ground may also impact upon infrastructure such as utilities.

In Stage 1A a preliminary review of historical land use has been completed based on
historical land use polygon mapping obtained from Groundsure. This polygon mapping has
been produced by Groundsure from their own review of historical mapping and would be
considered to be a reasonable source of information for the Stage 1A assessment. However, it should be noted that detailed review of historical maps themselves has not been completed at this stage given the size of the study area and there is therefore the potential for some potentially contaminative land uses to not have been identified in this preliminary Stage 1A assessment.

There are no designated EA ‘Special Sites’ within the study area.

A review has been completed of sites that may have been determined as Contaminated Land in respect to Part IIA of the Environmental Protection Act 1990. A review of COMAH sites has also been completed for study area.

Landfills

A preliminary review of landfills has been completed based on information provided by Groundsure and publicly available EA data. Landfills present within the scheme area include both authorised landfills, which are those which are subject to current regulation by the EA and may be active or closed, and historic landfills, which are no longer in use and are not currently regulated.

A detailed review of landfills has not been completed, but any landfills particularly large in size or expected to be significant in terms of their potential to pose a constraint to the route have been highlighted. It should be noted that the landfills review has been based on the available summary data but the meaning of terms in landfill descriptions may have evolved over time, so for example ‘inert’ waste in a historic landfill would not necessarily meet the current definition of inert waste. Also, a landfill licensed to receive ‘household, commercial and industrial waste’ would not necessarily have received all these materials.

2.5.8 Road drainage and the water environment

The study area for the Stage 1A assessment has been defined as a 2 kilometre area around the proposed corridor sections. The 2 kilometre buffer encompasses the flood risk constraints within the route options corridors and are therefore likely to have impact on the proposed scheme.

It should be noted that the study area could be extended when further data has been collected, site surveys completed and consultation has been undertaken with stakeholders about the scope. Furthermore, more detailed analysis of impacts in later assessment phases may necessitate an increase in the study area.

A study area of 1 kilometre around the corridors has been adopted for the geomorphology (including WFD), water quality and groundwater assessment. This distance has been identified based on professional judgement and has allowed for an assessment of potential direct effects, as well as providing a broader catchment context appropriate for purpose in Stage 1A. It is commensurate with the nature and scale of the proposed changes associated with the scheme.

An initial appraisal of the impact of the corridors on the water environment including flood risk, geomorphology, WFD, groundwater and water quality uses desk based information.
The following guidance is used in the assessment:

**European Union and UK legislation**

Key pieces of legislation setting the context for this chapter are discussed in turn below.

The Water Framework Directive (WFD) was adopted in 2000 and established a framework for management of water resources throughout the European Union. It is a significant piece of legislation with the overarching objective of enabling all water bodies in Europe to attain 'Good' or 'High' Ecological Status by 2015. The WFD is implemented in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003" (SI 3242/2003). The EA is the competent authority in England responsible for delivering the objectives of the WFD. Any watercourses, groundwater or water features covered under the WFD are referred to as ‘WFD water bodies’. The WFD foresees in its Articles 16 and 17 two Daughter Directives, which are as follows:

- The Priority Substances Directive 2008/105/EC

Other EU legislation is rationalised under the WFD by replacing other "first wave" Directives, including those concerned with freshwater fish, and shellfish. The operative provisions of the Directives are taken over in the WFD, allowing them to be repealed (as from December 2013).

The Department of the Environment, Food and Rural Affairs (Defra) is responsible for all aspects of water policy in England. Management and enforcement of this water policy is the responsibility of the EA. Relevant UK legislation relating to the water environment is identified below:

- The Flood Risk (England and Wales) Regulations 2009
- The Flood and Water Management Act 2010
- The Water Resources Act 1991
- The Environment Act 1995
- The Groundwater (England and Wales) Regulations 2009
- The Control of Pollution (Applications, Appeals and Registers) Regulations 1996 (SI1996/2971)
- The Environmental Protection Act 1990
- The Land Drainage Act 1991 and 1994
- The Water Act 2003
- The Control of Pollution (Consents for Discharge) (Secretary of State Functions) Regulations 1989
National policy drivers

The National Planning Policy Framework (NPPF) and supporting Planning Practice Guidance (PPG) came into existence in March 2012 and November 2016 respectively. The following NPPF (Highways Agency, 2012) paragraphs are relevant to this topic:

- Chapter 10 Meeting the Challenge of Climate Change, Flooding and Coastal Change (Paragraphs 94 and 99 to 104)
- Chapter 11 Conserving and Enhancing the Natural Environment (Paragraph 109)

In England, the requirements of the NPPF are set out in the accompanying PPG which provides additional information on development in flood risk areas. The NPPF sets strict tests to protect people and property from flooding. Under this strategy, areas of land throughout England are designated according to the potential flood risks from rivers or the sea. Any highways and transportation schemes deemed to be essential infrastructure should pass an ‘exception test’ requiring a development to:

- Provide wider sustainability benefits to the community that outweigh flood risk.
- Be safe for its lifetime, taking into account the vulnerability of its users, without increasing flood risk elsewhere. Where possible, flood risk should be reduced elsewhere.

The EA sets out its policy position in relation to managing and protecting groundwater in The Environment Agency’s Approach to Groundwater Protection (February 2018, Version 1.2). As general principles, the EA approach to groundwater protection includes the following.

- Wherever legislation allows, the EA will use a tiered, risk-based approach to regulate activities that may impact groundwater resources and to prevent and limit pollution.
- Where the potential consequences of a development or activity are serious or irreversible the EA will adopt the precautionary principle to manage and protect groundwater. The EA will also apply this principle in the absence of adequate information with which to conduct an assessment.
- The EA encourages everyone whose activities may impact upon groundwater to consider the groundwater protection hierarchy in their strategic plans when proposing new development or activities. The aim is to avoid potentially polluting activities being located in the most sensitive locations for groundwater.

Definition of significant effects

The options evaluation of the corridors is undertaken using high level information available for each of the areas. This includes identifying key areas at risk of flooding, Main Rivers, WFD water body catchments, ordinary watercourses, groundwater source protection zones (SPZs), licensed water supplies, key productive aquifers and areas designated for water supply. The assessment accounts for the potential generic impacts across the catchments and the number of receptors potentially at risk. The assessment has been undertaken in communication with other disciplines such as geology and soils and ecology to ensure that
any groundwater quality aspects relating to land contamination and any groundwater dependent habitat of relevance are embedded into wider hydrogeological considerations.

The identification of potentially significant effects is derived from a qualitative assessment of the information reviewed informed by previous experience, combined with a quantitative assessment of areas of risk. For example, the number and size of rivers traversed by each corridor, number of WFD catchments in each corridor etc.

For each corridor section the flood risk receptors are assigned an importance attribute based on professional judgement, as indicated in Table 2-13 below.

**Table 2-13: Assessment criteria for estimating the importance of water environment receptors**

<table>
<thead>
<tr>
<th>Importance</th>
<th>Typical descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Very High</strong></td>
<td><strong>Flood risk and drainage:</strong> Very large floodplain areas with significant constraints and a very high probability of flooding residential and industrial properties. In addition, a higher proportion of areas designated to be of ‘high’ surface water flood risk and groundwater susceptibility.</td>
</tr>
<tr>
<td><strong>High</strong></td>
<td><strong>Flood risk and drainage:</strong> Large floodplain areas with significant constraints and a high probability of flooding residential and industrial properties. In addition, a high proportion of areas designated to be of ‘high to medium’ surface water flood risk or groundwater susceptibility.</td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td><strong>Flood risk and drainage:</strong> Moderate floodplain areas with constraints and a moderate probability of flooding residential and industrial properties. In addition, a high proportion of areas designated to be of medium surface water flood risk or groundwater susceptibility.</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td><strong>Flood risk and drainage:</strong> Floodplain with limited constraints and a low probability of flooding of residential and industrial properties. Area designated to be predominantly of ‘low’ to ‘very low’ fluvial or surface water flood risk or low groundwater susceptibility.</td>
</tr>
</tbody>
</table>

In addition to sources identified already, the following data sources have also been used:

**Site Wide Sources**

- EA published flood zones, available from Government open data website (EA, 2018a)
- EA ‘Flood Map for Planning’, available from Government open data website (EA, 2018b)
- EA Historic Flood Extents, available from Government open data website (EA, 2018c)
2.5.9 Materials and waste

It is not possible at this early stage to evaluate each corridor individually using DMRB guidance to further understand the possible significant effects relating to materials and waste. This is due to the lack of design information on material and waste quantities such that a quantitative assessment cannot be carried out to compare the corridors. It is likely that all corridors would have a significant impact due to the scale and length of the expressway. Effects on materials and waste will be considered further at Stage 1B upon development of possible route options.

At this stage, a high level review only has been undertaken of the following:

- Materials – a review of permitted reserves of land-won primary aggregates within the East Midlands, East of England and South East, along with the collection of data on sales and consumption of primary aggregates in these regions; and
- Waste – a review of landfill capacity and the transfer, treatment and metal recycling sites within the East Midlands, East of England and South East in terms of site inputs.

This review is included within Annex C.

2.5.10 Cumulative effects

It is not possible at this early stage to meaningfully identify likely cumulative effects associated with the expressway. Given the scale of the corridors, it is considered that cumulative effects would not be a differentiator between the corridors.
At Stage 1B, data will be collected on the location of Reasonably Foreseeable Future Projects (RFFPs) within and close to the preferred corridor. These projects will be classified, according to PINS Advice Note 17 (planning Inspectorate (2015) https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf) criteria, as Tier 1, Tier 2 or Tier 3 projects.

These data will be used to provide an early indicator of the potential for cumulative effects to arise along the route options developed in Stage 1B.

2.6 Assumptions and limitations

2.6.1 Air quality

Whilst a high level score has been assigned to each corridor, this score is caveated as follows:

- The assessment is based on provisional traffic data only. The potential for impacts, is based on a high level review.

- Both Oxford and Cambridge may be implementing Clean Air Zones (“CAZs”) by 2020, and this may have implications for air quality of the scheme, resulting from journey changes (especially if charging zones are enforced). There is currently very limited information available to help inform the assessment regarding the likely effect of CAZs.

- Each corridor has the potential to deliver air quality benefits in locations where the route removes traffic away from sensitive receptors. Conversely there is potential for adverse impacts at sensitive receptors where the new sections pass through areas that are currently rural.

- Whilst it cannot be assessed at this stage, the disruption and nuisance from construction dust and vehicle movements upon the surrounding communities is likely to be an important consideration as route options are developed.

2.6.2 Noise and vibration

Route alignment (both horizontal and vertical) is key in terms of likely operational and construction impacts for noise and vibration on sensitive receptors and thus the assessments of corridors are undertaken at a high level only with considerable associated uncertainty;

Given the very wide corridors it is not practical to define Do-Minimum or ‘bypassed’ routes at this early stage. Therefore, the assessment focuses on route corridors only;

The scoring system does not apply to noise on a section by section basis, as it is not practical to undertake a meaningful assessment of the likely significance of potential effects at this stage of the project ahead of the development of route options.

2.6.3 People and communities

At this stage the focus has been on identifying those constraints which help to differentiate between corridor options. For reasons of proportionality, some constraints relevant to the assessment of effects on People and Communities have therefore not been used to inform
the corridor appraisal. These include public rights of way, national and regional cycle routes and expansive areas of land, including open access land and isolated individual private properties. These constraints are present throughout all corridor options and therefore the consideration of these constraints does not inform consideration of whether one corridor option is better than another. These types of constraint will become important considerations in the next stage of assessment, when routes are developed within a corridor, as the location of the route itself will influence the likely significance of effect in relation to these potential receptors.

There are insufficient traffic modelling data available to inform the degree of relief of traffic some existing settlements may experience from operation of a new expressway in any detail. However, potential opportunities to support the intervention objective ‘A’ have been identified at a high level.

### 2.6.4 Cultural heritage

The key limitations and assumptions for the cultural heritage Stage 1A assessment include the following:

- A Zone of Theoretical Visibility (ZTV) has not been produced for this stage and therefore the full extent of the views and settings of the cultural heritage assets, and the potential effects on them from the Proposed Development, may be subject to change.

- All research at this stage has been desk based, no site visits were undertaken.

- No consultation has been conducted with Local Authority Advisors at this stage.

- In the assessment of potential effects, it has been assumed that the final route option will not require the demolition of, or cause a direct physical impact to, High value historic buildings or be routed through a built up area.

### 2.6.5 Landscape and visual

Design assumptions have been made based on principles of Highways England Expressway design standards as outlined in the Expressways Technical Note (section 2 Core requirements) (Highways England, 2016), along with judgements based upon professional experience of typical effects of infrastructure design in the landscape.

This summary is based upon a high level review following an assessment of environmental constraints and published material available at the time of writing. No details of the highway design are known at this stage.

The designs and construction methodology is not sufficiently developed to provide details regarding the extent and nature of vegetation clearance. Therefore, assumptions are based on knowledge of similar schemes.

No fieldwork has been undertaken at this stage.
2.6.6 Nature conservation

The key limitations and assumptions for the nature conservation Stage 1A assessment include the following:

- Routes within corridors could lie anywhere within the corridor rather than certain sections being limited to on-line widening only.

- Route alignment within corridors will be sympathetic to designated sites and will avoid them wherever possible.

- Route design will incorporate previously examined and uncontroversial measures to mitigate potential impacts (for example wide-span bridges would be used for watercourse crossings in preference to culverts for sensitive water courses; land take will be minimised as far as possible, etc.).

2.6.7 Geology and soils

No field surveys have been completed as a desk-based study is considered appropriate and proportionate at Stage 1A.

The assessment of potential effects is based on professional judgement having regard for available desk study information. At this early stage the assessments are conservative in nature to account for the high degree of uncertainty.

For reasons of proportionality, a detailed review of historical maps has not been completed at this stage given the huge size of the study area and there is therefore the potential for some potentially contaminative land uses to not have been identified. This will be investigated more closely in Stage 1B as route options are developed.

BritPits dataset shows data up to 2015 only. Updated information will be sought from Local Planning Authorities in Stage 1B to support the development of route options.

2.6.8 Road drainage and the water environment

Assumptions

- The scheme is expected to consider the predicted impact of climate change on flood risk. The requirements could change across the length of the scheme subject to the River Basin District.

- Flood extents incorporating climate change may not be readily available, therefore Flood Zone 2 (equivalent to between a 1 in 100 and 1 in 1000 annual probability event) would be adopted as a surrogate for the assessment.

- The baseline information gathered is from desk based sources including EA data. The next phase of the assessment would include a more detailed study of flood constraints, after data have been obtained.

Limitations
- No water quality monitoring or modelling (including HAWRAT) has been undertaken at Stage 1A.

- No ground investigation information has been used to support the hydrogeological assessment at Stage 1A.

- No hydraulic modelling has been undertaken during Stage 1A to inform the identification of flood risk constraints.
3. Corridor A

3.1 Baseline conditions

3.1.1 Air quality

Section A-1

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- AQMAs: The A-1 area includes Abingdon AQMA (central Abingdon), and the southern part of the Oxford AQMA. Both have been declared due to exceedances in NO₂.

- Designated Sites: This area includes Dry Sandford Pit SSSI, Barrow Farm Fen SSSI, Sugworth SSSI and Cothill Fen SSSI and SAC.

- Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Oxford, Abingdon, Northcourt, Radley, Kennington, Toot Baldon, Sunningwell, Garsington and Cuddesdon.

- Sensitive Receptors: Within the A-1 boundary, there are over 20,000 potential air quality sensitive receptors.

- Clean Air Zone: The section is approximately 2km from the potential Oxford CAZ.

- PCM Model: Defra PCM links within the A-1 area have been identified on A415 and A4183 in Abingdon. Concentrations are elevated but not exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: The Vale of White Horse District Council has 18 NO₂ monitoring locations within A-1, in and around the centre of Abingdon. The latest monitoring data indicates elevated NO₂ concentrations within the AQMA, with one exceedance of the AQOs on the A415, and other concentrations outside the AQMA below the AQO.

- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the A-1 area (at 1km square intervals) are below the relevant AQOs for NOx (9.8-19 μg/m³), NO₂ (7.8-14.3 μg/m³) and PM₁₀ (12.2-15.6 μg/m³).

There is potential for air quality benefits at sensitive receptors in Oxford and Abingdon, should scheme route options change traffic routings away from these areas (and therefore a reduction in the impact of vehicle emissions at sensitive receptors along routes in these areas).
Section A-2

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs:** No AQMA areas have been declared within the A-2 boundary by either Aylesbury Vale District Council, Central Bedfordshire Council, or South Oxfordshire Council.

- **Designated Sites:** This broad area includes Stone SSSI (to the west of Aylesbury), Warren Farm SSSI, Stewkley, Bugle Quarry SSSI, and Bierton Clay Pit SSSI.

- **Residential Receptors:** Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Great Milton, Tiddington, Shabbington, Thame, Long Crendon, Haddenham, Cuddington, Dinton, Chearsley, Upper Winchendon, Stone, Aylesbury, Berryfields, Buckingham Park, Rowsham, Weedon, Aston Abbotts, and Wing.

- **Sensitive Receptors:** Within the A-2 boundary, there are over 30,000 potential air quality sensitive receptors.

- **Clean Air Zone:** The section is approximately 9km from the potential Oxford CAZ.

- **PCM Model:** Defra PCM links within this area have been identified on A4012 in Leighton Buzzard, and the A41, A413, A4157, and A418 around Aylesbury. Concentrations are elevated but not exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data:** Aylesbury Vale District Council undertake NO₂ monitoring in and around Aylesbury. The latest monitoring data indicates concentrations are within the relevant AQO, and no exceedances. South Oxfordshire Council undertake NO₂ monitoring in and around Thame. The latest monitoring data indicates concentrations within the relevant AQO, although one location (Aylesbury Road) is elevated.

- **Defra Background Concentrations:** The Defra background maps indicate 2018 background concentrations across the A-2 area (at 1km square intervals) are below the relevant AQOs for NOx (7.4-15.8 μg/m³), NO₂ (5.7-11.2 μg/m³) and PM₁₀ (11.2-16.5 μg/m³).

There is potential for air quality benefits in Thame, Haddenham and Aylesbury, should scheme route options change traffic routings away from these areas (and therefore a reduction in the impact of vehicle emissions at sensitive receptors along routes in these areas).

Section A-3

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:
AQMAs: No AQMA areas have been declared within the A-3 boundary by either Aylesbury Vale District Council, Central Bedfordshire Council or Milton Keynes Borough Council.

Designated Sites: This broad area includes Pokers Pond SSSI, Nares Gladley Marsh SSSI, Nine Acres Pit SSSI, Kings and Bakers Woods and Heaths SSSI, Double Arches Pit SSSI, Tebworth Marsh SSSI, and Wavendon Heath Ponds SSSI.

Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Leighton Buzzard, Stoke Hammond, Great Brickhill, Heath and Reach, Woburn Sands, Aspley Guise, Eversholt, Milton Bryan and Soulbury.

Sensitive Receptors: Within the A-3 boundary, there are approximately 29,000 potential air quality sensitive receptors.

Clean Air Zone: The section is approximately 43km from the potential Oxford CAZ.

PCM Model: Defra PCM links within this area have been identified on the A4146 in Milton Keynes, and the A4012 in Leighton Buzzard. Concentrations on these links are not exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: Central Bedfordshire Council undertake NO₂ monitoring in and around Leighton Buzzard. The latest monitoring data indicates a kerbside location in Woburn as exceeding the AQO, and a location in central Leighton Buzzard as close to exceeding. Milton Keynes Borough Council undertake NO₂ monitoring, and within the A-3 area, the latest monitoring data indicates concentrations below the AQO.

- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the A-3 area (at 1km square intervals) are below the relevant AQOs for NOₓ (8.6-16.6 μg/m³), NO₂ (6.6-12.2 μg/m³) and PM₁₀ (11.7-16.8 μg/m³).

There is potential for air quality benefits in Milton Keynes, Leighton Buzzard, Woburn and Little Brickhill, should scheme route options change traffic routings away from these areas (and therefore a reduction in the impact of vehicle emissions at sensitive receptors along routes in these areas).

**Overall**

The available information highlights the AQMAs within Corridor A, and the ongoing exceedances of the relevant AQOs. The corridor includes parts of large urban areas including Abingdon, south Oxford, Thame, Aylesbury and Leighton Buzzard, Bedford and St. Neots, as well as a number of designated sites. There is therefore a large number of sensitive receptors that could be impacted (both adversely and beneficially) by route options through this corridor. The monitoring exceedances within the AQMAs highlights the opportunity to reduce congestion in these areas and potentially improve air quality within the AQMAs.
3.1.2 Noise and vibration

Within the Corridor A study area there are 110,856 dwellings and 1,593 other sensitive receptors. The Corridor A study area contains the large settlements of Abingdon, Leighton Buzzard, the southern edge of Oxford, the majority of Aylesbury, Bletchley and the southeast of Milton Keynes, as well as numerous smaller towns and villages.

It is expected that receptors in close proximity to major roads and within urban areas are subject to high noise levels dominated by road traffic. Within this corridor study area, a number of residential settlements exist in close proximity to the A34 (e.g. Abingdon and Shippon), A418 (e.g. Tiddington, Thame, Westlington, Upton, Stone, Rowsham, and Wing), A4146 (e.g. Stoke Hammond), A5 (e.g. Little Brickhill) and A5130 (e.g. Woburn sands). Other major roads within the corridor study area include the M1, M40 and A41.

Receptors located in rural settings are expected to have their noise environment consisting of more local sources such as agriculture activities, road traffic on minor roads, railways and aircraft flights. There are rural expanses within the Corridor A study area between Abingdon and M40, M40 and Aylesbury, Aylesbury and Leighton Buzzard, and the area north of A5 and southeast of Milton Keynes where non-traffic sources are more likely to dominate the noise environment.

There are three railway lines running through the Corridor A study area that would contribute to the surrounding noise environment: the Cherwell Valley line, the Chiltern Main line, and the London to Birmingham line. In addition, Luton and Heathrow Airport have several flight paths and stacking areas through the Corridor A study area. The corridor also contains the Aylesbury Thame Airport, Holmbeck Farm Airfield, Abingdon Airfield, and Slay Barn private airstrip.

There are numerous SSSI s throughout the study area such as: Sugworth, Barrow Farm, Culham Brake, Dry Sandford Pit, Double Arches Pit and Heaths, and Aspley Heath.

The Corridor A study area contains a total of 73 NIAs. Three NIAs exist adjacent to the A34 between Abingdon and Oxford, four on the A4074, two within Abingdon and one in Littlemore. There are 11 NIAs adjacent to the A418 as well as 35 adjacent to the A40, M40, A41, A413, A4146, A329, A4129, and numerous within Aylesbury. Three are located on the A5, three on the A5130 and nine within and to the south east border of Milton Keynes. Three NIAs are designated due to rail noise on the London to Birmingham railway line south of Milton Keynes.

3.1.3 People and communities

Section A-1

Abingdon is located in the south-west of the section, while the southern outskirts of Oxford (Blackbird Leys area) coincide with the northern edge of the section. Other key settlements within the west part of the corridor section are Shippon, Gozzard’s Ford, Cothill, Radley and the Woodland/Pebble Hill/Bigwood mobile home estates north of Radley, while Nuneham Courtenay, Toot Baldon, Garsington, Chippinghurst, Denton and Cuddesdon are within the eastern part of the section. The western edge of Abingdon is bounded by the A34 which is a busy dual carriageway. However, the other settlements within the section are largely unaffected by major highway infrastructure.
There are areas of land allocated for development near Radley and the southern fringe of Oxford, while Dalton Barracks is used by the MOD and allocated for residential development in the emerging Vale of White Horse Local Plan.

In terms of recreation and open space, the Tilsley Park leisure complex abuts the eastern side of the A34 in Abingdon, while there are some areas of Local Green Space within some settlements, notably Chippinghurst. Radley College golf course (private) and Bagley Wood.

In terms of education, health and other sensitive community receptors, the Manor Preparatory School, School of St Helen and St Katharine, Larkmead School, Church of St Mary Magdalene and Stowford House care home are within 250m of the A34. Radley College, with its extensive grounds, is within the centre of the corridor (there is also a primary school within the village of Radley). Cemeteries, including war cemeteries are within existing settlements, with the exception of Nuneham Courtenay (All Saints) Churchyard which is on the edge of Nuneham Courtenay, although this is not in a location likely to pose a constraint to route options.

There are patches of best and most versatile agricultural land in the southern and eastern parts of the section.

**Section A-2**

This section follows the route of the A418. There are several small settlements located along the A418 including Tiddington, Gibraltar, Dinton, Upton, Stone, Hartwell, Rowsham and Wing. The larger settlements of Thame, Haddenham and Aylesbury are located along the south-eastern edge of the corridor section. Other villages within the corridor are Wheatley (bounded to north-east by the A40 dual carriageway), Waterstock, Waterperry, North Weston, Cuddington, Berton, Hardwick, Ickford, Shabbington, Upper Winchendon, Charsley, Long Crendon, Weedon, Cublington, Great Billington, Wingrave, Cublington and Aston Abbots.

There is a large development allocation at Berryfields, north-west of Aylesbury (with residential development under construction). Smaller allocations are located on the outskirts of Haddenham and Thame.

Recreational land use within the section includes 5 golf courses. In the west of the section is the Waterstock golf course, south of the village of Waterstock, and Oxfordshire golf hotel course off the A329 (Rycote Lane). The Aylesbury Park Golf Club is located on the western edge of Aylesbury. The Mentmore Golf and Country Club and Aylesbury Vale Golf Club are located in the eastern part of the corridor section. All of these golf courses are private. The Aylesbury Golf Centre between Berton and Hulcott is located just off the A418 and has a driving range (the golf course itself is understood to have closed in 2013). Thame Football Club is located near to the A418/A4129 roundabout. There are playing fields adjacent to A418 at Tiddington, Dinton, Stone and Wing and allotments at Stone and Wing. There are 10 areas listed as designated Local Green Space in the Wing neighbourhood plan, primarily to the north of the A418, Leighton Road. There are six designated Local Green Spaces in the Wingrave and Rowsham neighbourhood plan and one Local Green Space in Haddenham.

Chilworth House Upper and Lower schools cater for children with additional needs and are located close to the A418 near Wheatley Interchange.
Best and most versatile agricultural land covers a large area of the section to the west of Aylesbury.

Section A-3

Leighton Buzzard is within the south-east part of the section and the outskirts of Milton Keynes and Bletchley coincide with the north-west part of the section. There are several villages dispersed throughout the corridor including Great Brickhill, Little Brickhill, Bow Brickhill, Woburn Sands, Woburn, Milton Bryan, Stoke Hammond, Aspley Guise, Ridgmont, Eversholt, Tingrith, Soulbury Eggington and Heath and Reach. The A5 crosses the section, bypassing Little Brickhill. The A4146 also crosses the section and is a two lane dual carriageway bypassing Stoke Hammond. The majority of the villages in the section are relatively rural and away from major highway infrastructure.

The main development allocations are on the northern edge of Leighton Buzzard and the fringe of Milton Keynes. It is understood that these are residential allocations under construction.

Key areas of open space and recreation within the corridor section include Woburn Safari Park, located north west of Woburn, and Stockgrove Country Park located on the northern outskirts of Leighton Buzzard. There are 5 golf courses: Three Locks (near Bragenham), Leighton Buzzard, Woburn, Aspley Guise and Woburn Sands Golf Club and Wavendon Golf Academy. Extensive areas of woodland and heathland are present throughout the section and likely to be used for informal recreation (including King's Wood, Buttermilk Wood, Back Wood, Wavendon Wood and Wavendon Heath, Palmer's Shrubs, Brickground Plantation and Flitwick Plantation). There are several small areas of registered common land within or close to Stoke Hammond, Great Brickhill, Aspley Guise and Milton Bryan.

Most sensitive facilities identified are within existing settlements although Gilbert Inglefield Middle School, Vandyke Upper School and Community College, Greenleas Lower School, Oak Bank School and St Leonard's Heath and Reach Lower School are located on the outskirts of Leighton Buzzard, while Eversholt Lower School is located on the outskirts of Eversholt.

There is one isolated patch of best and most versatile agricultural land between Woburn and Milton Bryan.

3.1.4 Cultural heritage

Section A-1

There are 55 designated cultural heritage assets of High value within the Section A-1 corridor and 1 kilometre study area comprising:

- 9 scheduled monuments
- 10 Grade I listed buildings
- 34 Grade II* listed buildings
- 1 Grade I Registered Park and Garden
• 1 Grade II* Registered Park and Garden

There are a further 511 designated cultural heritage assets of Medium value within the Section A-1 corridor and 1 kilometre study area comprising:

• 499 Grade II listed buildings
• 11 Conservation Areas
• 1 Grade II Registered Park and Garden

Abingdon itself contains a large number of High value cultural heritage assets comprising scheduled monuments and Grade I and II* listed buildings. The majority of these assets are located relatively central within the built up area of the town; however, the 3 settlement site scheduled monuments located on the fringes of the town to the north east and across the A34 to the west are situated in a more open environment.

Grade I and Grade II* listed buildings are also located within the villages of Garsington, Cuddesdon and Denton, Radley, Marsh Baldon, Sunningwell, Toot Baldon, Great Milton, Kennington, Littlemore, Sandford-on-Thames and Chiselhampton. Garsington also contains a village cross scheduled monument and the Radley outskirts contains two settlement site scheduled monuments.

The Grade I Registered Park and Garden of Nuneham Courtenay extends approximately 450 metres into the Section A-1 corridor from the south; however, it is situated in a rural landscape on low, undulating hills with a steep slope towards its western boundary created by the River Thames. This situation creates important long views west towards Abingdon and north towards Oxford. The Grade II* Registered Park and Garden of Garsington Manor is much smaller in size, but is located more centrally within the corridor. Again, the rural setting and long panoramic views to the south to the Wittenham Clumps on the Sinodun Hills, and beyond these the Berkshire Downs in the far distance, contribute to the value of this asset.

Section A-2

There are 135 designated cultural heritage assets of High value within the Section A-2 corridor and 1 kilometre study area comprising:

• 28 scheduled monuments
• 28 Grade I listed buildings
• 74 Grade II* listed buildings
• 1 Grade I Registered Park and Garden
• 4 Grade II* Registered Park and Gardens

There are a further 1339 designated cultural heritage assets of Medium value within the Section A-2 corridor and 1 kilometre study area comprising:

• 1302 Grade II listed buildings
36 Conservation Areas

1 Grade II Registered Park and Garden

There is a high density of scheduled monuments across the Section A-2 corridor which are characterised by a wide variety of periods and types. These range from a potentially prehistoric bowl barrow, to medieval moated sites and settlements and a bridge, to the remains of a 16th-17th century mansion, formal garden, and warren. A number of these scheduled monuments are located centrally to the corridor and have a higher potential for impact, such as the scheduled monument of Notley Abbey which is also associated with 4 Grade I listed buildings and 1 Grade II* listed building.


Located to the west of Aylesbury is a sequence of large Registered Parks and Gardens that extend across the Section A-2 corridor comprising:

- the Grade I Registered Park and Garden at Waddesdon Manor which extends approximately 1.6 kilometres (1 mile) into the corridor from the north
- the Grade II Registered Park and Garden of Eythrope which lies immediately south of Waddesdon Manor and extends approximately 3 kilometres (1.8 miles) across the corridor
- the Grade II* Registered Park and Garden of Hartwell House which extends for almost 1.5 kilometres (1 mile) into the corridor from the south.

Waddesdon Manor and Eythrope have a historical connection as being 2 of the 7 country estates purchased by the Rothschild family within a 10km radius of Aylesbury during the second half of the 19th century, and the connection between the two therefore adds to their significance. The Grade I listed buildings of Waddesdon Manor house, which is within the 1 kilometre study area, is situated on Lodge Hill above the surrounding parkland and long views extend from various parts of Lodge Hill, including west towards Wotton Underwood and beyond, and east to Aylesbury and the Chiltern Hills in the distance. Eythrope is situated on low-lying land adjacent to the river, but maintains views to Aylesbury and the Chiltern Hills beyond to the east and south. The views outwards from these 2 parks contribute largely to their significance and greatly extends the extent of their setting beyond the boundaries of the designated assets themselves.

Hartwell House park is located within the Vale of Aylesbury and is bounded in parts by a long flint wall, fences and hedges.

There are two further Grade II* Registered Parks and Gardens at Ascott House and Mentmore Towers. Ascott House park is situated centrally to the corridor and is bounded on the northern edge by the current A418. The park encompasses high ground which provides views across sloping land to the west, south, and east. The Grade II* listed building of Ascott House itself is sited on the southern edge of the high ground and views of the agricultural
setting are highly visible. Mentmore Towers is also located in the Vale of Aylesbury, with the Grade I listed house being situated on the highest point of the site, with long views south and south east to the Chilterns in the distance. The views outwards from these 2 parks contribute largely to their significance and greatly extends the extent of their setting beyond the boundaries of the designated assets themselves.

Section A-3

There are 77 designated cultural heritage assets of High value within the Section A-3 Corridor and 1 kilometre study area comprising:

- 17 scheduled monuments
- 15 Grade I listed buildings
- 44 Grade II* listed buildings
- 1 Grade I Registered Park and Garden

There are a further 579 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section A-3 comprising:

- 552 Grade II listed buildings
- 24 Conservation Areas
- 3 Grade II Registered Park and Gardens

The Roman town of Magiovinium scheduled monument is situated on the edge of Bletchley and Fenny Stratford and is divided by the Roman Watling Street. It is roughly bounded by the current A4146 and A5. There are 2 further scheduled monuments, a medieval manor and a shrunken medieval village, within the constituent towns of Milton Keynes.

The Danesborough Camp hillfort and the Motte castle 200m south east of Wavendon Manor scheduled monuments both survive well archaeologically and are good examples of their class.

‘The Hoult’ scheduled monument survives in earthwork form and comprises a relatively large site extending approximately 850 metres across the centre of the corridor situated on open agricultural land. There are 4 further scheduled moated sites, a shrunken medieval village, and a medieval manor within the corridor, but these are smaller and more discrete assets.

The town of Leighton-Linslade contains a number of High value cultural heritage assets comprising scheduled monuments and Grade I and II* listed buildings. The majority of these assets are located relatively central within the built up area of the town; however, some assets, such as the Grade I listed Church of St Mary, the canal bridge at Old Linslade scheduled monument, and the 2 bowl barrow scheduled monuments are situated on the outer edges of the town.

Grade I and Grade II* listed buildings are also located within the villages of Leighton-Linslade, Milton Bryan, Battlesden, Tingrith, Woburn, Aspley Guise, Soulbury, Bletchley and Fenny Stratford, Eggington, Eversholt, Husborne Crawley, Ridgmont, Aspley Heath, Bow...
Brickhill, Great Brickhill, Heath and Reach, Hockliffe, Little Brickhill, Potsgrove, Simpson, Stoke Hammond, Walton, and Wavendon. Leighton-Linslade also contains a village cross scheduled monument and the All Saints Church at Segenhoe in Ridgmont is a scheduled monument as well as a Grade II* listed building.

The Woburn Abbey Grade I Registered Park and Garden is a large and complex site which incorporates 61 listed buildings (7 Grade I, 6 Grade II*, and 48 Grade II) on its grounds. The setting of the park is largely agricultural, with some areas of woodland and the villages lying close by. It is bounded to the southwest, northwest, and north by the current A4012 road where it is enclosed by high, red-brick walls.

3.1.5 Landscape and visual

Section A-1

There are no designated landscapes within this section of the corridor, although the North Wessex Downs and Chilterns AONBs run parallel to the corridor approximately 4-5 km to the south and south east. There are also a number of other designations that are relevant to landscape, including Oxford green belt. Although green belts are not a landscape designation, they are relevant to LVIA due to the need to consider effects on openness.

Also of relevance are Nuneham Courtenay, Marsh Baldon, Toot Baldon, Garsington, Little Milton, Great Milton conservation areas and numerous listed buildings whose setting may be affected by the proposals.

The area is characterised by the low lying river Thames floodplain and there are significant areas of ancient woodland within it.

A golf course and playing fields are associated with and adjacent to Radley College.

Sensitive visual receptors include residents on the northern edge of Abingdon, in rural settlements including Garsington, Denton and Cuddesdon, and isolated farmsteads and properties; and users of public rights of way (PRoW) including the Thames Path national trail. Users of PRoW within the Chilterns AONB, including the Icknield Way national trail, potentially experience long distance views from high ground.

Section A-2

The Chilterns AONB continues to run parallel over the full extent of this section at a distance of approximately 4-5 km from the eastern edge. Additionally, the Brill-Winchendon Hills and Quainton-Wing Areas of Attractive Landscape (AALs) stretch the full width of the corridor and are noted respectively for their ‘undulating hills and ridges, with magnificent panoramic views across the strongly scenic and rural landscape’ and ‘undulating hills and ridges with distant panoramic views across the strongly rural and picturesque landscape’. Together the Brill–Winchendon Hills and the Quainton-Wing Hills ‘form a series of low, generally open limestone hills with hilltop settlements, between the foot of the Chilterns escarpment and the dip slope of the Cotswolds’.

Other relevant designations in this section include Hartwell House Registered Park and Garden (RPG) grade II* and Eythrope RPG grade II which between them cover the majority of the corridor width to the south west of Aylesbury.
There are numerous historic villages in this area including Waterstock, Thame, Long Crendon, Haddenham, Chearsley, Cuddington, Dinton, Westlington, Upton, Gibraltar, Hartwell, Weedon, Bierton, Aston Abbots, Cublington and Wing conservation areas; and many listed buildings.

It is also a popular area for walking with many long distance paths including Bernwood Jubilee Way, Aylesbury Ring, Outer Aylesbury Ring, Midshires Way, North Bucks Way, and Bernwood Jubilee Way.

Outside of the higher ground of the AALs the area is characterised by the very open low lying landscape of the River Thame floodplain.

Also of note is the use of distinctive local stone for example enclosing Hartwell House estate. The area also contains Waterstock, The Oxfordshire and Aylesbury Park golf courses.

Sensitive visual receptors include Shabbington, North Weston, north eastern edge of Thame, Long Crendon, Haddenham, Cuddington, Gibraltar, Westlington, Dinton, Stonor and residents on the urban edge of Aylesbury; and users of PRoWs within this section. Users of PRoW within the Chilterns AONB, including the Icknield Way national trail may also experience views over the area.

**Section A-3**

The Chilterns AONB continues to run parallel to this section, except for the area around Luton that is excluded from the designation.

The majority of the western part of this section lies within the Brickhills AAL with the exception of a narrow area of non-designated land adjacent to the urban edge of Milton Keynes. Brickhills AAL is noted for its ‘distinct landform with wooded scarp slopes and interspersed agricultural areas and heathland’, and ‘open and panoramic views from the hilltops across the landscape of the Vale of Aylesbury to the Quainton Wing hills’.

To the east the AAL shares a boundary with the London Metropolitan green belt around Leighton Buzzard that extends beyond the extent of the corridor.

Other important designations include Woburn Abbey RPG grade I to the east of the corridor and Woburn, Aspley Heath, Aspley Guise and Husborne Crawley conservation areas. There is also a small area of common land south of Great Brickhill and the area is crossed by numerous PRoW including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths.

There are significant areas of woodland south and east of Brickhill and east of Woburn Abbey which includes areas of ancient woodland.

The area south of Aspley Heath includes extensive areas of heathland and woodland and includes Woburn Golf Course. Stockgrove Country Park also features within the area.

Sensitive visual receptors include residents on the southern edge of Milton Keynes, particularly the Lakes Estate area; residents in the rural villages and individual houses; and also users of PRoW and Stockgrove Country Park.
3.1.6 Nature conservation

The key nature conservation features (statutory and non-statutory designated sites) are primarily associated with the south western and north eastern ends of the corridor (Section A-1 and A-3 respectively). There is potential to contribute to improving ecological networks and biodiversity net gain within these areas as part of mitigation or enhancement measures taken forward as part of the scheme assessment.

Section A-1

The key sensitive features within the corridor are Cothill Fen SAC, 3 SSSI, 27 Ancient Woodlands (AW), a cluster of veteran trees associated with Radley College grounds. Only a very small section of Cothill Fen SAC and its constituent SSSI lies within the corridor, immediately west of Abingdon Airfield. Two small SSSIs are situated on the west and southern edge of the corridor, one within Abingdon Airfield and the second to the airfield’s south west corner. The main constraint within the section is AW associated with Bagley Wood on the northern edge of the corridor near Kennington.

With respect to Tier III sites, there is 1 Local Nature Reserve (LNR), and 14 Local Wildlife Sites (LWS) within this section of the corridor.

The statutory designated sites for nature conservation within 5km of the corridor comprise Cothill Fen SAC and Oxford Meadows SAC, 12 SSSI, and 1 National Nature Reserve (NNR). The non-statutory designated sites for nature conservation within 2km of the corridor comprise 45 AW, 1 LNR, 29 LWS, and 9 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section A-2

The key sensitive features within the corridor are 20 AW. The areas of AW are relatively small and dispersed widely within the section, the main area located south east of Tiddington.

In terms of Tier III sites, 2LNR and 18 LWS lie within this section of the corridor.

The statutory designated sites for nature conservation within 5km of the corridor comprise 10 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 32 AW, 2 LNR, 31 LWS, and 2 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section A-3

The key sensitive features within the corridor are 5 SSSI, 36 AW, and 1 NNR. The most significant constraint is the SSSI, NNR and AW associated with King’s Wood, which lies roughly at the centre of this section. The other SSSIs are smaller in area and are widely dispersed within the corridor. Further areas of ancient woodland lie to north and are spread widely across the width of the section creating more of a constraint to any potential route option. These are associated with Back Wood, Buttermilk Wood, Brickground Plantation and Palmer’s Shrubs. In terms of Tier III sites, 65 LWS lie within this section of the corridor.
The statutory designated sites for nature conservation within 5km of the corridor comprise 13 SSSI and 1 NNR. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 37 AW, 1 LNR and 75 LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

### 3.1.7 Geology and soils

#### Section A-1

The bedrock geology of Section A-1 broadly comprises a geological succession of sandstones, mudstones and some limestone of decreasing age, gently dipping to the southeast, from the oldest Upper Jurassic Ancholme Group and Corallian limestones to the Lower Cretaceous Gault Formation. Superficial deposits are absent from large parts of Section A-1 but sand and gravels and alluvium are common where they do occur, with Diamicton head deposits also common east of the River Thames.

The sites of geological importance present within Section A-1 are summarised below:

- **Cothill Fen**: this is a mixed biological and geological SSSI, which is in a favourable condition, the tip of which slightly extends into the southwest of Section A-1. The SSSI supports nationally rare calcareous fen and moss-rich mire communities together with associated wetland habitats; palaeovegetation can be interpreted from peat samples. Cothill Fen is also designated as a Special Area of Conservation (SAC).

- **Dry Sandford Pit**: this mixed biological and geological SSSI is situated in the southwest of Section A-1 and is in a favourable condition. A sequence of limestone rocks, formed during the Jurassic period in shallow coastal waters and containing fossil ammonites, is exposed at this site. The site is also designated as a LGS, the area of which is greater than the SSSI footprint.

- **Sugworth**: a geological SSSI in favourable condition sited adjacent to the A34 in the southwest of Section A-1. The site is designated for its rare inland interglacial sediments containing various fossil remains.

Two MSGAs are present in Section A-1: one designated for soft sand in the southwest of the section and another in the centre designated for sharp sand and gravel; the latter covers two-thirds of the width of the corridor.

The EA website identifies Radley PFA Lagoons, an authorised landfill site that extends into Section A-1, southeast of Radley.

The EA website also lists a number of relatively small historical landfills (the largest has a total area of approximately 5.7 ha), mainly in southwestern and central parts of Section A-1. A detailed review of potentially contaminative land uses is not possible at this stage, but notable current and historical land uses include Abingdon Airfield/Dalton Barracks (a semi-active historical RAF site) and Oxford sewage treatment works.

Groundsure COMAH data indicate that a site located just a few metres within the 250m buffer zone of the corridor was historically listed under the Notification of Installations Handling...
Hazardous Substances Regulations 1982 (NIHHS hereafter), registered to Johnson and Company.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA.

There are no active, dormant or historic mineral extraction sites recorded in the area based on BritPits data provided by the BGS.

At the time of writing data relating to LGS were not available for review, however these data will be available for Stage 1B.

Section A-2

The bedrock geology of Section A-2 is similar to A-1, with Jurassic mudstone, siltstone and sandstone dominant and limestone interbedded with these rock types in places and present in small pockets as the main rock type. The Lower Cretaceous Wealden Group is locally present around Haddenham. The early Cretaceous Gault Formation and Lower Greensand Group (Woburn Sands Formation) are more prevalent at the northern end of the section.

River terrace deposits and alluvium are common across central and southern parts of Section A-2 around the River Thame and its tributaries. Glaciofluvial deposits and glacial till are more common in northern parts of the section and head deposits are distributed across Section A-2. Superficial deposits are also absent from large parts of the section.

Four SSSIs of geological importance are located in Section A-2, as summarised below:

- Stone: a geological SSSI in unfavourable condition southwest of Aylesbury, designated for its outcrop of undated sands of Wealden facies, which is important for its geographical setting and bearing on Purbeck-Wealden palaeogeography.
- Bugle Quarry: a geological SSSI in favourable condition southwest of Aylesbury. The site displays a sequence of Jurassic sedimentary rocks, important for its stratigraphy, faunas and palaeoecology.
- Bierton Clay Pit: a geological SSSI in favourable condition, northeast of Aylesbury. The citation states that the site shows a unique stratigraphy demonstrating the relationship between Portland Beds and the Hartwell Clay.
- Warren Farm: a geological SSSI in favourable condition in the northwest of Section A-2. The quarry shows the most northerly outcrop of the Portland and Purbeck beds in England, making it important for palaeogeographic reconstructions.

Proposed Buckinghamshire MSGAs are present over large areas of Section A-2, seemingly in association with sand and gravel resources based on mineral resource mapping from the BGS. A Bedfordshire MSGA is present at the eastern extent of Section A-2, designated for protection of the Woburn Sands.

Two operational quarries are present within Section A-2: Moorend Lane Farm Sand Quarry, extracting sand within river terrace deposits north of Thame, and Grovebury Road Quarry mining the Woburn Sands, south of Leighton Buzzard. A historical quarry, Pratt’s Quarry (which extracted silica sand), is located within the north-eastern extent of the section.
The EA website identifies 2 authorised landfills, Wheatley Railway Cutting, an authorised landfill located adjacent to the north of the M40 in the south of Section A-2 and Ledburn Landfill, which is present to the north of the A505 in the north of the section.

The EA website also lists a number of historical landfills that are present within Section A-2, with the largest concentration located in the northeast of the section, south of Leighton Buzzard. Outside that area, the landfills are more sparsely distributed and are generally small (largest has an area of approximately 8.6 ha). Other potentially contaminative historical and current land uses include Aylesbury/Thame Airport (Haddenham Airfield), Holmbeck Farm Airfield and Aylesbury sewage works.

Groundsure COMAH data indicate that two sites have historically been listed as NIHHS sites: Aylesbury Gas Holder and Faccenda Chicken Ltd., in the centre and north of Section A-2 respectively.

A site formerly determined as contaminated land under Part IIA of the Environmental Protection Act 1990 is located within Thame in the south of Section A-2. The site is a former gasworks and was determined as contaminated land in 2011, but remediation works were undertaken such that the site is no longer considered to be contaminated land (Ecus Ltd., 2012 http://www.southoxon.gov.uk/sites/default/files/2911%20Thame%20Non%20Technical%20Summary%20Report%20Rev%20B%20280212.pdf).

At the time of writing data relating to LGS were not available for review, however these data will be available for Stage 1B.

**Section A-3**

The bedrock geology of Section A-3 comprises mudstones, siltstones and sandstones of the Upper Jurassic Ancholme Group to the northwest, overlain by sandstones and mudstones of the Lower Greensand Group and mudstone, sandstone and limestone of the Cretaceous Gault and Upper Greensand Formation to the southeast.

The superficial deposits in Section A-3 are predominantly comprised of glacial till and glaciofluvial deposits, with alluvium and river terrace deposits surrounding the River Ouzel and head deposits also common. The Wolston Formation, consisting of glacial tills, sands, gravels and laminated clays, is present in the north and northwest of the section. Superficial deposits are absent from parts of the section.

Two SSSIs with geological interest are located within Section A-3; these are summarised below:

- Nine Acres Pit: a geological SSSI in an unfavourable condition north of Leighton Buzzard, which shows a Lower Cretaceous section, including Carstone and Shelly Limestone, the latter of which contains a unique and diverse fossil fauna; dune bedding is also exposed at the site.

- Double Arches Pit: a geological SSSI in favourable condition north of Leighton Buzzard. The site has the best accessible exposure of Lower Greensand and Gault in the area, and study of these rock units has been important in understanding sedimentary, fossil and environmental changes through time in the Cambridge/Bedford area.
The King’s Wood and Rushmere NNR is located north of Leighton Buzzard. The site lies on an unusual mixture of soils. Much of the wildlife interest is a result of the varied geology of the Lower Greensand and Boulder Clay, which produces different soil conditions for the various habitats.

Bedfordshire MSGAs are present for the Woburn Sands around Leighton Buzzard and span approximately two-thirds of the corridor in the north of Section A-3. A proposed Buckinghamshire MSGA is present northwest of Leighton Buzzard, seemingly associated with sands and gravels. A Milton Keynes MSGA for sand and gravels extends into the west of Section A-3.

A number of operational quarries are present within Section A-3, all within the Woburn Sands to the north of Leighton Buzzard. These include Chamberlains Barn Quarry, Nine Acres Quarry, Munday's Hill Quarry (x3), Reach Lane Quarry, Bryant's Lane Quarry, Double Arches Quarry, Riddys Quarry, Churchways Quarry and Fox Corner Quarry. Several historical quarries and one dormant quarry are present in similar areas to the active quarries which also mined the Woburn Sands.

The EA website identifies 3 authorised landfills within Section A-3: Rislip Farm, northwest of Leighton Buzzard, and Sheepcote Quarry and Stone Lane Quarry, north of Leighton Buzzard.

The EA website also lists several historical landfills within Section A-3. These are primarily concentrated around Leighton Buzzard, south of the A5, but others are scattered around the northwest and northeast of the section. There are many other potentially contaminative historical land uses including infilled pits, disused brick works and disused sewage works.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA. There are also no COMAH sites in this area.

At the time of writing, data relating to LGS were not available for review, however these will be available for Stage 1B.

3.1.8 Road drainage and the water environment

Section A-1

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the rivers in the study area, detailed in Table 3-1. There are two rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):

- River Thames - flows south of Oxford and meanders south-east of Abingdon where it then flows in an easterly direction towards the A4074
- River Thame (a tributary of the River Thames) – flows south-west of the Wheatley Interchange and joins the River Thames at Dorchester-On-Thames.
Flood Zones 2 and 3 associated with the River Thames and River Thame are extensive within this section.

Table 3-1: Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>50.6</td>
<td>136.3</td>
<td>7.6</td>
<td>10.5</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be an approximately 3% increase in the area identified as Flood Zone 3, areas in south-east Abingdon are likely to be at greater risk of fluvial flooding.
Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment identifies that 2.1% of the section is within an area of high surface water flood risk (3.3% (1 in 30) Annual Exceedance Probability (AEP)) and 4.0% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area has a low to very low risk of surface water flooding. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ Strategic Flood Risk Assessments (SFRA’s) and the EA’s Area Susceptible to Groundwater Flooding (AStGWF) dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 29% of the study area is within an area of medium to high risk (see Table 3-2).

Table 3-2: Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>12.7</td>
<td>• South and east of Abingdon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South-east of Oxford</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>15.9</td>
<td>• Central Abingdon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South-east Abingdon</td>
</tr>
</tbody>
</table>

Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 3-3.

Table 3-3: Reservoir Breach Extents

<table>
<thead>
<tr>
<th>Flow Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Flows south of Oxford and meanders south-east of Abingdon, following</td>
</tr>
<tr>
<td>the route of the River Thames</td>
</tr>
<tr>
<td>2 Flows west of the town Thame and then flows past the M40 in a south-</td>
</tr>
<tr>
<td>westerly direction towards Warborough</td>
</tr>
</tbody>
</table>

Historic Flooding
The EA’s Historic Flood Maps detail the maximum extent of previous recorded flooding events from the sea, river, groundwater. According to the EA’s dataset, 7.7% of the section has been recorded to have flooded historically. There are records of flooding outside published Flood Zones, identifying additional areas at risk, particularly south-east of Oxford.

**Other Flood Sources**

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**

Table 3-4 shows the WFD operational catchments and WFD water body catchments which lie within Section A-1.

**Table 3-4: WFD operational and WFD water body catchments Section A-1**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames</td>
<td>Gloucestershire and the Vale</td>
<td>Ock</td>
<td>Northfield Brook (Source to Thames) at Sandford</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Thames (Evenlode to Thame)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ock and tributaries (Land Brook confluence to Thames)</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sandford Brook (source to Ock)</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frilford and Marcham Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td></td>
<td>Thame (Scotsgrove Brook to Thames)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Baldon Brook (South of Oxford)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Latchford Brook at Tetworth</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Haseley Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Groundwater**

Section A-1:
• crosses 4 Secondary A bedrock aquifers
• crosses 2 Secondary A superficial deposit aquifers
• contains 3 licensed groundwater abstractions
• contains 3 potential groundwater dependent terrestrial ecosystems (GWDTEs)
• contains approximately 10 springs as marked on the Ordnance Survey (OS) 1:25,000 map

Section A-2

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 3-5. There are two rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):

- River Thame - flows through the centre of the study area with its tributaries covering a significant area.
- River Ouzel - flows north-east towards Leighton Buzzard located within the northern portion of the study area.

Flood Zones 2 and 3 associated with the River Thame and its tributaries in particular are extensive within this section.

Table 3-5: Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>261.9</td>
<td>395.1</td>
<td>8.4</td>
<td>10.4</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 2% increase in the area identified as Flood Zone 3. The published Flood Zones indicate that areas, primarily in the vicinity of Aylesbury are likely to be at greater risk of fluvial flooding.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 5.1% of the study area is designated to be in an area of high surface water
flood risk (3.3% (1 in 30) AEP) and 8.6% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

**Groundwater**

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASIGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 11% of the study area is within an area of medium to high risk (see Table 3-6).

**Table 3-6: Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>4.4</td>
<td>• Aylesbury</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South Leighton Buzzard</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>7.0</td>
<td>• Thame</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Aylesbury</td>
</tr>
</tbody>
</table>

**Reservoir Failure**

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 3-7.

**Table 3-7 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows in south-westerly direction from north-east of Aylesbury following the River Thame and heads in a south westerly direction towards the Wheatley Interchange.</td>
</tr>
<tr>
<td>2</td>
<td>Flows from North Dorton along the A41 down to Lower Arncott</td>
</tr>
<tr>
<td>3</td>
<td>Flows from A5 near Battlesden through Leighton Buzzard following the River Ouzel.</td>
</tr>
</tbody>
</table>

**Historic Flooding**

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river, groundwater and in addition it indicates areas that have previously been flooded. According to the EA data set 3.4% of the study area has been recorded to have flooded historically. There are records of flooding outside Flood Zones 2 and 3 in particular in Leighton Buzzard.

**Other Flood Sources**

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The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**

Table 3-8 shows the WFD operational catchments and WFD water body catchments which lie within Section A-2.

**Table 3-8: WFD operational and WFD water body catchments within Section A-2**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian Ouse Upper and Bedford</td>
<td>Great Ouse Upper</td>
<td>Claydon Brook</td>
<td>Moderate</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ouzel and Milton Keynes</td>
<td>Ouzel US Caldecote Mill</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ledburn Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouzel (US Clipstone Brook)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Whistle Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouzel Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eaton Bray Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clipstone Brook</td>
<td>Good</td>
<td>No</td>
</tr>
<tr>
<td>Thames Cherwell and Ray Oxon Ray</td>
<td></td>
<td>Tetchwick Brook, Source to Ray and tribs</td>
<td>Moderate</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Thames and Chilterns South Thame</td>
<td></td>
<td>Thame upstream of Aylesbury</td>
<td>Poor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hardwick Brook (Source to Thame)</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thame (Aylesbury to Scotsgrove Brook)</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bear Brook and Wendover Brook</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scotsgrove Brook (upstream Kingsey Cuttle Brook)</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thame (Scotsgrove Brook to Thames)</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stoke Brook Aylesbury</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cuttle Brook</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chinor Brook and Sydenham Brook</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Latchford Brook at Tetsworth</td>
<td>Poor</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
River Basin District | WFD Management Catchment | WFD Operational Catchment | WFD Water Body Catchment | WFD Water Body Status (Cycle 2, 2016) | Large WFD Water Body Crossing
--- | --- | --- | --- | --- | ---
Peppershill and Shabbington Brooks | | | Moderate | Yes |
Worminghall Brook and tributaries | | | Poor | Yes |
Kingsley Cuttle Brook and tributaries at Thame | | | Poor | Yes |
Fleet Marston Brook, Denham Brook, Pitchcott Brook west | | | Poor | Yes |
Dorton, Chearsley and Waddesdon Brooks | | | Poor | Yes |
Holton Brook and tributaries | | | Moderate | Yes |

Section A-2 also traverses 1 artificial WFD water body, the Grand Union Canal, Tring summit to Milton Keynes.

**Groundwater**

Section A-2:

- Crosses a limestone Principal bedrock aquifer (underlies less than 25% of the section)
- Crosses 3 Secondary A bedrock aquifers;
- Crosses 3 Secondary A superficial deposit aquifers
- Contains 5 licensed groundwater abstractions
- Contains 1 potential GWDTE
- Contains approximately 38 springs as marked on the OS 1:25,000 map

**Section A-3**

**Flood Risk**

**Fluvial**

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 3-9. There is one main river and its tributaries within this section that has areas of Flood Zone 3b (functional floodplain):
• River Ouzel (tributary of the River Great Ouse) - flows north from Leighton Buzzard through Milton Keynes.

### Table 3-9 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.5</td>
<td>303.1</td>
<td>3.3</td>
<td>4.0</td>
</tr>
</tbody>
</table>

The detailed hydraulic model for Central Bedfordshire Council has been used to assess the potential future extent of Flood Zone 3 as a result of climate change (upper end, 65% climate change allowance has been assessed). In the absence of hydraulic modelling for all other areas the extent of Flood Zone 2 has been adopted to assess future Flood Zone 3 extent. The assessment identifies that there will be approximately 1% increase in the area identified as Flood Zone 3. The Flood Zone map indicates that areas in the outskirts of Bletchley are likely to be within a greater risk from fluvial flooding over the lifetime of the development.

#### Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment identifies that 2.6% of the section is within an area of high surface water flood risk (3.3% (1 in 30) AEP) and 4.8% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area has a low to very low risk of surface water flooding. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

#### Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s AStGW dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 20% of the study area is within an area of medium to high risk (see Table 3-10).

### Table 3-10 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
</table>
| High (> 75%) | 5.7      | • North-west Leighton Buzzard  
               |           | • South-east Milton Keynes |
| Medium (50 – 75%) | 14.3 | • North-east Leighton Buzzard  
               |           | • South-east Milton Keynes  
               |           | • Bletchley |
Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 3-11.

**Table 3-11 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows from A5 near Battlesden through Leighton Buzzard following the River Ouzel.</td>
</tr>
<tr>
<td>2</td>
<td>South-east Leighton Buzzard, follows the River Ouzel</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river, groundwater and in addition indicate areas that have previously been flooded. According to the EA’s dataset, 2.4% of the section has been recorded to have flooded historically. There are areas of recorded historic flooding from the River Ouzel that fall outside of the identified Flood Zone 2 and 3.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**

Table 3-12 shows the WFD operational catchments and WFD water body catchments which lie within Section A-3.

**Table 3-12: WFD operational and WFD water body catchments within Section A-3**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Ivel</td>
<td>Flit tributary</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Running Waters-Steppingley</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flit</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flit and Ivel</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Navigation d/s of Shefford</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Broughton Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouzel US Caldecote</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### River Basin District | WFD Management Catchment | WFD Operational Catchment | WFD Water Body Catchment | WFD Water Body Status (Cycle 2, 2016) | Large WFD Water Body Crossing
--- | --- | --- | --- | --- | ---
 | Keynes | Mill | | | |  
 | Ledburn Brook | Moderate | | | |  
 | Newton Longville Brook | Poor | Yes | | |  
 | Clipstone Brook Tributary | Good | Yes | | |  
 | Ouzel (US Clipstone Brook) | Moderate | Yes | | |  
 | Ouzel Brook | Moderate | Yes | | |  
 | Clipstone Brook | Good | Yes | | |  

Section A-3 also traverses 1 artificial WFD water body, the Grand Union Canal, Milton Keynes trough pound.

**Groundwater**

Section A-3:

- Crosses a sandstone Principal bedrock aquifer (underlies more than 75% of the section)
- Crosses 3 Secondary A superficial deposit aquifers
- Contains 3 groundwater Source Protection Zone1s (SPZ1s) associated with licenced potable abstractions
- Contains 2 SPZ2s associated with licenced potable abstractions
- Contains 2 SPZ3s associated with licenced potable abstractions
- Contains 19 licensed groundwater abstractions
- Contains 5 potential GWDTE
- Contains approximately 12 springs as marked on the OS 1:25,000 map

### 3.2 Environmental assessment

#### 3.2.1 Air quality

**3.2.1.1 Key findings**

Section A-1

Basic Screening Exercise
Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section A-1 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link).

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link).

The changes in traffic flow look to provide reductions in traffic within part of the Abingdon and Marcham AQMAs.

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential Oxford CAZ, which may be in place by then.

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (7.6-15.8 μg/m³), NO₂ (5.9-11.6 μg/m³) and PM₁₀ (11.8-15.2 μg/m³).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Oxford and Abingdon), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section A-2

Basic Screening Exercise

Based on the provisional traffic data provided, an assessment of the changes in AADT traffic within corridor section A-2 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this section, this includes J8a of the M40.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link).
The screening calculations indicate that main routes through Thame and Aylesbury could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (5.7-12.1 µg/m³), NO₂ (4.8-9.1 µg/m³) and PM₁₀ (10.8-16.1 µg/m³).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Thame, Haddenham and Aylesbury), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section A-3

Basic Screening Exercise

Based on the traffic data provided, an assessment of the changes in AADT traffic within corridor section A-3 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this section, this includes main routes from Leighton Buzzard.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening exercise indicates that traffic flow may be reduced in some areas, including the M1 and south of Milton Keynes for this corridor section.

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information
The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.7-13.7 μg/m³), NO₂ (5.2-10.2 μg/m³) and PM₁₀ (11.3-16.4 μg/m³).

Section Impacts

It is assumed that the benefits in some locations may be balanced by dis-benefits in similar locations with similar air quality concentrations, although traffic may be rerouted from the more densely populated areas (e.g. Leighton Buzzard and Milton Keynes), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This may result in improvements in air quality concentrations at some sensitive receptors.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed. On this basis, the corridor section has been assessed as neutral.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Overall

The available information highlights the AQMAs within Corridor A, and the ongoing exceedances of the relevant AQOs. The corridor includes parts of large urban areas including Abingdon, south Oxford, Thame, Aylesbury and Leighton Buzzard, as well as a number of designated sites.

Corridor A has approximately 80,000 air quality sensitive receptors that could be impacted (both adversely and beneficially) by route options through this corridor. The monitoring exceedances within the AQMAs highlights the opportunity to reduce congestion in these areas and potentially improve air quality within the AQMAs.

3.2.1.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>Avoidance of AQMAs (and journey re-routing through them).</td>
</tr>
<tr>
<td></td>
<td>Best practice dust and site management mitigation measures</td>
</tr>
<tr>
<td></td>
<td>during construction.</td>
</tr>
<tr>
<td>A-2</td>
<td>Best practice dust and site management mitigation measures</td>
</tr>
<tr>
<td></td>
<td>during construction.</td>
</tr>
<tr>
<td>A-3</td>
<td>Best practice dust and site management mitigation measures</td>
</tr>
<tr>
<td></td>
<td>during construction.</td>
</tr>
</tbody>
</table>
3.2.2 Noise and vibration

3.2.2.1 Key findings

The effect of traffic noise on sensitive receptors is very sensitive to exact alignment, which is not known at this early stage of scheme development. The qualitative key findings for this study area are based on indicative predictions on how sensitive receptors could be impacted based on whether the ultimate route alignment is ‘on-line’ (following an existing main road) or ‘off-line’ (creating a new main road).

If the route alignment was to be ‘on-line’ for the relevant sections of the A34 and the A418 within the study area, then there is potential for sensitive receptors nearby to these roads (e.g. Abingdon and Shippon, Tiddington, Thame, Westlington, Upton, Stone, Rowsham and Wing) and 13 NIAs to experience adverse noise effects as traffic possibly moves closer, and/or traffic flows and speeds increase. Significant adverse effects are possible.

Should the route alignment move ‘off-line’ from the A34 and the A418, then sensitive receptors near these roads would have the potential to experience beneficial effects. The beneficial effects would be dependent on whether vehicles would be diverted away from the A34 and the A418, thus reducing the amount of traffic on those roads, with an ‘off-line’ alignment. Settlements away from the A34 such as Sunningwell and Bayworth could be adversely affected if the route was to be built close to these settlements as part of a potential ‘off-line’ route option. Settlements set back from the A418 (such as north Aylesbury, Shabbington, Chearsley, Cuddington) and A413 (Weedon, Wingrave and Cublington) could also be adversely affected should an ‘off-line’ route alignment be introduced near to such settlements.

The sensitive receptors located in the large rural areas where either the route would, or has the potential to be, ‘off-line’ may experience adverse effects due to the introduction of a new noise source. These include Little London, Radley, Sandford-on-Thames, Blackbird Leys, Toot Baldon, Garsington, Cuddesdon, Soulbury, Great Brickhill and Stoke Hammond. This also includes numerous individual receptors throughout the rural areas. The ultimate route alignment is key in determining the potential effect for such receptors.

For the larger settlements of Abingdon, Aylesbury, Leighton Buzzard, Bletchley, and the southeast of Milton Keynes, the sensitive receptors on the boundaries of these settlements could be adversely affected through the introduction of a new route. The effects would depend on the proximity of the route alignment to the settlement boundaries. The same sensitive receptors could potentially be beneficially affected if the route alignment bypasses the larger settlements. Similar effects could occur for the NIAs in the settlements.

The indicative traffic data shows potential noise benefits between Bicester and Buckingham along the A4421 and between Buckingham and Milton Keynes along the A421, resulting from possible reduction in traffic on these roads. In addition, potential noise benefits are observed between Abingdon and Thame (A415, A418, B4015 and the A329) resulting from possible reductions in traffic on these roads. Furthermore, several roads in or around Leighton Buzzard (A4146, Wing Road, and A4102), Oxford (A4142 and B4495), east of Milton Keynes (A421), Aylesbury (town centre roads) and Bicester (A4095, B4100 and B4030) show potential noise benefits. Receptors located nearby to these roads, including a number of NIAs, could therefore potentially experience noise reductions from the corridor option.
The indicative traffic data shows potential adverse noise effects for the A415 (Frilford to Kingston Bagpuize), as well as on a number of minor roads on the road network. Receptors located nearby to these roads could experience noise increases from this corridor option.

The construction of a new or improved highway requires the use of noise and vibration emitting plant. Sensitive receptors that will be situated close to the ultimate route alignment would have the potential to be exposed to adverse noise and vibration impacts from such works. This would particularly apply to those receptors in proximity to potential ‘off-line’ carriageway alignments within rural areas that could be associated with Corridor A (i.e. between Abingdon and M40, M40 and Aylesbury, Aylesbury and Leighton Buzzard, and the area north of A5 and east of Milton Keynes), where existing ambient noise and vibration levels are relatively low.

Sensitive receptors located adjacent to existing ‘on-line’ road sections where road widening would be likely as a result of the scheme (e.g. sections of the A34 and A418), would already be exposed to high ambient noise levels. Nevertheless, potential adverse effects may still be possible for nearby receptors.

Given the transient nature of the majority of the construction activities, any adverse noise and vibration effects experienced by sensitive receptors would be limited in duration. This reduces the potential for significant effects to arise. Nevertheless, any effects would be minimised through the use of specific mitigation measures and controlled via the relevant Local Authority’s Environmental Health departments.

### 3.2.2.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>The typical mitigation measures that would be considered are as follows:</td>
</tr>
<tr>
<td></td>
<td>• Thin Surfacing (Low Noise Road Surfacing) – In accordance with HD 213/11, low noise surfacing provides a benefit, relative to traditional Hot Rolled Asphalt of 3.5 dB(A) at speeds of 75kph and above. Such a measure can be considered a holistic mitigation measure, as it reduces noise at source for the entire scheme.</td>
</tr>
<tr>
<td>A-2</td>
<td>• Noise Bunds and Noise Barriers – Earth bunds or noise barriers of sufficient length and height can provide attenuation above 10 dB(A). It is anticipated that such measures would be employed through the scheme, with noise barriers more likely at ‘on-line’ sections and within built-up areas, and bunds employed within the more rural areas.</td>
</tr>
<tr>
<td>A-3</td>
<td>• It is anticipated that all work would be undertaken to the guidance detailed in BS 5228: 2009+A1:2014 – Parts 1 and 2. These standards contain various measures to mitigate noise and vibration from construction works and centre around the principle of a ‘best practicable means’ approach.</td>
</tr>
</tbody>
</table>
3.2.3 People and communities

3.2.3.1 Key findings

For all sections there is potential for a new route to cause significant effects on sensitive receptors. Potential impacts could include the loss of land and property for some residents, landowners and businesses and loss of amenity to local recreational assets (including PRoW) and communities from the introduction of new expressway infrastructure into areas that are currently relatively rural. Such impacts could give rise to effects on physical and mental health, access, land use and viability of businesses. There is best and most versatile land throughout the corridor and therefore some loss of this resource would be likely if a route is developed in this corridor.

Section A-1

There is potential loss of amenity and adverse effects on wellbeing for residents in communities close to where new highway infrastructure could potentially be introduced, for example the Woodland, Pebble Hill and Bigwood park home estates and properties along Sugworth Lane (north of Radley).

A route in this area could potentially result in land-take from Radley College’s grounds and golf course.

Section A-2

There is potential to relieve some settlements along the A418 of existing severance caused by traffic. This would be realised if route options direct traffic away from the A418, relieving communities such as Tiddington from through-traffic.

Section A-3

There is potential for community severance and loss of residential properties if route alignments were to pass through the north-east area of this corridor section. However, within this corridor there is the opportunity to develop routes to the east of Woburn Safari Park if other environmental constraints could also be avoided. Although such a route could require loss of isolated residential properties, significant community severance could be avoided.

Overall

With good route alignment, significant new community severance could be avoided and there is opportunity to address existing issues of severance caused by traffic for communities along the A418.

3.2.3.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>Select a route alignment that minimises impacts on nearby communities, whilst maintaining viability of recreational assets. Good route alignment is required to minimise impacts on agricultural viability, for example by maintaining tenable field sizes. Any proposed widening of the A34 or other existing roads should seek to avoid sensitive features such as playing fields and cemeteries.</td>
</tr>
</tbody>
</table>
### 3.2.4 Cultural heritage

#### 3.2.4.1 Key findings

**Section A-1**

The 3 settlement site scheduled monuments in this section are moderately discrete areas on the fringes of the corridor; although it should be noted that the presence of this type of asset may be indicative of further associated unknown archaeological remains of potentially High value outside of the scheduled area. The further 5 scheduled monuments within Abingdon and the 1 scheduled monument within Garsington are relatively protected and screened by the surrounding built environment. Overall, any potential significant effects to the scheduled monuments and their settings should be able to be mitigated through design.

The 277 listed buildings, 1 Grade II Registered Park and Garden, and 3 Conservation Areas within Abingdon would likely be at least partially screened from new development, particularly if the expressway route were to remain online with the current A34. However, there is still the potential for significant adverse effects on the setting of these assets through noise and visual intrusion during construction and operation. The remaining listed buildings are primarily located in groups within smaller villages which provide some screening; however, those on the fringes of the built up areas or on higher ground have a higher potential to be more adversely affected by noise and visual intrusion during operation and construction. Those listed buildings within Toot Baldon, Garsington, and Cuddesdon Denton are also located relatively central to the corridor, meaning that they are more likely to be next to any new development and to be adversely affected. There are also a small number of Grade II listed buildings that are located independently in more rural settings which have a higher potential to be significantly affected by noise and visual intrusion from construction and operation of any offline development.

A cluster of 13 listed buildings (12 Grade II, 1 Grade II*) are located within 350 metres of the current A34 in an area where online development is likely. In particular, the Grade II Manor Preparatory School and Manor Cottage, as well as the Grade II* listed barn associated with the Manor Preparatory School, are within 100 metres of the current A34 and, although they are currently well screened, there is the potential for significant effects to their setting from noise and visual intrusion during construction and operation of any online development.
Important long views to the west and north contribute to the significance of the Grade I Registered Park and Garden of Nuneham Courtenay and to the south of the Grade II* Registered Park and Garden of Garsington Manor. These views contribute to the value of these assets and have the potential to be significantly affected by noise and visual intrusion from construction and operation.

Section A-2

The high density of scheduled monuments scattered across the whole of Section A-2, many of which are central to the corridor, indicates that any offline development would have the potential for a significant adverse effect on these assets through the removal of archaeological remains during construction or to their setting through noise and visual intrusion during construction and operation. In particular, the Medieval settlement of Eythrope is a sizeable asset located very centrally within the corridor and in an area that has a high density of cultural heritage assets overall. However, the nature of these scheduled monuments are primarily well defined (often by earthworks), are discrete areas of varying size and could be potentially avoided through careful design. The majority of these assets are unlikely to be significantly affected by any online development of the current A418 to the west and east of Aylesbury; except for a small bowl barrow (known as Round Hill) which lies less than 15 metres from the current A418 and the scheduled remains of Ascott House mansion, formal gardens and warren which is located just south of Wing.

There is also the potential for an adverse effect on the setting of the Cublington motte castle, Castle Hill and Bolbec Castle scheduled monuments through the disruption of views which add to their historical significance.

The Grade I listed Nether Winchendon House, although in part screened by the village and river to the south, is situated in a very limited and sparse urban environment, and has the potential for an adverse effect to its setting through noise and visual intrusion during construction and operation.

If the Proposed Development were to be largely online with the current A418 to the east and west of Aylesbury, the majority of listed buildings within the corridor would not be significantly affected. The exceptions to this comprise:

- Approximately 40 Grade II listed buildings and 6 Conservation Areas within 200 metres of the current A418
- The Grade II* listed Dinton Castle, which is within 50m of the current A418. This asset is well screened by vegetation; however, any online development has the potential for a significant effect on this asset physically and on its setting
- A cluster of listed buildings comprising the Grade I listed Church of St Mary and the Grade II* listed Prebendal with associated Grade II* listed Solar and Grade I listed Chapel are located on the northern edge of Thame and have the potential for views to the north. These assets would therefore have a higher potential for significant effects from both online and offline developments than the further 9 Grade II* listed buildings located within Thame, which are well shielded by neighbouring structures
- The Grade I listed Church of St James, which is bounded to the north by the current A418
The Grade I listed Church of All Saints in Wing, which is located within 500m of the current A418

The Grade II* listed Dinton Hall and the Parish Church of Saints Peter and Paul, which are located within 500m of the current A418

The Grade II* listed Church of St John the Baptist in Stone, which is located approximately 100m from the current A418

The Grade II* listed Ascott House, which is located within 500m of the current A418 and the grounds of which is a Grade II* Registered Park and Garden that is bounded to the north by the current A418

Overall, the generally dispersed and rural nature of the listed buildings within Section A-2 mean that they have varying levels of screening in place from the surrounding built environment and vegetation. Those set well within towns and villages would have a lower potential for a significant adverse effect; however, there are a large number of relatively isolated, rural structures and, particularly if the development is offline, all of the listed buildings have the potential for a significant effect through noise and visual intrusion during construction and operation.

Located within the Section A-2 Corridor is a sequence of Registered Parks and Gardens comprising (from north to south):

- The Grade I Registered Park and Garden at Waddesdon Manor which extends approximately 1.6 kilometres (1 mile) into the corridor from the north
- The Grade II Registered Park and Garden of Eythrope which lies immediately south of Waddesdon Manor and extends approximately 3 kilometres (1.8 miles) across the corridor
- the Grade II* Registered Park and Garden of Hartwell House which extends for almost 1.5 kilometres (1 mile) into the corridor from the south.

A large part Waddesdon Manor is situated on a hill commanding surrounding views and there is the potential for a significant adverse effect on this asset through the disruption of these views. Eythrope is set within a largely agricultural landscape and has views of Aylesbury to the south-east and to the Chiltern Hills to the east and south. It incorporates the Eythrope medieval settlement scheduled monument within its grounds. Hartwell House is well screened from the current A418 by surrounding vegetation, but is relatively open towards the north. The Proposed Development has the potential for a significant adverse effect on the setting of this asset and the associated listed buildings through noise and visual intrusion during construction and operation. The size of these assets and the extent of their settings, along with their sensitivity and the interrelationship of these assets as a group, would severely hinder the potential for a route option through this area; mitigation may not therefore be possible.

The Ascott House and Mentmore Towers Grade II* Registered Park and Gardens are both located to the south of the current A418 and would restrict any route design in this area. Ascott House Park and Garden is bounded by the current A418 to the north and any online development would therefore have the potential for a significant adverse effect through the
removal of park land or through noise and visual intrusion during construction and operation. There may also be a significant adverse effect on the setting of Mentmore Towers through noise and visual intrusion during construction and operation and from the interruption of views to the north.

Section A-3

The canal bridge at Old Linslade scheduled monument is situated on the southern edge of the route corridor, but the Proposed Development has the potential for a significant adverse effect on its setting through the visual interruption of views along the Grand Union Canal to the north west.

‘The Hoult’ scheduled monument survives in earthwork form and comprises a relatively large site extending approximately 850 across the centre of the corridor situated on open agricultural land. Surviving medieval and post-medieval cultivation earthworks in combination with moated sites are rare, and there is the potential for a significant adverse effect to this asset through the removal of scheduled archaeological remains. However, this asset and the other below-ground and earthwork scheduled monuments within the corridor are clearly defined sites which could be avoided with careful design.

It should be noted that the nature of some of the scheduled monuments may be indicative of further associated unknown archaeological remains of high value outside of the scheduled area. For example, the presence of two large barrows within visual range on the Knoll’s suggest the potential for a wider prehistoric landscape, and the occupation areas of the Roman town of Magiovinium and Roman Fort and the Shrunken Medieval Village may extend beyond the scheduling boundaries.

The listed buildings in this corridor are generally situated in small groups on the edges of small towns and villages or are isolated rural structures and are typically only partially screened by neighbouring properties and/or vegetation. There is a notably high number of small conservation areas in this section which is indicative of the high density and spread of listed buildings across the corridor overall. This would limit the potential for suitable route options and there is the potential for a significant adverse effect on these assets through noise and visual intrusion during construction and operation.

Woburn Abbey itself is a Grade I listed building and its grounds comprise an extensive Grade I Registered Park and Garden located relatively centrally to the Section A-3 corridor. The long western edge of the park is bounded by the current A4012 and it is well screened by dense vegetation along its boundary, which also provides screening for the designated assets located on the grounds. However, without further assessment of the potential noise and visibility of the Proposed Development it is not possible to completely rule out the potential for a significant adverse effect on the Registered Park and Garden and the associated designated asset through noise and visual intrusion during construction and operation.

Overall

Overall, due to the density of cultural heritage assets within this corridor overall and within Section A-2 in particular, it may not be possible to mitigate the potential significant adverse effects on cultural heritage assets within Corridor A.
3.2.4.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>The overall spread and density of the cultural heritage assets in Section A-1 should allow for offline route design that would mitigate the potential significant adverse effects. The primary consideration in this section is the important views north from Nuneham Courtenay Grade I Registered Park and Garden towards Oxford. Online development of the current A34 would need to be particularly sensitive to the cluster of listed buildings in St. Helen Without and the Grade II* listed barn that lies within 100 metres of the current A34.</td>
</tr>
<tr>
<td>A-2</td>
<td>Of particular consideration for Section A-2 is the high density of cultural heritage assets across the corridor to the north west of Aylesbury. Specifically, the line of 3 Registered Parks and Gardens (1 Grade I, 1 Grade II*, and 1 Grade II), along with numerous listed buildings, 2 Conservation Areas, and a scheduled monument, which severely restricts the potential route options in this area. The Registered Parks and Gardens also incorporate important views outwards, which further increase the potential for significant effects to the setting of these assets beyond the boundaries of the parks themselves. Therefore, mitigation of the potential adverse effects may not be possible.</td>
</tr>
<tr>
<td>A-3</td>
<td>Of particular consideration within Section A-3 is the extensive scheduled monument of 'The Hoult' and associated field system which is located centrally to the corridor and between an area of woodland and the Grade I Registered Park and Garden of Woburn Abbey. Furthermore, there is a notable density of small Conservation Areas and isolated listed buildings spread throughout the corridor that would restrict the potential for route design. Particularly sensitive design would be required in order to mitigate the potential adverse impact to the setting of these assets during construction and operation.</td>
</tr>
</tbody>
</table>

3.2.5 Landscape and visual

3.2.5.1 Key findings

Section A-1

If a route option was developed to the east of the corridor where the landscape is more open and less built up there would potentially be adverse landscape and visual impacts on the setting of the North Wessex Downs and Chilterns AONBs due to the relationship of the designated landscape with the adjacent low lying landscapes and the likelihood of extensive views to and from the AONB. Users of PRoW within the AONBs, including the Ridgeway and Icknield Way national trails, would potentially experience long distance views from high ground.

The corridor runs to the north of Abingdon and south and south east of Oxford and includes the villages of Garsington, Denton and Cuddesdon that are located on undulating higher ground to the north west the corridor. If this corridor is taken forward, adverse visual impacts would be likely to affect the residents of these areas along with those in scattered rural properties, and users of PRoW including the Thames Path national trail.
To the west any potential impacts would need to be considered in the context of the existing built up area and A34 corridor. Where the corridor crosses the railway and River Thames and River Thame floodplains it is likely that extensive lengths of embankment or viaduct that would be required, which would be at odds with the low lying landscape and highly visible. Additionally, there could potentially be secondary landscape impacts if borrow pits are needed to create embankments.

There would also potentially be impacts on Radley golf course and Radley College sports fields and nearby ancient woodland if this corridor is selected.

Section A-2

For this corridor, there is the potential for adverse landscape and visual impacts on the setting of the Chilterns AONBs and the inter-relationship between the AONB and AALs; and a direct impact on the Brill-Winchendon Hills and Quainton-Wing AALs. The alignment of a route through the rolling hills of the AALs is highly likely to be at odds with their distinctive topography and impact on the panoramic views to and from these areas for which they are noted.

Outside of the AALs the corridor is characterised by an open low lying landscape, featuring the River Thame floodplain. A route through this area is likely to require extensive lengths of embankment or viaducts that would be incongruous and highly visible. As with section A-1 there could potentially be secondary landscape impacts if borrow pits are needed to create embankments.

To the south west of Aylesbury is a particularly constrained section that includes the River Thame floodplain, a belt of RPGs across almost the full width of the corridor, a golf course, and the urban area. It is highly unlikely that a route could be selected that would not have significant landscape and visual adverse effects on some or all of these features. Most significant of these would be the impacts on the views from and setting of one or more of Waddesdon RPG grade I, Hartwell House RPG grade II* and Eythrope RPG grade II. There would also potentially be potential impacts on the views from and the setting of conservation areas within the wider corridor.

For this corridor, there would potentially adverse visual impacts on sensitive visual receptors including the residents of Shabbington, North Weston, north eastern edge of Thame, Long Crendon, Haddenham, Cuddington, Gibraltar, Westlington, Dinton and Stonor; and users of PRoW including long distance paths.

Users of PRoW within the Chilterns AONBs, including the Icknield Way national trail, would potentially experience long distance views from high ground.

Waterstock, Aylesbury Park and The Oxfordshire golf courses lie within the area and it could be difficult to mitigate impacts that could potentially arise at these locations.

Section A-3

There would potentially be adverse landscape and visual impacts on the setting of the Chilterns AONBs and the inter-relationship between the Brickhills AAL and Quainton-Wing Hills AAL.
The western section lies mostly within the Brickhills AAL which is characterised by its undulating topography and extensive areas of woodland and heathland to the south and east of Great Brickhill, including ancient woodland.

The eastern section of this corridor passes through London Metropolitan green belt and a route here could have an impact on its sense of openness. There is also the potential for direct and indirect impacts on Woburn Abbey RPG grade I including impacts on views and on its setting. There are extensive areas of heathland and woodland south of Aspley Heath which includes Woburn Golf Course that could be difficult to mitigate as compensation land could be required.

Whilst the woodland cover provides potential for screening there are numerous PRoWs in this area including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths. Users of these paths and the PRoW network and of Stockgrove Park Country Park are sensitive visual receptors. A route developed here would likely cause adverse visual impacts on residents of the southern edge of Milton Keynes.

Users of PRoW within the Chilterns AONBs, including the Icknield Way national trail, potentially experience long distance views from high ground.

**Overall**

Whilst Corridor A does not contain any Tier 1 landscape constraints, it passes through three AALs that extend the full width of the corridor. There is the potential for any route through this section of the corridor to have significant effects on the setting of the Chilterns AONB due to the scale and extent of the proposals as the corridor and nationally designated landscape run parallel to much of the length of Corridor A. The descriptions provided for the AALs state that there is a relationship between both the AALs and the Chilterns so, if this corridor is taken forward, further assessment of these designated landscapes would need to have a holistic approach to assess the overall impact on all landscapes at a regional scale.

Siting of a route within the corridor would be difficult as more easterly options would be highly visible within the River Thame floodplain, whilst more westerly options would intrude further into and sever the AALs and conflict with their distinctive undulating topography.

It is unlikely that a route could be selected in this corridor that did not have significant adverse landscape and visual impacts on the heavily constrained area west of Aylesbury where the combined constraints of three RPG and the visually sensitive floodplain extend the full width of the corridor.

At the northern extent of the corridor route options would need to be located immediately adjacent to the edge of Milton Keynes to minimise the impact on the Brickhills AAL. An eastern route would impact on the openess of the London Metropolitan green belt and potentially on the setting of Woburn Abbey, with the potential loss of extensive areas of heathland and woodland.

Overall, this corridor performs poorly in landscape terms compared to other corridors.
### 3.2.5.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>Follow the existing A34 as closely as possible and as far as practicable, having regard for other environmental constraints, seek to avoid routes that directly impact on Radley College, associated playing fields and the golf course as far as practicable. Keep vertical alignment as low as possible in the landscape to minimise visual impact. Careful consideration to be given to the location of gantries, lighting and signs to avoid additional visual impacts, particularly close to sensitive visual receptors.</td>
</tr>
<tr>
<td>A-2</td>
<td>Even with careful consideration of the horizontal and vertical alignment, a significant adverse effect on the landscape would remain due to the open undulating character of this landscape, its relationship to the Chilterns AONB and the unavoidable impact on a series of RPGs</td>
</tr>
<tr>
<td>A-3</td>
<td>Route options to the west of the corridor should be investigated to avoid impacts on the Brickhills AAL, Woburn Abbey RPG grade I and maintain the openness of the London Metropolitan green belt. Keep route options as close as possible to the existing A4146 corridor to minimise severance of and direct impacts on the Brickhills AAL and other constraints and sensitive visual receptors that are not currently affected by infrastructure. Consideration should be given to creating a buffer/visual screen to reduce visual impacts on residents south of Milton Keynes. Even with careful consideration of the horizontal and vertical alignment, a large adverse effect on the landscape would remain.</td>
</tr>
</tbody>
</table>

### 3.2.6 Nature conservation

#### 3.2.6.1 Key findings

For all sections, in addition to direct habitat loss, there is the potential for significant effects on key sensitive features through factors such as habitat fragmentation, air quality changes, hydrological changes, and increased disturbance from changes in noise, vibration and lighting levels. Designated sites lying outside the corridor boundary may potentially be affected by noise and visual disturbance, and changes to air quality as a result of construction and operational phases, or if hydrologically sensitive and connected to areas affected by construction and operational effects. These indirect effects are most likely in the areas where the route alignment is most constrained by designated sites.

**Section A-1**

Direct habitat loss from within the SAC, SSSI and LNR should be avoidable through route alignment. However, direct loss of AW, veteran trees and LWS could be more difficult to avoid as there are significant extents of these designations north of Radley College with limited route alignment opportunities given the presence of urban areas.

**Section A-2**
There appears to be plenty of opportunity for route alignment to avoid direct habitat loss of AW, LNR and LWS given the limited extents of these designations within the corridor.

**Section A-3**

It should be possible to avoid direct habitat loss from SSSI and NNR through appropriate route alignment. However, the extensive areas of AW and LWS throughout much of this corridor section may make avoidance of direct loss more difficult.

**Overall**

From an ecological perspective, this corridor is relatively unconstrained compared to the other corridors. Section A-1 and A-3 of this corridor have the greatest concentration of constraints. It is considered likely that the Tier I constraints could be avoided through appropriate route alignment.

### 3.2.6.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>There is the potential to avoid habitat loss to key sensitive features through appropriate route alignment. Mitigation for other effects on key sensitive features could include creation of compensatory habitats, habitat screening by planting/fencing, and appropriate drainage, dust suppression and lighting strategies.</td>
</tr>
<tr>
<td>A-2</td>
<td></td>
</tr>
<tr>
<td>A-3</td>
<td></td>
</tr>
</tbody>
</table>

### 3.2.7 Geology and soils

#### 3.2.7.1 Key findings

**Section A-1**

There is the potential for significant effects relating to SSSIs in this corridor section, however as these are relatively small then careful route selection could likely avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these sand and gravel resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGA in one location spans two-thirds of the corridor width and so it may be difficult to route around this when taking into account other environmental constraints. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and historical potentially contaminative land uses (in particular Radley PFA Lagoons and Abingdon Airfield), however this could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.
Section A-2

There is the potential for significant effects relating to SSSIs, however as these are relatively small then careful route selection could likely avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these sand and gravel resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the width of the corridor in several locations and so it is unlikely to be possible route around them to avoid the features. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere. Two operational quarries are recorded within the corridor, without adequate mitigation there is the potential for activities to be disrupted here and extraction may be compromised by the expressway, however route selection could avoid this. It may also be possible to expedite extraction of minerals in advance of the works, although this would need further consultation and assessment.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses, however this could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

Section A-3

There is the potential for significant effects relating to SSSIs and the NNR, however careful route selection could likely avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. Given the extent and location of the MSGAs it is unlikely to be possible to route around them. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere. A number of operational quarries are recorded within the corridor; without adequate mitigation there is the potential for activities to be disrupted here and extraction may be compromised, however route selection could avoid this. It may also be possible to expedite extraction of minerals in advance of the works, although this would need further consultation and assessment.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses, however this could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

Overall
There is the potential for significant effects relating to SSSIs and the NNR, however as these are relatively small then careful route selection could avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this corridor; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. Given the extent and location of the MSGAs it is unlikely these would be avoidable. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere. A number of operational quarries are recorded within Corridor A; without adequate mitigation there is the potential for activities to be disrupted here and extraction may be compromised, however route selection could avoid this. It may also be possible to expedite extraction of minerals in advance of the works, although this would need further consultation and assessment.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses, but these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

### 3.2.7.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which nearly span the width of the corridor. In this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>A-2</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span the width of the corridor. In this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>A-3</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which nearly span the width of the corridor. In this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
</tbody>
</table>

### 3.2.8 Road drainage and the water environment

#### 3.2.8.1 Key findings

Section A-1

HE565628-JAC-EGN-SCHW_MT-RP-LE-0009 | Rev P01

September 2018
Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas in south-east Abingdon.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality

Section A-1 has the potential for significant effects on 7 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section A-1 has the potential for significant effects on the water quality of 7 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater

Section A-1 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and spring discharges.

Section A-2

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas in the vicinity of Aylesbury.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.
Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

*Geomorphology, WFD and Water Quality*

Section A-2 has the potential for significant effects on 21 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section A-2 has the potential for significant effects on the water quality of 21 large WFD water bodies from outfalls associated with the drainage of the new expressway.

*Groundwater*

Section A-2 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and spring discharges.

*Section A-3*

*Flood Risk*

Potential loss of floodplain could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas in the outskirts of Bletchley.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

*Geomorphology, WFD and Water Quality*

Section A-3 has the potential for significant effects on 8 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section A-3 has the potential for significant effects on the water quality of 8 large WFD water bodies from outfalls associated with the drainage of the new expressway.

*Groundwater*
Section A-3 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing all three SPZ1s within this section.

**Overall**

**Flood Risk**

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

**Geomorphology, WFD and Water Quality**

Corridor A has the potential for significant effects on up to 33 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The corridor also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Corridor A has the potential for significant effects on the water quality of up to 33 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Corridor A has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this corridor including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing all three SPZ1s within this corridor.
### 3.2.8.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td><strong>Flood Risk</strong></td>
</tr>
<tr>
<td></td>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
</tr>
<tr>
<td></td>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
<td></td>
<td>• May need to increase vertical alignment of road network to ensure that the proposed road is safe for users, as required by National Policy Statement (NPS) and National Planning Policy Framework (NPPF) this should account for future peak water levels as a result of climate change.</td>
</tr>
<tr>
<td></td>
<td>• Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.</td>
</tr>
<tr>
<td></td>
<td>• Groundwater mitigation may be required where groundwater flow paths are impeded.</td>
</tr>
</tbody>
</table>

**Geomorphology, WFD and Water Quality**

- Crossing of large WFD water bodies to be avoided through design (embedded mitigation).
- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.
- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.

**Groundwater**

- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- Groundwater abstractions may require monitoring and possible replacement if they are impacted by works.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.

<table>
<thead>
<tr>
<th>A-2</th>
<th><strong>Flood Risk</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
</tr>
<tr>
<td></td>
<td>• The route should be positioned away from continuous parallel alignment with the River Thame, where practicable.</td>
</tr>
<tr>
<td></td>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
<td></td>
<td>• May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
</tr>
<tr>
<td></td>
<td>• Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.</td>
</tr>
</tbody>
</table>

**Geomorphology, WFD and Water Quality**
### Section Design, mitigation and enhancement consideration for Stage 1B

<table>
<thead>
<tr>
<th>Section</th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crossing of large WFD water bodies to be avoided through design (embedded mitigation).</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.</strong></td>
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<tr>
<td><strong>Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.</strong></td>
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</tbody>
</table>

**Groundwater**

- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- Groundwater abstractions (including those for public supply) may require monitoring and possible replacement if they are impacted by works.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.

---

<table>
<thead>
<tr>
<th><strong>Flood Risk</strong></th>
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</thead>
<tbody>
<tr>
<td>Crossings should be made at locations with the smallest floodplain width.</td>
<td></td>
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</tr>
<tr>
<td>There are areas of small fluvial flood risk, to the north-east of Leighton Buzzard, which should ideally be explored in the initial instance.</td>
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<tr>
<td>A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
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<tr>
<td>May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
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<tr>
<td>Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.</td>
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<tr>
<td>Groundwater mitigation may be required where groundwater flow paths are impeded.</td>
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</tbody>
</table>

**Geomorphology, WFD and Water Quality**

- Crossing of large WFD water bodies to be avoided through design (embedded mitigation).
- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.
- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.

**Groundwater**

- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- Groundwater abstractions (including those for public supply) may require monitoring and possible replacement if they are impacted by works.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.
3.3 **Assessment Summary**

3.3.1 **Intervention objectives assessment**

### Table 3-13 Intervention objective 1 assessment – Corridor A

<table>
<thead>
<tr>
<th>Discipline</th>
<th>A-1</th>
<th>A-2</th>
<th>A-3</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Quality</strong></td>
<td></td>
<td></td>
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<td></td>
<td>For sections A-1 and A-2 it is assumed that traffic could be rerouted from the more densely populated areas e.g. Oxford, Abingdon, Thame, Haddenham and Aylesbury, which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations), and on this basis would be beneficial overall. For section A-3 it is assumed that the benefits in some locations would likely be of broadly similar extent to dis-benefits in other locations and on this basis is assessed as neutral. Overall, provided that the expressway could be routed away from the more densely populated areas discussed above, it is expected that net community benefits in terms of air quality would be possible.</td>
</tr>
</tbody>
</table>
| **Noise and Vibration** |     |     |     |         | Overall potential net beneficial effect having regard for: Benefits:  
  - Potential positive noise benefits between Bicester and Buckingham along the A4421 and between Buckingham and Milton Keynes along the A421 resulting from possible reduction in traffic on these roads.  
  - Potential positive noise benefits between Abingdon and Thame (A415, A418, B4105 and the A329) resulting from possible reductions in traffic on these roads.  
  - Potential reduction in noise within Aylesbury if bypassed. Disbenefits:  
  - Potential increases in noise for receptors adjacent to possible ‘on-line’ sections (A34, A421 – east of M1) due to possible increased traffic and speeds and road widening.  
  - Potential for adverse changes in noise at sensitive receptors in rural areas where new offline sections could form part of a new route option. |
### Rationale
- Potential for adverse noise and vibration impacts at sensitive receptors associated with construction and online widening.

### People and Communities
Potential for additional adverse effects in section A-1 on wellbeing within communities although some effects could be reduced through careful route design and mitigation.

Potential beneficial effects in section A-2 through the relief of existing severance if the route alignment is directed away from the A418. This could relieve communities such as Tiddington, Gibraltar, North Weston, Dinton, Upton, Stone, Hartwell, Rowsham, Berton, Wing from through-traffic.

Community constraints in the Woburn Sands area (section A-3) near Milton Keynes means that an adverse effect of transport on communities would be likely if a route is developed in this area.

### Overall
Corridor A has been scored light green for this intervention objective reflecting the opportunities for net beneficial effects and assuming that potential effects on people and communities would be reduced through careful route design.

---

### Table 3-14 Intervention objective 2 assessment – Corridor A

<table>
<thead>
<tr>
<th>Discipline</th>
<th>A-1</th>
<th>A-2</th>
<th>A-3</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Heritage</td>
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<tr>
<td>Corridor A has the potential flexibility in the corridor to avoid all Tier I cultural heritage constraints through careful route design. Therefore, at this stage it is considered that it may be possible to mitigate significant effects on Tier I cultural heritage constraints. Particular attention would need to be given to careful route design in section A-2 to the west of Aylesbury and Berryfields where there is a high concentration of cultural heritage assets including Waddesdon Manor Registered Park and Garden (RPG) Grade I, Hartwell House RPG Grade I, Eythrope RPG Grade II, a scheduled monument within Eythrope RPG, Hartwell Conservation Area and a number of listed buildings. These assets are situated in such a way that route...</td>
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<tr>
<td>Discipline</td>
<td>A-1</td>
<td>A-2</td>
<td>A-3</td>
<td>Overall</td>
<td>Rationale</td>
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<td>design would unlikely be able to mitigate a significant impact to one or more of these assets. This is assessed to be amber (and not red) as the impact to the Tier I (High value) assets could potentially be avoided.</td>
</tr>
<tr>
<td>Landscape and Visual</td>
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<td>Corridor A does not contain any Tier I landscape constraints.</td>
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<td>Section A-2 contains two Areas of Attractive Landscape (AAL) which covers the full width of Corridor A. There is the possibility for any route through this section of the corridor to have significant effects on the setting of the Chilterns Area of Outstanding Natural Beauty (AONB) due to the scale and extent of the scheme.</td>
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<td></td>
<td>With landscape in mind, any route through section A-3 would preferably to go west of Great Brickhill, Little Brickhill and Bow Brickhill immediately adjacent to the edge of Milton Keynes to reduce the impact on the AAL designated landscape.</td>
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<td>The London Metropolitan green belt partially extends across section A1-3 although a route to the west of this section would avoid this.</td>
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<tr>
<td>Nature Conservation</td>
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<td></td>
<td>Section A-1 and A-3 contains a large number of Tier I constraints that would need to be avoided through careful route design, including ancient woodland and aged/veteran trees.</td>
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<td></td>
<td>Section A-3 also includes a number of Tier I constraints that would need to be avoided through careful route design, including Sites of Special Scientific Interest (SSSI), ancient woodland and aged/veteran trees.</td>
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<tr>
<td>Geology and Soils</td>
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<td></td>
<td>The corridor contains a large coverage of Mineral Safeguarding Areas (MSGA’s) which would be unavoidable.</td>
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<td>There are a number of geological SSSI’s along the corridor but it is considered that it may be possible to avoid these constraints through careful route design.</td>
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<td>King’s Wood and Rushmere National Nature Reserve (NNR) located in section A-3 is of geological interest but it is considered that with careful route design it may be possible to avoid significant effects on this constraint.</td>
</tr>
</tbody>
</table>
### Overall findings

**Table 3-15 Summary of Corridor A environment assessment**

<table>
<thead>
<tr>
<th>Intervention objective 1</th>
<th>Intervention objective 2</th>
<th>Intervention objective 3</th>
<th>Strategic objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>Light green – slightly advantageous</td>
<td>Amber – moderately disadvantageous</td>
<td>Grey - neutral</td>
</tr>
</tbody>
</table>

The corridor contains two operational quarries, authorised landfills and potentially contaminated land. It is considered it may be possible to avoid these features through careful route design.

Within all sections, the corridor has the potential to cross areas of flood zone 3b (FZ3b), particularly in sections A-1 and A-2 where crossings of the River Thames and the River Thame would be required.

Within section A-3, there are areas of no or little fluvial flood risk, to the south of Leighton Buzzard. A yellow score has been given to this section on the assumption that the Source Protection Zone 1 located within this section could be avoided.

Corridor A has scored Amber for this intervention objective reflecting the likelihood of some significant adverse effects.

This score is based on assumptions that routes could be developed:

- in section A-1 to avoid Tier I nature conservation constraints;
- section A-2 to avoid Tier I heritage constraints west of Aylesbury; and
- in section A-3 to avoid Woburn Abbey RPG.
4. Corridor B1

4.1 Baseline conditions

4.1.1 Air quality

Section B1-1

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- AQMAs: There are four AQMAs within this broad area. These are Oxford AQMA, Botley AQMA, Abingdon AQMA and Cherwell DC AQMA. All have been declared due to exceedances in NO₂.

- Designated Sites: This broad area includes Barrow Farm Fen SSSI, Frilford Heath, Ponds and Fens SSSI, Cothill Fen SSSI and SAC, Dry Sandford Pit SSSI, Hurst Hill SSSI, Wytham Woods SSSI, Port Meadow with Wolvercote Common and Green SSSI, Oxford Meadows SAC, Hook Meadow and The Trap Grounds SSSI, Pixey and Yarnton Meads SSSI, Cassington Meadows SSSI, Wytham Ditches and Flushes SSSI, Rushy Meadows SSSI, Shipton-on-Cherwell and Whitehill Farm Quarries SSSI, Kirtlington Quarry SSSI, Weston Fen SSSI, Wendlebury Meads and Mansmoor Closes SSSI.

- Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Abingdon, Cothill, Wootton, Bessels Leigh, Cumnor, Botley, West Oxford, Farmoor, Wytham, Lower Wolvercote, Cassington, Yarnton, Kidlington, Shipton-on-Cherwell, Bletchington, Kirtlington, Weston-on-the-Green.

- Sensitive Receptors: Within the B1-1 boundary, there are approximately 35,000 potential air quality sensitive receptors.

- Clean Air Zone: The section is likely to be within the potential Oxford CAZ.

- PCM Model: Defra PCM links within this area have been identified on the A415 in Abingdon, and the A4260, A420, A4165, A40 and A34 around Oxford. Concentrations on the links around Abingdon are not exceeding in. However, links around Oxford are elevated and some are exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: Cherwell District Council undertake NO₂ monitoring to the north of Oxford. The latest monitoring data indicates locations within the AQMA as exceeding the AQO. Oxford City Council undertake NO₂ monitoring with all sites within the AQMA area. The latest monitoring data indicates concentrations at four locations within Oxford centre as exceeding (or close to). Other locations are below the AQO. Vale of White Horse District Council undertaken NO₂ monitoring to the south-east of Oxford.
Oxford. The latest monitoring data indicates most locations are below the AQO, but three locations within the Abingdon AQMA are exceeding the AQO.

- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the B1-1 area (at 1km square intervals) are below the relevant AQOs for NOx (8.8-27.2 μg/m^3), NO_2 (6.8-18.7 μg/m^3) and PM_{10} (11.9-16.5 μg/m^3).

There is potential for air quality benefits in Abingdon, Oxford, Yarnton, Kidlington, Kirtlington, Bletchingdon, should scheme route options change traffic routings away from these areas (and therefore a reduction in the impact of in vehicle emissions at sensitive receptors along routes in these areas).

Potential to improve journey routing in this area to reduce congestion (and thus emissions) within Oxford, and potentially reducing air quality concentrations within the AQMA.

Section B1-2

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- AQMAs: Section B1-2 includes is one AQMA, Cherwell DC No.4, declared by Cherwell District Council in the centre of Bicester, due to exceedances in the annual NO_2 concentrations.

- Designated Sites: This broad area includes Ardley Trackways SSSI, Stratton Audley Quarries SSSI, Arncott Bridge Meadows SSSI, Long Herdon Meadow SSSI.

- Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Bicester, Wendlebury, Chesterton, Caversfield, Stratton Audley, Ambrosden, Blackthorn, March Gibbon, Upper Heyford.

- Sensitive Receptors: Within the B1-2 boundary, there are approximately 20,000 potential air quality sensitive receptors.

- Clean Air Zone: The section is approximately 13km from the potential Oxford CAZ.

- PCM Model: Defra PCM links within this area have been identified on the A4421, A41, and A4095, all around Bicester. Concentrations are elevated but not exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: Cherwell District Council undertake NO_2 monitoring in and around Bicester. The latest monitoring data indicates locations within the AQMA are either close to, or exceeding the AQO. Monitoring locations outside of the AQMA show concentrations below the AQO.

- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the B1-2 area (at 1km square intervals) are below
the relevant AQOs for NOx (8.0-16.4 μg/m$^3$), NO$_2$ (6.2-12.1 μg/m$^3$) and PM$_{10}$ (11.4-16.3 μg/m$^3$).

There is potential for air quality benefits for sensitive receptors in Bicester, should scheme route options change traffic routings away from these areas (and therefore a reduction in the impact of vehicle emissions at sensitive receptors along routes in these areas).

Overall, it is assumed that traffic will be rerouted from the more densely populated areas (e.g. Bicester), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations), and on this basis would be beneficial.

Section B1-3

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- AQMAs: No AQMA areas have been declared within the B1-3 boundary by either Aylesbury Vale District Council, Cherwell District Council or Milton Keynes Borough Council.

- Designated Sites: This broad area includes Ham Home-Cum-Hamgreen Woods SSSI, Grendon and Doddershall Woods SSSI, Finemere Wood SSSI, Sheephouse Wood SSSI.

- Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Twyford, Steeple Claydon, Calvert Green, Winslow, Swanbourne, Granborough, Mursley, Little Horwood.

- Sensitive Receptors: Within the B1-3 boundary, there are approximately 8,500 potential air quality sensitive receptors.

- Clean Air Zone: The section is approximately 22km from the potential Oxford CAZ.

- PCM Model: There are no Defra PCM links within this area. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: Aylesbury Vale District Council undertake NO$_2$ monitoring at one location within B1-3 area. The latest monitoring data indicates concentrations below the AQO.

- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the B1-3 area (at 1km square intervals) are below the relevant AQOs for NOx (7.5-12.8 μg/m$^3$), NO$_2$ (5.8-9.7 μg/m$^3$) and PM$_{10}$ (11.0-13.9 μg/m$^3$).

There is potential for air quality benefits for sensitive receptors in Winslow, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).
Section B1-4

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs:** No AQMA areas have been declared within the B1-4 boundary by either Aylesbury Vale District Council, Central Bedfordshire Council or Milton Keynes Borough Council.

- **Designated Sites:** This broad area includes Pokers Pond SSSI, Nares Gladley Marsh SSSI, Kings and Bakers Woods and Heath SSSI, Wavendon Heath Ponds SSSI.

- **Residential Receptors:** Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Bletchley, Great Brickhill, Little Brickhill, Stoke Hammond, Aspley Heath, Woburn Sands, south Milton Keynes, Bow Brickhill, Drayton Parslow, Lakes Estate, Newton Longville.

- **Sensitive Receptors:** Within the B1-4 boundary, there are approximately 25,000 potential air quality sensitive receptors.

- **Clean Air Zone:** The section is approximately 37km from the potential Oxford CAZ.

- **PCM Model:** Defra PCM links within this area have been identified on the A4146 and A5. Concentrations are elevated (but not exceeding) in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data:** Milton Keynes Borough Council undertake NO\(_2\) monitoring at two locations within the B1-4 area. The latest monitoring data indicates concentrations below the AQO.

- **Defra Background Concentrations:** The Defra background maps indicate 2018 background concentrations across the B1-4 area (at 1km square intervals) are below the relevant AQOs for NO\(_x\) (8.0-19.0 μg/m\(^3\)), NO\(_2\) (6.2-13.8 μg/m\(^3\)) and PM\(_{10}\) (11.4-16.8 μg/m\(^3\)).

There is potential for air quality benefits for sensitive receptors in Milton Keynes and Bletchley, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

### 4.1.2 Noise and vibration

Within the Corridor B1 study area there are 124,074 dwellings and 3,042 other sensitive receptors. The Corridor B1 study area contains the large settlements of Abingdon, the western fringe of Oxford, Bicester, Bletchley and the southeast of Milton Keynes, as well as numerous smaller towns and villages.

It is expected that receptors in close proximity to major roads and within urban areas are subject to high noise levels dominated by road traffic. Within this corridor study area, a number of residential settlements exist in close proximity to the A34 (e.g. Abingdon, West...
Oxford, Chawley, Wytham, Wolvercote, and Kidlington), A44 (e.g. Yarnton and Begbroke), A40 (e.g. Cutteslowe and Cassington), A420 (e.g. Bessels Leigh, Cumnorn, and Dean Court), A40 (e.g. Cassington), A41 (e.g. Bicester), A413 (e.g. Winslow), A4146 (e.g. Stoke Hammond), A5 (e.g. Little Brickhill) and A5130 (e.g. Woburn Sands). Other major roads within this corridor study area are the M1 and M40.

Receptors located in more rural settings are expected to have their noise environment consisting of more local noise sources such as agriculture activities, road traffic on minor roads, railways and aircraft flights. The Corridor B1 study area is mainly a rural corridor. There are rural expanses between Abingdon and Oxford, Oxford and Bicester, and Bicester and Milton Keynes where non-traffic sources are more likely to dominate the noise environment.

There are numerous railway lines running through the Corridor B1 study area that would contribute to the surrounding noise environment, these being the London Marylebone to Oxford line, the Manchester to Bournemouth line, the London to Birmingham line, the London to Aylesbury line, the West London Route, and Marston Vale line. In addition, Luton and Heathrow Airports have several flight paths and stacking areas through the Corridor B1 study area. Abingdon Airfield, Oxford Airport, RAF Bicester, RAF Weston-on-the-Green & Oxford Gliding Club and a small local runway west of Marsh Gibbon are all located within the Corridor B1 study area.

Numerous SSSIs exist within the corridor study area. Several exist to the north east of Oxford. Further along the corridor, SSSIs include: Arncott Bridge Meadows, Sheephouse Wood, Grendon and Doddershall Woods, Finemere Woods, Kings and Bakers Wood and Heaths, and Poker's Pond Meadow.

The Corridor B1 study area contains a total of 60 NIAs. Two are along the A420, seven along the A34, three on the A40, seven along the A44, three along the A41, one adjacent to the A413, two on the A421, three on the A5130, and one adjacent to the A421. The remainder of the NIAs are within Oxford, Abingdon and Milton Keynes. Three NIAs are designated due to rail noise on the London to Birmingham railway south of Milton Keynes.

4.1.3 People and communities

Section B1-1

Abingdon and Shippon cover the south-eastern corner of the section corridor, and the centre of the section corridor is constrained as west Oxford extends into Botley and Cumnorn. There are further smaller scattered settlements throughout the section corridor, including Weston-on-the-Green, Hampton Poyle, Bletchingdon, Kirtlington, Tackley, Shipton-on-Cherwell, Thrupp, Begbroke, Yarnton, Cutteslowe, Upper Wolvercote, Lower Wolvercote, Wytham, Swinford, Binsey, Osney, North Hinksey, Dean Court, Farmoor, South Hinksey, Sunningwell, Dry Sandford, Cothill, Wootton, Bessels Leigh, Appleton and the larger settlement of Kidlington north of Oxford.

Dalton Barracks is located immediately east of Shippon, and is currently used by the MOD and allocated for residential development in the emerging Vale of White Horse Local Plan.

Botley war cemetery is located within Botley and Wolvercote cemetery is located to the east of the A34 near Water Eaton. Neighbourhood plans are currently being worked on so there is no designated Local Green Space at the moment. Some areas of green space identified in
Cherwell dataset constrains route options. Frilford Heath Golf Club, Hinksey Heights Golf Club, North Oxford Golf Club and Kirtlington Golf Clubs are all located within the section. There are several areas of woodland that are likely to be used as recreational assets, in particular Wytham Woods which occupies the centre of the corridor section. Other potential recreational assets include Farmoor Reservoir and the fisheries associated with Worton Hall. Registered common land spreads across approximately half of corridor width north-west of Oxford.

Educational, health and care/nursing facilities are largely located within existing settlement boundaries, with the following notable exceptions:

- The Action for Children Parklands Campus and St Lawrence's Church are located immediately adjacent to the A420 at Tubney Wood
- Shrublands Care Home is located immediately adjacent to the A420 at Bessels Leigh
- St Margaret's Church is located adjacent to the A34 at Binsey
- Oaken Holt House Nursing Home is located adjacent to the B4044 between Oxford and Farmoor.

There is a large area of best and most versatile agricultural land to the south of the corridor section.

Section B1-2

The centre middle of the corridor section is constrained by the large settlement of Bicester, adjacent smaller communities of Caversfield and new Graven Hill development. There are several smaller outlying settlements scattered across the section corridor including Marsh Gibbon, Launton, Stratton Audley, Blackthorn, Ambrosden, Bucknell, Caulcott, Middleton Stoney and Wendlebury and Merton.

There are numerous land parcels on the southern and eastern outskirts of Bicester with planning permission and/or under construction for residential and industrial use.

Small areas of registered common land are within the settlements of Arncott, Piddington, Marsh Gibbon and a further small area approximately 300m north of Marsh Gibbon. There is a large public park (Bignell Park) with golf course adjacent located south-west of Bicester, and also small playing fields, allotments and recreational grounds within and on the outskirts of smaller communities within the section corridor. There are two designated Local Green Spaces in Marsh Gibbon, while the other neighbourhood plans are in development.

Educational, health and care/nursing facilities are largely located within existing settlement boundaries, with the following notable exceptions:

- St Giles's Church is located immediately adjacent to the A41 at Wendlebury
- St Edburg's Church of England School is located within 200m of the A41 on the southwestern outskirts of Bicester.
- Wyndham Hall Care Home is located immediately adjacent to the A421 on the north-eastern outskirts of Bicester.
There is best and most versatile agricultural land in the far north-west part of corridor, which is unlikely to pose much of a constraint.

Section B1-3

There are no large settlements within this corridor section, with the exception of the outskirts of Milton Keynes which impinge on the very northern part of the section. The largest settlement wholly within the corridor section is the small market town of Winslow which is relatively central within the corridor section. There are several villages dispersed throughout the corridor section including Little Horwood, Mursley, Swanbourne, Addington, Adstock, Steeple Claydon, Middle Claydon, East Claydon, Botolph Claydon, Edgcott, Grendon Underwood, Granborough, North Marston and Quainton.

There is land allocated for development on the outskirts of Winslow and the edge of Milton Keynes.

There is a cluster of woodlands to the east of the section corridor which is likely used for informal recreational purposes and which also serves as a hub in the local PROW network. To the far north of the section corridor, Tattenhoe Park and Windmill Hill Golf Course lie adjacent to the A421 on the outskirts of Milton Keynes. There are six designated Local Green Spaces within Winslow and six designated greenspaces in and around Steeple Claydon, including land around St Michael's church cemetery on the south east edge of the village. Common land, allotments, playing fields and other cemeteries are largely within or close to the very edge of settlements.

There is very little best and most versatile agricultural land within this corridor section.

Section B1-4

The outskirts of Milton Keynes and Bletchley coincide with the north-west edge of the section. There are several villages dispersed throughout the corridor including Great Brickhill, Little Great Brickhill, Bow Brickhill, Woburn Sands, Drayton Parslow, Stoke Hammond, Aspley Guise, Stewkley and Soulbury. The A5 crosses the section, bypassing Little Brickhill. The A4146 also crosses the section and is a two lane dual carriageway bypassing Stoke Hammond. The majority of the villages in the section are relatively rural and away from major highway infrastructure.

The main development allocations are along the fringe of Milton Keynes.

Key areas of open space and recreation within the corridor section include part of Woburn Safari Park, located north west of Woburn, and Stockgrove Country Park, located on the northern outskirts of Leighton Buzzard. There are four golf courses: Three Locks (near Bragenham), Woburn, Aspley Guise and Woburn Sands Golf Club and Wavendon Golf Academy. Crawley Park is located between Aspley Guise and Ridgmont and Caldecotte Lake is located between Bletchley and Wavendon. There are a number of small areas of playing fields within and on the outskirts of Milton Keynes and the smaller settlements. Extensive areas of woodland and heathland are present throughout the section and likely to be used for informal recreation (including King's Wood, Buttermilk Wood, Back Wood, Wavendon Wood and Wavendon Heath). There are several small areas of registered common land within or close to Stoke Hammond, Great Brickhill and Aspley Guise.
The Lindens Residential Care Home is located on Stoke Road between Bletchley and Stoke Hammond. St James's Church and Husborne Crawley Lower School are on the edge of Husborne Crawley. Otherwise, educational facilities, health care facilities and care/nursing homes are largely located within or in close proximity to existing settlement boundaries.

Land surrounding Milton Keynes, Bletchley and Newton Longville largely comprises of best and most versatile agricultural land (although also coincides with land allocated for development, so it is likely to be lost in the future baseline situation).

### 4.1.4 Cultural heritage

#### Section B1-1

There are 312 designated cultural heritage assets of High and Very High value within the Corridor and 1 kilometre study area for Section B1-1 comprising:

- 1 World Heritage Site
- 37 scheduled monuments
- 128 Grade I listed buildings
- 140 Grade II* listed buildings
- 4 Grade I Registered Park and Garden
- 2 Grade II* Registered Park and Gardens

There are a further 1613 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section B1-1 comprising:

- 1564 Grade II listed buildings
- 38 Conservation Areas
- 11 Grade II Registered Park and Gardens

The World Heritage Site of Blenheim Palace lies within the 1 kilometre study area and is considered to be of Very High value. The UNESCO listing for the site states that ‘the integrity of the property is well protected by its enclosing wall but important visual links do exist between the gates, the parkland buildings, buildings in the surrounding villages and landscape, and care needs to be taken to ensure these key visual links are protected’ ([https://whc.unesco.org/en/list/425](https://whc.unesco.org/en/list/425) [accessed 24/04/2018]). These views extend the setting of this asset well beyond the boundary of the designated site itself.

There are a large number of scheduled monuments within the Section B1-1 Corridor including a Prehistoric Long Barrow west of Enslow Bridge, medieval moated sites and settlement sites, 17th century water gardens and earthworks, and the 18th century Swinford bridge. The majority of these assets are small and discrete.

There are a number of High value assets on the fringes of Oxford including scheduled monuments, Grade I and Grade II* listed buildings, and the Grade II* Worcester College...
Registered Park and Garden. The scheduled monuments comprise Rewley Abbey, the remains of Osney Abbey, the Swing bridge (LNWR Station), the Port Meadow site ring ditches, barrows, and associated enclosures, the Seacourt medieval settlement, Godstow Abbey, the North Hinksey conduit house, and the Old Abingdon Road culverts.

The town of Abingdon also contains scheduled monuments and a large number of Grade I and Grade II* listed buildings. The scheduled monuments here comprise the Castle Mound at Fitzharris and the Ock Bridge.

There are further Grade I and Grade II* listed buildings in Rousham, Cumnor, Kidlington, Yarnton, Gosford, Kirtlington, Islip, Wytham, Cassington, Bletchingdon, North Hinksey, Tackley, Appleton-with-Eaton, Weston-on-the-Green, Hampton Gay and Poyle, Sunningwell, St. Helen Without, Shipton-on-Cherwell and Thrupp, Begbroke, South Hinksey, and Bessels Leigh.

The Rousham Grade I Registered Park and Garden contains an associated 56 listed buildings (1 Grade I, 24 Grade II*, and 31 Grade II) and a Dovecote scheduled monument. The largely rural setting is noted as contributing to the significance of this asset, particularly the views north and east from Rousham house (Grade I), the gardens and pleasure grounds. The designed landscape was intended to include the extensive views across the flood meadows north of the Cherwell and the farmland beyond, to local villages, and, in particular, the church towers and villages of Steeple Aston, Upper and Lower Heyford and Rousham together with the causewayed Heyford Bridge. Modern development partly already obscures some of these intended views ([https://historicengland.org.uk/listing/the-list/list-entry/1000107](https://historicengland.org.uk/listing/the-list/list-entry/1000107) [accessed 24/04/2018]).

The Grade II* Registered Tackley Water Garden consists of two areas, one of which relates to the 17th century house and is located on agricultural land and the other which is also the water gardens scheduled monument.

Section B1-2

There are 34 cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section B1-2 comprising:

- 11 scheduled monuments
- 8 Grade I listed buildings
- 14 Grade II* listed buildings
- 1 Grade I Registered Park and Garden

There are a further 396 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section B1-2 comprising:

- 384 Grade II listed buildings
- 11 Conservation Areas
- 1 Grade II Registered Park and Garden
The Middleton Stoney Castle scheduled monument is situated on the grounds of the Grade II Registered Middleton Park, which also contains Grade I and Grade II* listed buildings. There is also a Saxon Barrow scheduled monument that lies just outside of Middleton Park at its south eastern corner. The barrow has been partially removed by the B340, but the remaining portion is expected to contain archaeological remains.

Section B1-2 is dominated by the town of Bicester, which contains Grade I and Grade II* listed buildings. Just to the north of the town is the RAF Bicester which contains 11 protected structures that together comprise the scheduled monument. Just south of Bicester are the large Alchester Roman site and parade ground scheduled monuments and to the east of Bicester is the Wretchwick Deserted Medieval Settlement scheduled monument.

There are further Grade I and Grade II* listed buildings in Middleton Stoney, Launton, Bucknell, Stratton Audley, Merton, March Gibbon, Chesterton, Caversfield and Ambrosden. Stratton Audley also contains a moated site scheduled monument and Ambrosden also contains a scheduled churchyard cross scheduled monument.

The Wotton House Grade I Registered Park and Garden is primarily south of the corridor but extends to within the 1 kilometre study area of Section B1-2. Furthermore, the park is purposely aligned with views towards Tittershall Wood, which lies within the corridor itself.

Section B1-3

There are 56 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section B1-3 comprising:

- 11 scheduled monuments
- 8 Grade I listed buildings
- 35 Grade II* listed buildings
- 2 Grade I Registered Park and Garden

There are a further 531 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section B1-3 comprising:

- 512 Grade II listed buildings
- 18 Conservation Areas
- 1 Grade II Registered Park and Garden

The majority of scheduled monuments within this corridor are smaller, discrete assets located within rural, open settings. This includes a later Bronze Age to Early Iron Age hillfort, which is unusual for its location on a low lying plateau rather than a summit or a ridge, and medieval period moated sites, villages and settlements, fishponds, and a standing cross.

There are Grade I and Grade II* listed buildings in Middle Claydon, Quainton, Winslow, North Marston, Adstock, Twyford, Hillesden, Hoggeston, East Claydon, Grendon Underwood, Mursley, Swanbourne, Steeple Claydon, Little Horwood, Granborough, Edgcott, and Addington.
The Grade I Registered Park and Garden of Wotton House has an avenue that extends into the corridor. Furthermore, the park is purposely aligned with views towards Grove Wood, which lies within the corridor itself.

Section B1-4

There are 52 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section B1-4 comprising:

- 11 scheduled monuments
- 4 Grade I listed buildings
- 36 Grade II* listed buildings
- 1 Grade I Registered Park and Garden

There are a further 414 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section B1-4 comprising:

- 394 Grade II listed buildings
- 19 Conservation Areas
- 1 Grade II Registered Park and Garden

The Roman town of Magiovinium scheduled monument is situated on the edge of Bletchley and Fenny Stratford and is divided by the Roman Watling Street. It is roughly bounded by the current A4146 and A5. There are 2 further scheduled monuments, a medieval manor and a shrunken medieval village, within the constituent towns of Milton Keynes.

The Danesborough Camp hillfort and the Motte castle 200m south east of Wavendon Manor scheduled monuments both survive well archaeologically and are good examples of their class.

‘The Hoult’ scheduled monument survives in earthwork form and comprises a relatively large site which extends approximately 200 metres into the corridor and is situated on open agricultural land. There is also a more discrete moated site scheduled monument at Stewkley.

There are Grade I and Grade II* listed buildings in West Bletchley, Stewkley, Newton Longville, Aspley Guise, Bletchley and Fenny Stratford, Soulbury, Husborne Crawley, Wavendon, Drayton Parslow, Great Brickhill, Stoke Hammond, Ridgmont, Little Brickhill, Bow Brickhill, and Aspley Heath.

The Grade I Registered Park and Garden of Woburn Abbey extends a maximum of 750 metres into the B1-4 corridor. Woburn Abbey is a large and complex site which incorporates 61 listed buildings (7 Grade I, 6 Grade II*, and 48 Grade II) on its grounds; most of which lay outside of the Section B1-4 corridor and study area. The setting of the park is largely agricultural, with some areas of woodland and the villages lying close by. It is bounded to the southwest, northwest, and north by the current A4012 road where it is enclosed by high, red-brick walls.
Section B1-1

The Cotswolds AONB lies approximately 1.5 km from western boundary of the corridor adjacent to Blenheim Palace RPG grade I and World Heritage Site (WHS) that is less than 500m from the western boundary of the corridor.

Other relevant designations include Oxford green belt that covers the majority of the area. Pixey Mead and Port Meadow areas common land lie immediately west of Oxford and there are numerous conservation areas and listed buildings and areas of ancient woodland throughout the section. To the north of this section lies Kirtlington Park RPG grade II.

Oxford Airport lies towards the west where a safeguarding area applies that restricts the height of development, type of planting and lighting requirements.

The area is characterised by low lying floodplains west of Oxford with numerous areas of green space including the common land at Pixey Mead and Port Meadow.

Sensitive visual receptors include residents in surrounding settlements and users of PRoW and open space.

Section B1-2

Poundon Hill LLA lies within this section. It should, however, be noted that the updated Vale of Aylesbury Local Plan (2013 – 2033) Policies Map (November 2017), which has not yet been adopted, no longer shows Poundon LLA. This accords with the Defining the special qualities of local landscape designations in Aylesbury Vale District – Final Draft Report (LUC, March 2016) that forms part of the landscape supporting evidence, and which recommends the Poundon Hill LLA is not worthy of local landscape designation.

Other relevant designations include Middleton Park RPG grade II, Bignell Park (public park) west of Bicester and RAF Bicester, Stratton Audley, Chesterton and Marsh Gibbon conservation areas and scattered listed buildings.

RAF Bicester is very open in character with views across an airfield. To the south of Bicester, the area is characterised by low lying floodplain of the River Ray and Otmoor.

Sensitive visual receptors include residents of Middleton Stoney, Chesterton, Bucknell, Ambrosden, Launton, Marsh Gibbon, and smaller settlements and isolated properties; and on the urban edges of Bicester. Also users of PRoW and visitors to Bignell Park.

Section B1-3

The Quainton - Wing AAL lies within the southern part of the corridor which is noted for its ‘Undulating hills and ridges with distant panoramic views across the strongly rural and picturesque landscape’ forming ‘a series of low, generally open limestone hills with hilltop settlements, between the foot of the Chilterns escarpment and the dip slope of the Cotswolds. The prominent hills form a backdrop to many views in the district. Nucleated villages create texture, a sense of history, variety and rhythm. The strong sense of history is present in the many conservation areas, scheduled monuments and landscape features such as ridge and furrow and irregular enclosed fields’. 
Other relevant designations include Claydon RPG Grade II and Claydon House National Trust (NT); along with Middle Claydon, Addington, Winslow, Great and Little Horwood, Swanbourne, Mursley and Whaddon conservation areas and many listed buildings.

The area is dissected by the disused railway line that is the subject of the East-West Rail Proposals. There is also an area of unregistered but attractive parkland at Addington Manor equestrian centre.

Sensitive visual receptors include residents of the villages of Twyford, Steeple Claydon, Middle Claydon, Verney Junction, Addington, the urban edge of Winslow, Great and Little Horwood, Swanbourne, Mursley and Whaddon.

Section B1-4

The majority of the western part of this section lies within the Brickhills AAL with the exception of a narrow area of non-designated land adjacent to the urban edge of Milton Keynes. Brickhills AAL is noted for its ‘distinct landform with wooded scarp slopes and interspersed agricultural areas and heathland’, and ‘open and panoramic views from the hilltops across the landscape of the Vale of Aylesbury to the Quainton Wing hills’.

To the east the AAL shares a boundary with London Metropolitan green belt that extends beyond the extent of the corridor.

Other important designations include Woburn Abbey RPG grade I to the east of the corridor and Woburn, Aspley Heath, Aspley Guise and Husborne Crawley conservation areas. There is also a small area of common land south of Great Brickhill and the area is crossed by numerous PRoW including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths.

There are significant areas of woodland south and east of Brickhill and east of Woburn Abbey which includes areas of ancient woodland.

The area south of Aspley Heath includes extensive areas of heathland and woodland and includes Woburn Golf Course. Stockgrove Country Park also features within the area.

Sensitive visual receptors include residents on the southern edge of Milton Keynes, particularly the Lakes Estate area; residents in the rural villages and individual houses; and also users of PRoW and Stockgrove Country Park.

4.1.6 Nature conservation

A large number key nature conservation features (statutory and non-statutory designated sites) are present within corridor B1, notably Cothill Fen SAC and Oxford Meadows SAC in section B1-1. There many sites in the areas to the east of Bletchley, east of Bicester and west and south of Oxford.

Section B1-1

The key sensitive features within the corridor are Cothill Fen SAC at the south of the section, and Oxford Meadows SAC which lies north east of Oxford and spans over half of the corridor width. Fifteen SSSI lie within the corridor including those forming the 2 SACs (which includes 1 NNR), and those associated with Wytham Woods. The distribution of these SSSI
comprises over three quarters of the width of the corridor to the west of Oxford. Significant areas of the 123 AW within the section lie in its southern half, a large percentage associated with Bagley Wood to the east and Tubney Wood to the south west, as well as the aforementioned Wytham Woods. To the north of the section, numerous small blocks of AW are dispersed widely across the width of the corridor. With respect to Tier III sites, 2 LNR, 63 LWS and 12 Proposed LWS are present within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise Cothill Fen SAC and Oxford Meadows SAC, 32 SSSI, and 1 NNR. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 152 AW, 3 LNR, Otmoor RSPB reserve, 93 LWS and 17 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section B1-2

The key sensitive features within the corridor are 3 SSSI, and 18 AW. The 3 SSSI are relatively small, two are located towards the southern edge of the corridor and one intersecting its northern boundary. The AW generally consists of small units, located adjacent to the northern boundary of the corridor, although the two largest units are just south of Bicester (associated with Graven Hill) and in the south eastern extent (associated with Tittershall Wood). With respect to Tier III sites, 1 LNR, 28 LWS and 2 Proposed LWS lie within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 6 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 39 AW, 1 LNR, Otmoor RSPB reserve, 49 LWS and 4 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section B1-3

The key sensitive features within the corridor are 4 SSSI, and 47 AW, the majority are located at south western extent of the section. The SSSI are associated with woodland: Finemere Wood; Doddershall Wood; Grendon Wood and Lee Wood. These woods, plus other adjacent woodlands, are also designated AW. Further areas of AW are found in the north east extent of the section, adjacent to, and south of, the A421. With respect to Tier III sites, 30 LWS lie within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 8 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 71 AW and 45 LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section B1-4

The key sensitive features within the corridor are 4 SSSI, 21 AW, and 1 NNR. The largest area of SSSI is associated with Kings Wood and is divided by the southern boundary. The other SSSI are much smaller in size and are located just south west of Kings Wood, west of the A4146, and within New Wavendon Heath. Kings Wood is also designated AW, as is Black Wood, and Buttermilk Wood, which are adjacent to New Wavendon Heath, itself having...
an area of designated AW although separated from the heath by the A5130. Duncombe Wood is separated from Buttermilk Wood by the A5. Together these designations form a dense distribution of constraints within the eastern side of this section. With respect to Tier III sites, 1 LNR and 38 LWS lie within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 4 SSSIs and 1 NNR. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 27 AW, 1 LNR and 56 LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

### 4.1.7 Geology and soils

**Section B1-1**

Bedrock comprises a geological sequence of decreasing age from the Lower Jurassic Lias in the north, through Middle Jurassic limestones of the Great Oolite Group and mudstone, siltstone and of the Ancholme Group. Late Jurassic Corallian Group including limestones and sandstones, and other mudstones, siltstones and sandstones are present in the southern section. The youngest bedrock in the area is Lower Cretaceous Lower Greensand locally present in the Boars Hill area southwest of Oxford.

Superficial deposits are absent from large parts of the south and north of Section B1-1. Where present, they typically comprise alluvium or sand and gravel of the Summertown-Radley Sand and Gravel Member or Northern Drift Formation.

The following sites of geological importance are located within Section B1-1:

- **Cothill Fen:** a mixed biological and geological SSSI, which is in a favourable condition, entirely located within the south of Section B1-1. The SSSI supports nationally rare calcareous fen and moss-rich mire communities together with associated wetland habitats; palaeovegetation can be interpreted from peat samples. Cothill Fen is also designated as a SAC.

- **Dry Sandford Pit:** this mixed biological and geological SSSI is situated in the south of Section B1-1 and is in a favourable condition. A sequence of limestone rocks, formed during the Jurassic period in shallow coastal waters and containing fossil ammonites, is exposed at this site. The site is also designated as a LGS, the area of which is greater than the SSSI footprint.

- **Cumnor:** a geological SSSI in favourable condition within the south of Section B1-1, west of the A420. The site demonstrates the complex biostratigraphy and palaeogeography of the Oxfordshire Corallian (a coral rag limestone group).

- **Sugworth:** a geological SSSI in favourable condition sited adjacent to the A34 in the southwest of Section B1-1. The site is designated for its rare inland interglacial sediments containing various fossil remains.

- **Hurst Hill:** a biological and geological SSSI east of the A420 in the south of the section, split into two report units, one of which is in unfavourable recovering condition and the other of which is in unfavourable declining condition. The
geological interest stems from the old brickpits which have yielded fossils of marine reptiles and the skeleton of an ornithopod dinosaur.

- Shipton-on-Cherwell & Whitehill Farm Quarries: a geological SSSI in the north of the section, northeast of Oxford Airport. The Shipton-on-Cherwell Quarry is in an unfavourable recovering condition whilst the Whitehill Quarry is in a favourable condition. The quarries expose sections of the White Limestone Formation and demonstrate lithostratigraphy typical of this rock unit. Fine fossil reptiles have also been yielded from the quarries.

- Kirtlington Quarry: a geological SSSI in favourable condition, west of Kirtlington in the north of Section B1-1. The site has yielded the most diverse assemblage of Middle Jurassic mammal fossils described to date worldwide. The site, including additional land to the west is also classified as a Local Geological Site (named Kirtlington Quarry and Washford Pits Wood).

- Tubney Woods Sandpit: an active quarry with exposures of lower calcareous grit in the south of the section which is classed as a LGS; the grit produces poor soils demonstrating the link between geology, pedology and biodiversity.

- Greenhill Farm Quarry (East and West): disused quarries in the north of the section classed as a LGS, which show important sections in the highly fossiliferous Jurassic rock unit – Cornbrash Formation.

Several Oxfordshire MSGAs are present within Section B1-1 as follows:

- soft sand within the southwest and north-western extent of the section (Corallian Formation)
- sharp sand and gravel across two-thirds of the width of the corridor in the centre of the section
- crushed rock in the north of the section (Great Oolite).

Two active quarries are located within Section B1-1: Upwood Quarry (mining sand of the Kingston Formation) in the southwest, and Shipton Quarry (mining the White Limestone Formation of the Great Oolite) in the northwest.

The Banbury Road Rail Depot is listed as an active depot within BritPits data in the centre of the section.

One historical (sand and gravel) quarry and two dormant (clay and shale and limestone) quarries are also present in the centre and north of the section.

The EA website identifies 2 authorised landfills within the southwest of Section B1-1: Upwood Quarry and Tubney Woods Landfill, both accepting inert waste. The EA website also lists a number of historical landfills within Section B1-1, that are distributed across the section but occupy a small proportion of its overall footprint. Other potentially contaminative current and historical land uses include Abingdon Airfield/Dalton Barracks, Oxford Airport and RAF Weston-on-the-Green.
One historical NIHHS site is listed in the Groundsure COMAH data for Section B1-1 – Swinford Water Treatment Works.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA.

**Section B1-2**

The bedrock geology comprises mainly sandstone, limestone and argillaceous rocks of the Middle Jurassic Great Oolite Formation in the north-western third, and mudstone, siltstone and sandstone of the Upper Jurassic Ancholme Group in the south-eastern two-thirds of the section.

The superficial geology in Section B1-2 is composed of alluvium and river terrace deposits of sand and gravel south of Bicester, and mainly glacial till in the northeast; they are largely absent elsewhere.

The following sites of geological importance are located within Section B1-2:

- **Ardley Trackways**: a geological SSSI in the northwest of the section, in favourable condition. The site is of international importance due to the presence of a rare array of fossilised trackways formed by a herd of dinosaurs during the Middle Jurassic.

- **Ardley Cutting and Quarry SSSI**: a biological and geological SSSI in unfavourable recovering condition, northwest of Bicester. The geological interest lies in the exposures of Jurassic rocks, but the variations in soils also influence habitat variations at the site.

- **Stratton Audley Quarries**: a geological SSSI destroyed due to infilling with waste material and water, northeast of Bicester. There are no practical means of restoring access to the interest feature and so the site must be considered destroyed.

- **Ardley Fields Quarry**: a LGS which extends into the north of Section B1-2, bordering the Ardley Trackways SSSI.

An Oxfordshire MSGA for crushed rock is present in the northwest of the section and proposed Buckingham MSGAs for sand and gravel are located in the east and north-eastern extent of the section spanning half the corridor width.

One active quarry, Dewar’s Farm mining the White Limestone Formation, is present within the northwest of the section.

The EA website identifies 2 authorised landfills, Ardley Landfill, which extends approximately 125m into the northwest of the section and Glebe Farm in the north of the section. The EA website also lists 5 historical landfills that are located in Section B1-2, within central and northern parts.

Other potentially contaminative current and historical land uses include RAF Weston-on-the-Green, RAF Upper Heyford, Bicester and its airfield (formerly RAF Bicester), Pear Tree Farm airfield, Graven Hill and Arncott Ordnance Depots and Piddington Depot. Two Control of Major Accident Hazards (COMAH) sites are listed in the northwest of Section B1-2: a current
listing for Southern Bomb Store, likely in association with RAF Upper Heyford, and an historical listing for Black Cat Fireworks.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA.

Section B1-3

The bedrock is composed mainly of mudstone, siltstone and sandstone of the Upper Jurassic Ancholme Group. At Quainton there is an isolated outlier of Late Jurassic Portland and Purbeck Group limestone, calcareous sandstone and interbedded mudstone.

Superficial deposits are absent from over half of Section B1-3, particularly in the southwest. Where present, they comprise mainly glacial till, glacial sand and gravel and alluvium around watercourses.

There are no sites of geological importance within Section B1-3, however it should be noted that information relating to LGS is not yet available; this will be available in Stage 1B.

Proposed Buckinghamshire MSGAs for sand and gravel are mapped across a large proportion of Section B1-3, spanning the width of the corridor in places. Two Milton Keynes MSGAs for sand and gravel are located in the north-eastern extent of the section.

One dormant quarry, Woodham Brickworks, mining clay and shale of the Weymouth Member is present in the southwest of the section. A historical quarry, Calvert Brickworks, which mined clay and shale of the Peterborough Member is located in the west of the section (and is now the site of Calvert Landfill).

The EA website identifies an authorised landfill named Calvert Landfill that is located in the west of the section. The EA website also lists several historical landfills within Section B1-3, with the largest not far to the northwest of the authorised Calvert Landfill.

Other potentially contaminative current and historical land uses include RAF Little Horwood and a large (approximately 7 ha) electricity grid substation.

The Groundsure COMAH data show the Aylesbury Compressor Station historical NIHHS COMAH site is listed in the south-west of Section B1-3, the British Aerospace Westcott site is also a historical COMAH site which is located just beyond the study area at approximately 270m south of the corridor boundary.

Section B1-4

Bedrock geology in Section B1-4 comprises mudstone, siltstone and sandstone of the Ancholme Group in the west and north of the section, and sandstone and mudstone of the Lower Cretaceous Lower Greensand Formation in the east to southeast.

Glacial till dominates the superficial geology in the west of Section B1-4, with glaciofluvial deposits also common. Alluvium and river terrace deposits surround the River Ouzel and Grand Union Canal. East of these watercourses, head deposits of clay, silt sand and gravel are common, as are glacial till, glaciofluvial deposits and chalky boulder clay in the north.
The King’s Wood and Rushmere NNR is located within the eastern centre of Section B1-4; north of Leighton Buzzard. The site lies on an unusual mixture of soils. Much of the wildlife interest is a result of the varied geology of the Lower Greensand and Boulder Clay, which produces different soil conditions for the various habitats. At the time of writing information relating to LGS was not available, however this is being sought for reference in Stage 1B.

A Milton Keynes MSGA for sand and gravel extends into the north of the section around Bletchley, with proposed Buckinghamshire MSGAs for sand and gravel to the south and the Bedfordshire MSGA for Woburn Sands south. Collectively, these areas span the width of the corridor. Another Bedfordshire MSGA for Woburn Sands is present in the northeast of the section and a Bedfordshire MSGA for river valley/glacial sand and gravel extends approximately 10m into the section within the north.

An active quarry is recorded named Bletchley Rail Depot to the northwest of the section. This is recorded in BritPits data as an active quarry however it is expected that this is associated with transport of crushed limestone resources rather than actual quarrying. Rammanere Heath, a dormant quarry within the Woburn Sands Formation, is located in the east of the section.

The EA website identifies 4 authorised landfills that are located within the study area for Section B1-4: Bletchley Landfill located in the northwest, and Rislip Farm located in the south. Sheepcote and Stone Lane Quarry are located adjacent the corridor boundary. Bletchley Landfill is significant in size and currently serves Milton Keynes with planning permission till 2022.

The EA website also lists a number of historical landfills in Section B1-4, that are distributed across the section and with the largest surrounding the authorised Bletchley Landfill. Other potentially contaminative current and historical land uses include brick works, industrial estates and a rifle range.

A site formerly determined as contaminated land under Part IIA of the Environmental Protection Act 1990 is located within the northwest of the section at Buckingham House in Bletchley. The contamination was caused by a heating oil leak from underground pipework but was remediated. Another site in Bletchley formerly determined as contaminated land under Part IIA is listed in George Street, with the contamination caused by diesel leaking from a disused underground tank; the site has now been remediated.

A current COMAH site is located just outside of the study area (280m from the corridor boundary) registered to Evonik Goldschmidt UK, which is noted to be a Lower Tier Operator.

4.1.8 Road drainage and the water environment

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the rivers in the study area, detailed in Table 4-1. There are four rivers within this section that have large areas of Flood Zone 3b (functional floodplain):
River Ock (a tributary of the River Thames) flows in a westerly direction towards Abingdon.

River Thames – flows north towards the A40 before it meanders south through Oxford City Centre towards east Abingdon.

River Cherwell (a tributary of the River Thames) – flows in a south westerly direction in parallel with the A4260 towards Oxford.

River Ray – flows past the A41 heading in a westerly direction towards Islip where it joins River Cherwell.

The Flood Zone 2 and 3 associated with the River Thames, River Cherwell and River Ray are extensive within this section.

Table 4-1 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>287.3</td>
<td>426.2</td>
<td>17.9</td>
<td>22.5</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. Based on this assumption there would be an approximately 5% increase in the area identified as Flood Zone 3, predominantly affecting areas to the west of Oxford which would be at greater risk of fluvial flooding.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 1.8% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 3.5% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.
Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASTGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 29% of the study area is within an area of medium to high risk (see Table 4-2)

Table 4-2 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>17.4</td>
<td>• Oxford Centre</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Outskirts of Oxford (following the River Thames)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Abingdon</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>11.7</td>
<td>• West Oxford</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Abingdon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South Bicester</td>
</tr>
</tbody>
</table>

Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 4-3.

Table 4-3 Reservoir Breach Extents

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows north of Sutton before heading south towards Oxford at the A40.</td>
</tr>
<tr>
<td>2</td>
<td>Flooding around the Otmoor area, that flows east along the River Ray</td>
</tr>
<tr>
<td>3</td>
<td>Flows south following the River Cherwell towards Bletchingdon</td>
</tr>
<tr>
<td>4</td>
<td>Other small breach extents identified within the section</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of previous recorded flooding events from the sea, river, groundwater. According to the EA’s dataset, 17.1% of the section has been recorded to have flooded historically. There are records of flooding outside of the existing Flood Zone 2 and 3 associated with River Thames, impacting areas in Oxford.

Other Flood Sources
The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**

Table 4-4 shows the WFD operational catchments and WFD water body catchments which lie within Section B1-1.

**Table 4-4: WFD operational and WFD water body catchments within Section B1-1**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Cherwell</td>
<td>Cherwell (Bletchingdon to Ray)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cherwell (Ray to Thames) and Woodeaton Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cherwell (Nell Bridge to Bletchingdon)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bayswater Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td>Oxon Ray</td>
<td>Oxon Ray (upstream A41 to Cherwell) including Otmoor</td>
<td></td>
<td>Oxon Ray</td>
<td>Bad</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Langford Brook (Bicester to Ray inc Gagle Brook)</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Gallos Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bletchingdon Stream</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td>Cotswolds</td>
<td>Evenlode</td>
<td>Evenlode</td>
<td>Evenlode (Glyme to Thames)</td>
<td>Bad</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dorn (Source to Glyme)</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Glyme (Dorn confluence to Evenlode)</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td>Windrush</td>
<td>Thames (Leach to Evenlode)</td>
<td></td>
<td>Thames</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Filichampstead Brook at Farmoor</td>
<td>Bad</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chil and Limb Brooks (source to B4044)</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td>Gloucestershire and the Vale</td>
<td>Ock</td>
<td>Northfield Brook (Source to Thames) at Sandford</td>
<td>Northfield Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
</tbody>
</table>
River Basin District | WFD Management Catchment | WFD Operational Catchment | WFD Water Body Catchment | WFD Water Body Status (Cycle 2, 2016) | Large WFD Water Body Crossing
---|---|---|---|---|---

Thames (Evenlode to Thame) | Moderate | Yes
Ock and tributaries (Land Brook confluence to Thames) | Poor | Yes
Sandford Brook (source to Ock) | Good | Yes
Frilford and Marcham Brook | Moderate | Yes

Section B1-1 also traverses 2 artificial WFD water bodies, the Oxford Canal, Aynho to Thrupp and the Oxford Canal, Thrupp to Thames.

**Groundwater**

Section B1-1:

- Crosses a limestone Principal bedrock aquifer (underlies less than 25% of the section)
- Crosses 4 Secondary A bedrock aquifers
- Crosses 2 Secondary A superficial deposit aquifers
- Contains 5 licensed groundwater abstractions
- Contains 10 potential GWDTE
- Contains approximately 21 springs as marked on the OS 1:25,000 map

**Flood Risk**

**Fluvial**

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 4-5. There are two rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):

- River Ray (a tributary of the River Thames) – flows in a south-westerly direction from the A41 towards the south of M40
• Unnamed Watercourse (a tributary of the River Ray) – flows south through Bicester towards the M40 joining the River Ray.

Flood Zone 2 and 3 associated with the River Ray is extensive within this section.

Table 4-5 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>103.3</td>
<td>200.5</td>
<td>12.3</td>
<td>15.0</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 3% increase in the area identified as Flood Zone 3. Areas to the south-east of Bicester are likely to experience greater risk from fluvial flooding over the lifetime of the development as a result of climate change.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 3.3% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 6.2% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 14% of the study area is within an area of medium to high risk (see Table 4-6).

Table 4-6 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>5.9</td>
<td>• South-east of Bicester (following the River Ray)</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>7.9</td>
<td>• South-east of Bicester (following the River Ray)</td>
</tr>
</tbody>
</table>

Reservoir Failure
EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow route that intersects this section has been detailed in Table 4-7.

**Table 4-7 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows from North Dorton along the A41 down to Lower Arncott</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river, groundwater and in addition it indicates areas that have previously been flooded. According to the EA data set 2.9% of the study area has been recorded to have flooded historically. There are no records of flooding to have occurred outside Flood Zones 2 and 3.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**

Table 4-8 shows the WFD operational catchments and WFD water body catchments which lie within Section B1-2.

**Table 4-8: WFD operational and WFD water body catchments within Section B1-2**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Cam and Ely Ouse</td>
<td>Great Ouse Upper</td>
<td>Padbury Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Cherwell</td>
<td>Cherwell (Nell Bridge to Bletchingdon)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Oxon Ray</td>
<td>Gubbinshole and Broadmoor ditch to Ray (Oxon)</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Summerstown Ditch and Launton and Cutters Brook</td>
<td>Bad</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oxon Ray (upstream A41 to Cherwell) including Otmoor</td>
<td>Bad</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
Section B1-2 also traverses 1 artificial water body, the Oxford Canal, Aynho to Thrupp.

**Groundwater**

Section B1-2:

- crosses a limestone Principal bedrock aquifer (underlies less than 25% of the section)
- crosses 2 Secondary A bedrock aquifers
- crosses 2 Secondary A superficial deposit aquifers
- contains 5 licensed groundwater abstractions
- contains 4 potential GWDTE
- contains approximately 14 springs as marked on the OS 1:25,000 map

**Section B1-3**

**Flood Risk**

**Fluvial**

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 4-9. There are three rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):
River Ray (a tributary of the River Thames) – flows in a south-westerly direction from the A41 towards the south of M40

Padbury Brook (a tributary of the River Great Ouse) – flows in south-easterly direction from the A421, near M40 J10. It then meanders and heads north towards Buckingham before joining the River Great Ouse

Claydon Brook (a tributary of the River Great Ouse) – flows in a south-westerly direction past the A413, joining the Padbury Brook.

Flood Zone 2 and 3 associated with the River Ray is extensive within this section.

**Table 4-9 Quantitative Analysis of Rivers and Fluvial Flood Risk**

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>45.7</td>
<td>322.2</td>
<td>3.9</td>
<td>4.9</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, modelling the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 1% increase in the area identified as Flood Zone 3. The Flood Zone map indicates that areas to the south-east of Winslow are likely to be within a greater risk from fluvial flooding over the lifetime of the development.

**Surface Water**

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 4.4% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 7.2% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

**Groundwater**

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASIGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 13% of the study area is within an area of medium to high risk (see Table 4-10).

**Table 4-10 Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
</table>

Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 4-11.

**Table 4-11 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Extents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows from North Dorton along the A41 down to Lower Arncott</td>
</tr>
<tr>
<td>2</td>
<td>Flows from pond in Claydon Park heading in westerly direction towards Stoke Lyne</td>
</tr>
<tr>
<td>3</td>
<td>Flows from Milton Keynes center to the outskirts of Milton Keynes where it continues to follow the River Great Ouse.</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA data set a significantly small area 0.5% of the study area has been recorded to have flooded historically. There are records of flooding outside Flood Zones 2 and 3 associated with a tributary of the River Great Ouse to the south of the A421.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

Geomorphology, WFD and Water Quality

Table 4-12 shows the WFD operational catchments and WFD water body catchments which lie within Section B1-3.

**Table 4-12: WFD operational and WFD water body catchments within Section B1-3**
<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Great Ouse Upper</td>
<td>Horwood Tributary</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook (DS Granborough)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Padbury Brook (The Twins)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Padbury Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Beachampton Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook Tributary</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weald Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouse (Brackley to Buckingham)</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Ouzel and Milton Keynes</td>
<td></td>
<td>Ouzel US Caldecote Mill</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Newton Longville Brook</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Loughton Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Oxon Ray</td>
<td>Gubbinshole and Broadmoor ditch to Ray (Oxon)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ray and tributaries NorthEast of Grendon Underwood</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tetchwick Brook, Source to Ray and tribs</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td>Hardwick Brook (Source to Thame)</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fleet Marston Brook, Denham Brook, Pitchcott Brook west</td>
<td>Poor</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Groundwater**

Section B1-3:

- Crosses a limestone Principal bedrock aquifer (underlies less than 25% of the section)
- Crosses 3 Secondary A bedrock aquifers
• Crosses 3 Secondary A superficial deposit aquifers
• Contains 3 potential GWDTE
• Contains approximately 12 springs as marked on the OS 1:25,000 map

Section B1-4

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 4-13. There is one Main River within this section that has areas of Flood Zone 3b (functional floodplain):

• River Ouzel (a tributary of the River Great Ouse) – flows from south-west Leighton Buzzard through Milton Keynes where it joins the River Great Ouse.

Flood Zone 2 and 3 associated with the River Ouzel is moderate within this section.

Table 4-13 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.9</td>
<td>210.5</td>
<td>2.9</td>
<td>3.4</td>
</tr>
</tbody>
</table>

The detailed hydraulic model for Central Bedfordshire Council has been used to assess the potential future extent of Flood Zone 3 as a result of climate change (upper end, 65% climate change allowance has been assessed). In the absence of hydraulic modelling for all other areas the extent of Flood Zone 2 has been adopted to assess future Flood Zone 3 extent. The assessment identifies that there will be approximately 1% increase in the area identified as Flood Zone 3. The Flood Zone map indicates that areas in the outskirts of Bletchley are likely to be within a greater risk from fluvial flooding over the lifetime of the development.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 2.2% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 4.2% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASTGWF dataset indicates that the predicted risk of groundwater flooding varies
across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 20% of the study area is within an area of medium to high risk (see Table 4-14).

**Table 4-14 Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>6.2</td>
<td>• North Leighton Buzzard</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>13.5</td>
<td>• South-east of Bletchley</td>
</tr>
</tbody>
</table>

**Reservoir Failure**

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 4-15.

**Table 4-15 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows north through Milton Keynes Center where it continues to follow the River Great Ouse</td>
</tr>
<tr>
<td>2</td>
<td>Flows north east from Woburn towards the M1 where it continues to flow in parallel with the M1 where it continues to follow the River Ouzel</td>
</tr>
</tbody>
</table>

**Historic Flooding**

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA data set 2.5% of the study area has been recorded to have flooded historically. There are records of flooding outside of the existing Flood Zone 2 and 3 associated with the River Ouzel, identifying additional areas on the outskirts of Bletchley towards Leighton Buzzard to be at risk.

**Other Flood Sources**

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**
Table 4-16 shows the WFD operational catchments and WFD water body catchments which lie within Section B1-4.

**Table 4-16: WFD operational and WFD water body catchments within Section B1-4**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Ivel</td>
<td>Flit tributary</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Running Waters-Steppingley</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Great Ouse Upper</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouzel and Milton Keynes</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Broughton Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouzel US Caldecote Mill</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ledburn Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Newton Longville Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Loughton Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clipstone Brook Tributary</td>
<td>Good</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouzel (US Clipstone Brook)</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Thames</td>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td>Hardwick Brook (Source to Thame)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Section B1-4 also traverses 1 artificial WFD water body, the Grand Union Canal, Milton Keynes trough pound.

**Groundwater**

Section B1-4:

- Crosses a sandstone Principal bedrock aquifer (underlies 25% to 50% of the section)
- Crosses 1 Secondary A bedrock aquifer
- Crosses 3 Secondary A superficial deposit aquifers
- Contains 2 SPZ1s associated with licenced potable abstractions
- Contains 2 SPZ2s associated with licenced potable abstractions
- Contains 2 SPZ3s associated with licenced potable abstractions
- Contains 12 licensed groundwater abstractions
• Contains 3 potential GWDTE
• Contains approximately 9 springs as marked on the OS 1:25,000 map

4.2 Environmental assessment

4.2.1 Air quality

4.2.1.1 Key findings

Section B1-1

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section B1-1 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this section, this includes routes to the west of Abingdon and Oxford, and A34 north of Oxford.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes (A34 south of Oxford and B4017 north of Abingdon) could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

• The current PCM predictions indicate that concentrations in 2025 would not be in exceedance, although some links are elevated (west of Oxford). This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

• The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.8-22.2 μg/m$^3$), NO$_2$ (5.3-15.7 μg/m$^3$) and PM$_{10}$ (11.5-16.1 μg/m$^3$).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Oxford and Abingdon), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.
It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section B1-2

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section B1-2 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes the M40.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes through in and around Bicester could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.1-13.2 μg/m³), NO₂ (4.8-9.9 μg/m³) and PM₁₀ (11.0-15.9 μg/m³).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Bicester), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section B1-3

Basic Screening Exercise
Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section B1-3 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes the area to the north of Winslow.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate main routes through Winslow that could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- There are no PCM links within this section.
- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (5.8-10.3 μg/m³), NO₂ (4.6-7.8 μg/m³) and PM₁₀ (10.6—13.5 μg/m³).

Section Impacts

It is assumed that the benefits in some locations may be balanced by dis-benefits in similar locations with similar air quality concentrations, although traffic may be rerouted from the more densely populated areas (e.g. Winslow), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This may result in improvements in air quality concentrations at some sensitive receptors.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Overall the net effect on the corridor section is scored as neutral.

Section B1-4

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section B1-4 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this section, this includes the A4146 and A5.
Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes to the south of Milton Keynes could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).
- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.3-14.5 μg/m³), NO₂ (4.9-10.8 μg/m³) and PM₁₀ (11.0-16.4 μg/m³).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Milton Keynes), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Overall

The available information highlights the AQMAs within Corridor B1 (Oxford and Bicester), and the ongoing exceedances of the relevant AQOs. The corridor includes parts of large urban areas including Abingdon, Oxford, Bicester, Winslow and Milton Keynes, as well as a number of designated sites.

Corridor B1 has approximately 89,000 air quality sensitive receptors that could be impacted (both adversely and beneficially) by route options through this corridor. The monitoring exceedances within the AQMAs highlights the opportunity to reduce congestion in these areas and potentially improve air quality within the AQMAs.

### 4.2.1.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1-1</td>
<td>Avoidance of AQMAs (and journey re-routing through them).</td>
</tr>
<tr>
<td></td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
</tbody>
</table>
### 4.2.2 Noise and vibration

#### 4.2.2.1 Key findings

The effect of traffic noise on sensitive receptors is very sensitive to exact alignment, which is not known at this early stage of scheme development. The qualitative key findings for this study area are based on indicative predictions on how sensitive receptors could be impacted based on whether the ultimate route alignment is ‘on-line’ (following an existing main road) or ‘off-line’ (creating a new main road).

If the route alignment was to be ‘on-line’ for the relevant sections of the A34, the A41, the A420, and A4146 within the study area, then there is potential for sensitive receptors nearby to these roads (e.g. Abingdon, West Oxford, Chawley, Wytham, Wolvercote, Kidlington, Bicester, Bessels Leigh, Cumnor, Dean Court and Stoke Hammond), including a number of NIAs, to experience adverse noise impacts as traffic possibly moves closer, and/or traffic flows and speeds increase. Significant adverse effects are possible.

Should the route alignment move ‘off-line’ from the A34, the A41, the A420, and A4146, then sensitive receptors near these roads would have the potential to experience beneficial effects. The beneficial effects would be dependent on whether vehicles would be diverted away from the A34, the A41, the A420, and A4146, thus reducing the amount of traffic on those roads, with the ‘off-line’ alignment. Settlements set back from the A34 (i.e. Sunningwell, Wytham, Wolvercote, and Weston-on-the Green), the A41 (i.e. Grendon Underwood and Ludgershall), the A420 (i.e. Appleton and Wootton), and the A4146 (i.e. Little Brickhill and Great Brickhill) could be adversely affected should an ‘off-line’ route alignment be introduced near to such settlements.

The sensitive receptors located in the large rural areas where the route either would, or has the potential to be, ‘off-line’ may experience adverse effects due to the introduction of a new noise source. These include Shippon, Cothill, Wootton, Dry Sandford, Merton, Ambrosden, Blackthom, Arnott (including the army barracks), Bucknell, Marsh Gibbon, Twyford, Charndon, Calvert, Steeple Claydon, East Claydon, Addington, Winslow, Little Horwood, Mursley, Newton Longville, Water Eaton, Stoke Hammond, Great Brickhill, Woburn Sands, Aspley Guise, Cross End, Aspley Heath, Bow Brickhill, and Stewkley. This also includes numerous individual receptors throughout the rural areas. The ultimate route alignment is key in determining the potential effect for such receptors.

For the larger settlements of Abingdon, western fringe of Oxford, Bicester, Bletchley and the southeast of Milton Keynes, the sensitive receptors on the boundaries of these settlements could be adversely affected through the introduction of a new route. The effects would depend on the proximity of the route alignment to the settlement boundaries. The same sensitive receptors could potentially be beneficially affected if the route alignment bypasses the larger settlements. Similar effects could occur for the NIAs in the settlements.
The indicative traffic data shows potential noise benefits between Bicester and Buckingham along the A4421 and between Buckingham and Milton Keynes along the A421, resulting from possible reduction in traffic on these roads. In addition, potential noise benefits are observed on the A422 between both Buckingham to Brackley and Buckingham to Old Stratford, within Abingdon (B4017), around Bicester (A4095, B4100 and B4030), to the east of Leighton Buzzard (A4012 and A505), within Oxford (A4158 and A4495), and east of Milton Keynes (A421 and A4146), show potential noise benefits. Receptors located near to these roads, including a number of NIAs, could therefore potentially experience noise reductions from the corridor option.

The indicative traffic data shows potential adverse noise effects for the A338 (between A415 and A420), sections of the A420 west of Oxford, as well as on a number of minor roads on the road network. Receptors located near to these roads could experience noise increases from this corridor option.

The construction of a new or improved highway requires the use of noise and vibration emitting plant. Sensitive receptors that will be situated close to the ultimate route alignment would have the potential to be exposed to adverse noise and vibration impacts from such works. This would particularly apply to those receptors in proximity to potential ‘off-line’ carriageway alignments within rural areas that could be associated with Corridor B1 (i.e. between Abingdon and Oxford, Oxford and Bicester, and Bicester and Milton Keynes) where existing ambient noise and vibration levels are relatively low.

Sensitive receptors located adjacent to existing ‘on-line’ road sections where road widening would be likely as a result of the scheme (e.g. sections of the A34, A420, and A4146), would already be exposed to high ambient noise levels. Nevertheless, potential adverse effects may still be possible for nearby receptors.

Given the transient nature of the majority of the construction activities, any adverse noise and vibration effects experienced by sensitive receptors would be limited in duration. This reduces the potential for significant effects to arise. Nevertheless, any effects would be minimised through the use of specific mitigation measures and controlled via the relevant Local Authority’s Environmental Health departments.

4.2.2.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1-1</td>
<td>The typical mitigation measures that would be considered are as follows:</td>
</tr>
<tr>
<td></td>
<td>• Thin Surfacing (Low Noise Road Surfacing) – In accordance with HD 213/11, low noise surfacing provides a benefit, relative to traditional Hot Rolled Asphalt of 3.5 dB(A) at speeds of 75kph and above. Such a measure can be considered a holistic mitigation measure, as it reduces noise at source for the entire scheme.</td>
</tr>
<tr>
<td></td>
<td>• Noise Bunds and Noise Barriers – Earth bunds or noise barriers of sufficient length and height can provide attenuation above 10 dB(A). It is anticipated that such measures would be employed through the scheme, with noise barriers more likely at ‘on-line’ sections and within built-up areas, and bunds employed within the more rural areas.</td>
</tr>
<tr>
<td>B1-2</td>
<td></td>
</tr>
<tr>
<td>B1-3</td>
<td></td>
</tr>
</tbody>
</table>
Section B1-4

It is anticipated that all work would be undertaken to the guidance detailed in BS 5228: 2009+A1:2014 – Parts 1 and 2. These standards contain various measures to mitigate noise and vibration from construction works and centre around the principle of a ‘best practicable means’ approach.

4.2.3 People and communities

4.2.3.1 Key findings

For all sections there is potential for a new route to cause significant effects on sensitive receptors. Potential impacts include the loss of land and property for some residents, landowners and businesses and loss of amenity to local recreational assets (including PRoW) and communities from the introduction of new expressway infrastructure into areas that are currently relatively rural. Such impacts could give rise to effects on physical and mental health, access, land use and viability of businesses.

Section B1-1

Due to the number of settlements dispersed across the width of the corridor section and substantial ribbon development along roads to the west of Oxford and north-west of Abingdon, it is likely the development of a route in this area would likely result in some community severance. Loss of some best and most versatile agricultural land would also be likely for any route developed in this section.

Section B1-2

Potential routes would need to be aligned to the north or south of Bicester. Development of route in this section would likely result in the loss of some isolated residential properties, with consequent adverse wellbeing effects on individuals. Careful route alignment would avoid significant effects on existing communities.

Section B1-3

Development of route in this section would likely result in the loss of some isolated residential properties, with consequent adverse wellbeing effects on individuals. Careful route alignment would avoid significant effects on existing communities.

Section B1-4

This section is very constrained in the Woburn Sands area. Development of a route here would likely result in significant adverse effects caused by community severance and loss of amenity for local communities.

Overall

The spread of settlements on the north west outskirts of Oxford and again in the Woburn Sands area means that there is likely to be significant community severance from route options within this corridor, although the centre part of the corridor is relatively constraint free.
4.2.3.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1-1</td>
<td>Seek to avoid community severance. The number of settlements within relatively close proximity provide opportunity to enhance cycle network further through scheme design. National Cycle Network routes 5 and 51 are present, along with others in Abingdon and Oxford that could be linked into. Good route alignment is required to minimise impacts on agricultural viability, for example by maintaining tenable field sizes.</td>
</tr>
<tr>
<td>B1-2</td>
<td>Design to minimise disruption to local communities as far as practicable.</td>
</tr>
<tr>
<td>B1-3</td>
<td>Design to minimise disruption to local communities as far as practicable.</td>
</tr>
<tr>
<td>B1-4</td>
<td>Seek to avoid community severance. Should this not be achievable, then seek to build in cycle and pedestrian networks between communities severed by the new route, to create improved active travel opportunities between local community destinations. This could contribute to health benefits in the longer term.</td>
</tr>
</tbody>
</table>

4.2.4 Cultural heritage

4.2.4.1 Key findings

Section B1-1

The World Heritage Site of Blenheim Palace is located within 300 metres of the corridor boundary. The UNESCO listing for the site states that ‘the integrity of the property is well protected by its enclosing wall but important visual links do exist between the gates, the parkland buildings, buildings in the surrounding villages and landscape, and care needs to be taken to ensure these key visual links are protected’ (https://whc.unesco.org/en/list/425 [accessed 24/04/2018]). There is the potential for adverse effects to the setting of this asset through noise and visual intrusion during construction and operation and through the disruption of important views.

The Castle Mound at Fitzharris and the Ock Bridge scheduled monuments are within the town of Abingdon, and the North Hinksey conduit house, the Swing Bridge, Rewley Abbey, and the remains of Osney Abbey scheduled monuments are within the built up outskirts of Oxford. All are therefore unlikely to be situated within close proximity to any route for the Proposed Development. The setting of the Ock Bridge has views to the west over the Ock valley, however, the current A34 is not currently visible from this location and any development in this location would likely be online or offline further to the west. Therefore, there is likely to be no significant effects on these assets or on their settings. The Swinford Bridge is an isolated, discreet asset, in use as a crossing over the river Thames, and is also unlikely to be affected by the Proposed Development.

The majority of scheduled monuments in this area are relatively small and discreet, except the Port Meadow site which extends for almost 2.5 kilometres (1.5 miles) north to south. Although the location of a number of these assets would suggest that it is unlikely that they would be near enough to the Proposed Development for significant adverse effects to occur, in some areas the location of these assets would be difficult to avoid. In particular, the extensive Port Meadow site is just east of both the Godstow Abbey and Seacourt medieval settlement scheduled monuments. The Seacourt medieval settlement scheduled monument
is also currently dissected by the current A34. This means that the potential for both online and offline development is highly restricted in this area. It should also be noted that the presence of numerous settlement sites and a dense multi-period site dating back to the prehistoric period may be indicative of further associated unknown archaeological remains of high value outside of the scheduled area.

The setting of scheduled monuments may also be affected by noise and visual intrusion during construction and operation including:

- The Dovecote which is associated with the Grade I listed Rousham House and the Grade I Registered Park and Garden which comprises its grounds
- The views to the south from the hillfort at Bladon Heath

Many of the listed buildings within the B1.1 corridor are situated in small groups within towns and villages that provide some screening. There are also a large number of Grade II listed assets that are either independent or in small groups situated more rurally. The relatively high number of small conservation areas within this section is indicative of the density and spread of the historic built environment more generally. Specifically, the Oxford Canal Conservation Area runs for approximately 14.5 kilometres (9 miles) from north to south within the corridor and a significant effect on this asset would be difficult to mitigate. If the Proposed Development were to be offline, there would be the potential for a significant adverse impact on the setting of all of the listed buildings and Conservation Areas within the Section B1.1 corridor through noise and visual intrusion during construction and operation.

Any online development of the current A420 has the potential to impact upon 18 listed buildings (1 Grade II* and 17 Grade II) and 1 Conservation Area which are located within 250 metres of the existing road.

A cluster of 13 listed buildings (12 Grade II, 1 Grade II*) are located within 350 metres of the current A34 in an area where online development could be a possibility. In particular, the Grade II Manor Preparatory School and Manor Cottage, as well as the Grade II* listed barn associated with the Manor Preparatory School, are within 100 metres of the current A34 and, although they are currently well screened, there is the potential for significant effects to their setting from noise and visual intrusion during construction and operation of any online development. There are a further 25 listed buildings (1 Grade I, 4 Grade II*, and 20 Grade II) and 5 Conservation Areas within 300 metres of the current A34, most of which are located to the south of the A40 junction; there is the potential for significant effects to the setting of these assets through noise and visual intrusion during construction and operation of any online development.

The 190 listed buildings, 2 scheduled monuments, 1 Grade II Registered Park and Garden, and 2 Conservation Areas located within Abingdon are at least partially screened from new development, particularly if the route remains online with the current A34. However, there is still the potential for significant adverse effects on the setting of these assets through noise and visual intrusion during construction and operation.

The Grade I Registered Park and Garden at Rousham, which contains a total of 32 High value assets, is situated on the edge of this corridor and is unlikely to be directly affected by the Proposed Development. However, there is the potential for adverse effects on the setting of the assets through noise and visual intrusion during construction and operation broadly. Specifically, important views out from the property are predominantly those to the north and
east of the house, which should not be affected by the Proposed Development, with views to the south terminating with a rim of low, partly wooded hills approximately 2 kilometres away (https://historicengland.org.uk/listing/the-list/list-entry/1000107 [accessed 24/04/2018]). However, the rural setting more generally is also considered to be of significance and sensitive design in this area would be needed.

The Grade II* Registered Park and Garden at Worcester College is within the built up area along the edges of Oxford. It is well screened by trees and by railway infrastructure to the west. This asset is therefore unlikely to be situated within close proximity to any route for the Proposed Development and there is likely to be no significant effect on the setting of this asset.

Section B1-2

The Alchester Roman site scheduled monument is currently bisected by railway infrastructure and the associated parade ground, access road, and marching camp scheduled monument lies immediately to the southeast of Bicester. This is a large scheduled monument which is located very near to the current A41 and may therefore be adversely affected by both online or offline development in this area. Furthermore, the nature of this site indicates the potential for associated archaeological remains of High value to be found outside of the scheduled areas.

Similarly, the Wretchwick Deserted Medieval Settlement scheduled monument survives as earthworks just south of Langford Village and the current A4421 as two separated areas bisected by a current working farm. However, a much smaller area is included in the scheduling here than in the Alchester Roman site, and the location of the monument is such that only online development of the A4421 would be likely to have the potential for significant adverse effects on this asset. It should be noted that, due to the nature of settlement sites, there is the potential for associated archaeological remains of High value to be found outside of the scheduled areas.

As they are relatively discreet assets in locations that are unlikely to be within the Section B1-2 route alignment, the Proposed Development is unlikely to have a significant adverse effect on the Ambrosden churchyard cross scheduled monuments, or on the moated site at Stratton Audley, which is well screened by the current village. The Middleton Stoney motte and bailey castle was partially excavated in the 1970s and is located within the grounds of a Grade II Registered Park and Garden, both of which are factors that reduce the potential for adverse effects from the Proposed Development. Also the Saxon Barrow south of Middleton Stoney survives well as a clearly defined earthwork, partially excavated in 1974 as part of the Oxford Road development. The asset is discrete and could be easily avoided; however, due to its proximity to the current A4095, any online development has the potential to adversely affect the setting of this asset as well as associated archaeological materials.

RAF Bicester scheduled monument comprises eleven distinct scheduling areas; including structures such as bomb stores, air raid shelters, a hanger complex, and pillboxes. It is likely that any route within the section B1-2 corridor would have to be situated well to the north or south in order to bypass Bicester and would therefore be a suitable distance away from these scheduled areas. It is therefore unlikely that there would be a significant impact on this scheduled monument.

The majority of listed buildings within the B1-2 corridor are located in clusters away from the main roads in small towns and villages or within the centre of Bicester (comprising 114 listed...
buildings). Offline development to the north or south of Bicester has the potential for a significant effect on the setting of these assets through noise and visual intrusion; however, the spread and density of the assets is such that mitigation through design should be possible.

Online development is unlikely to significantly impact upon the majority of the listed buildings apart from:

- The Grade I listed Church of St Mary and the Grade II* listed Barn in Launton, which are both located on the northern edge of the village and west of Bicester, 250 metres from the current A4421
- 20 Grade II listed buildings and 1 Conservation Area associated with the RAF Bicester and bordering the A4421 just north of Bicester
- 14 Grade II listed buildings located within 250 metres of the current A41
- 1 Grade II listed building located within 50 metres of the current M40.

The Grade II Registered Middleton Park forms the setting for 11 listed buildings (1 Grade I, 3 Grade II*, and 7 Grade II). There is the potential for visual and noise intrusion on the setting of the buildings and the designated formal grounds during operation and construction of the Proposed Development.

Section B1-3

The scheduled monuments within the Section B1-3 corridor are primarily small and discrete. Although there is the potential for adverse effects on the assets and their settings, these could be avoided through careful design.

Most listed buildings in Section B1-3 are dispersed along the corridor as singular assets or in small groups and are typically situated within very small to small villages with limited screening. There is therefore a potential significant adverse effect due to noise and visual intrusion during construction and operation on the setting of these assets. The listed buildings are spread out evenly across the corridor; however, the density is such that mitigation through design may be possible.

The Grade I Registered Park and Garden of Wotton House has an avenue that extends into the corridor. A large part of the park is well screened by vegetation, and the majority of the registered land lies outside of the corridor; however, the park is purposely aligned with views of the forested areas of Tittershall and Grove Woods, which have a potential to be affected by the Proposed Development. Views to the north from the Park, into the corridor, are unscreened, and the Proposed Development has the potential for an adverse effect on the setting of the asset during construction and operation.

The Grade I Registered Park and Garden of Waddesdon Manor lies to the south of Section B1-3 within the 1km study area, and also has important views to the north which would extend to within the corridor itself. Sensitive design is required in order to not impact the setting of these High value assets.

Section B1-4

The Roman town of Magiovinium scheduled monument flanks the Roman Road of Watling street and is roughly bordered by the river Ouzel, the current A4146 and the current A5. The
nature of this site suggests the potential for further unknown archaeological remains of High value associated with this asset that lie outside of the scheduling boundary. Proposed Development online or offline within the vicinity of the A4146, and to the current roundabout would have a potential significant effect on this asset through the removal of archaeological deposits during construction.

‘The Hoult’ scheduled monument extends slightly into the Section B1-4 corridor from the south. It survives in earthwork form and is situated on open agricultural land. Surviving medieval and post-medieval cultivation earthworks in combination with moated sites are rare, and there is the potential for a significant adverse effect to this asset through the removal of scheduled archaeological remains.

The other scheduled monuments within the Section B1-4 corridor are located in positions that are unlikely to be situated within close proximity to the Proposed Development. There is therefore unlikely to be a significant effect on these assets; however, the Danesborough Camp hillfort is specifically located on a prominent hill and the setting of this asset may be significantly affected through noise and visual intrusion during construction and operation.

Sixty-four listed buildings within Section B1-4 are within the built up areas of Bletchley and Milton Keynes and are unlikely to be situated within close proximity to the Proposed Development. It is therefore unlikely that there would be a significant effect on the setting of these assets. The rest of the listed buildings within the corridor are located within small town and village Conservation Areas with a small number of assets situated independently in more rural settings. These assets have varying levels of screening from vegetation and neighbouring properties; however, there is potential for a significant adverse effect on the setting of these assets through noise and visual intrusion during construction and operation. The spread of the assets is such that mitigation through design should be possible; however, it may be more difficult within the northern section of the corridor where 4 Conservation Areas are situated linearly from east to west.

The Grade I Registered Park and Garden of Woburn Abbey extends a maximum of 750 metres into the B1-4 corridor. The park is bounded on the north by Turnpike Road, and is well screened in this area by dense vegetation. However, without further assessment of the potential noise and visibility of the Proposed Development it is not possible to completely rule out the potential for a significant adverse effect on the Registered Park and Garden and the associated designated asset through noise and visual intrusion during construction and operation.

Overall, due to the density of cultural heritage assets within Section B1-1 and the proximity of the Very High value Blenheim Palace, it may not be possible to mitigate the significant adverse effects on cultural heritage assets within Corridor B1.

4.2.4.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1-1</td>
<td>The World Heritage Site of Blenheim Palace is within the study area for Section B1-1 and, due to the Very High value of this asset, even a minor adverse impact to the setting of this asset, which includes long views, would be considered significant.</td>
</tr>
</tbody>
</table>
Design, mitigation and enhancement consideration for Stage 1B

In conjunction to this, there are a number of High and Medium value assets that have the potential to be significantly affected by both online or offline development; such as the Oxford Canal Conservation Area and the Port Meadow and Seacourt Medieval settlement scheduled monuments. Mitigation of these significant adverse effects may not be possible.

If archaeological remains cannot be avoided, a programme of archaeological investigation, recording, analysis, interpretation and dissemination would be required to mitigate any removal of archaeological deposits, and within scheduled monument boundaries this would require Scheduled Monument Consent from the Secretary of State.

B1-2

The route potential for this section is limited by the town of Bicester and, although the centre of this corridor has a high density of assets, there is the potential for a route to the north and south of the town that could mitigate the potential significant adverse effects.

Of particular note for Sections B1-2 and B1-3 is the Grade I Registered Park and Garden of Wotton House, which has an avenue that extends into the Section B1-3 corridor and noted views north and west into the section B1-2 corridor. Sensitive design would be required in order to not impact upon the views that lie outside of the registered area.

B1-3

The assets within Section B1-3 are evenly spread out across the corridor but are of a low enough density to allow for a route that could mitigate any potential significant adverse effects.

Of particular note for Corridors B1-2 and B1-3 is the Grade I Registered Park and Garden of Wotton House, which has an avenue that extends into Section B1-3 corridor and noted views into the section B1-2 corridor. The Section B1-3 study area also incorporates the Grade I Registered Park and Garden of Waddesdon Manor which also has important views to the north that extend into the corridor. Sensitive design would be required in order to not impact the setting of these High value assets.

B1-4

The assets within Section B1-4 are generally evenly spread out across the corridor and should allow for a route that could mitigate any potential significant adverse effects.

Of particular note for Corridor B1-4 is the Roman town of Magiovinium and Roman fort along the current A4146. Any online development would likely have a significant adverse effect on this asset through the removal of archaeological remains. There is also a density of cultural heritage assets within the north of the corridor including the Grade I Registered Park and Garden of Woburn Abbey, 4 Conservation Areas and 1 scheduled monument that are situated linearly from east to west and which may restrict the potential for suitable route options in this area; however, mitigation of potential significant adverse effects may still be possible.
4.2.5 Landscape and visual

4.2.5.1 Key findings

Section B1-1

A route developed in the western part of the corridor could affect views from and the setting of the Cotswolds AONB and Blenheim Palace RPG grade I and World Heritage Site. This impact could be compounded by potential restrictions on planting and mounding associated with Oxford Airport safeguarding area.

The eastern part of the corridor crosses areas of the floodplain west of Oxford and routes developed here would be likely to require extensive lengths of embankment or viaduct which would be highly visible in the landscape. There could potentially be secondary landscape impacts if borrow pits are needed to create embankments. There could also potentially be direct and indirect landscape and visual effects on areas of common land at Pixie Mead and Port Meadow; public parks and the setting of listed buildings and conservation areas.

Development or improvements of the existing route along the A34 could result in large adverse landscape and visual effects due to the close proximity of sensitive receptors and landscapes.

Section B1-2

There are potential large adverse impacts where the corridor crosses the low lying River Ray floodplain and Otmoor south of Bicester and any route developed here is likely to require extensive lengths of embankment or viaduct that could be at odds with the open landscape and highly visible. Additionally, there could potentially be secondary landscape impacts if borrow pits are needed to create embankments.

To the west of Bicester, the corridor is constrained by Middleton Park RPG grade II and a public park at Bignell Park. A route developed here could potentially affect the setting of and views from Middleton Park and on users of the public park.

Impacts on RAF Bicester from a route developed in this section would be difficult to mitigate due to the open character of the airfield. Restrictions may also apply to elements associated with the expressway such as the height of gantries; extent and height of lighting, and planting types to avoid conflict with aircraft.

Section B1-3

The southern part of this section is particularly sensitive. A route developed here could potentially result in direct impacts on the Quainton – Wing AAL or indirect impacts on the panoramic views from and the setting of the AAL. There could potentially be impacts on the network of ancient woodlands of Bernwood Forest to the west of the M40. It would be important to avoid impacts on the setting of and views from Wotton House RPG grade I, which lies partially within the corridor, and Waddesdon Manor RPG grade I, which lies just outside the corridor.

There are less landscape constraints to the north of the corridor. Routes developed here could potentially affect the setting of and views from Claydon RPG grade II and Claydon House; and also on the unregistered but attractive parkland at Addington Manor.
Section B1-4

The corridor crosses the Brickhills AAL which would be affected by routes developed in this section. Route alignments here would pass through the London Metropolitan green belt and may have an impact on its sense of openness. There is also the potential for direct and indirect impacts on Woburn Abbey RPG grade I including impacts on views and on its setting. There are extensive areas of heathland and woodland south of Aspley Heath which includes Woburn Golf Course that could be difficult to mitigate.

Whilst the woodland cover provides potential for screening there are numerous PRoWs in this area including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths.

The corridor passes to the south of the Lakes Estate on the southern edge of Milton Keynes. Whilst this area is already affected by the A4146, the development of an expressway route here could potentially increase visual impacts from signs and gantries and new junction arrangements.

Routes developed in this corridor would require grade separated junctions with the A5 and M1 and also need to cross a railway line, which would be likely to have landscape and visual impacts on residents and users of PRoW and open space. Between the A5 and M1 there are a number of constraints including numerous settlements some with conservation area status, extensive areas of heathland and woodland south of Aspley Heath and a number of golf courses.

Overall

Development of route options to the west of Corridor B1 would potentially result in large adverse effects on views from and the setting of the Cotswolds AONB and Blenheim Palace RPG grade I and World Heritage Site.

Routes that follow the existing A34 alignment would be constrained by the potential for direct and indirect landscape and visual effects on areas of common land at Pixie Mead and Port Meadow; public parks and the setting of listed buildings and conservation areas.

The southern part of Corridor B1 from south of Bicester through to Woburn is sensitive due to the topography, character and numerous designated constraints. Any route developed here could result in large adverse impacts associated with crossing the low lying River Ray floodplain and Otmoor. There would also potentially be direct and indirect impacts on the distinctively undulating Quainton–Wing AAL noted for its panoramic views. There would also be potential impacts on the networks of ancient woodlands around Bernwood Forest and Brickhills. Other sensitive constraints in this area include Wotton House RPG grade I and Waddesdon Manor RPG grade I where there is potential for significant adverse effects, particularly on views and setting.

There are less landscape constraints to the north of the corridor, although impacts on RAF Bicester would be difficult to mitigate due to the open character of the airfield. Within this area landscape and visual impacts are likely on the setting of and views from Middleton Park RPG grade II, Claydon RPG grade II and Claydon House; and also on the unregistered but attractive parkland at Addington Manor and publically accessible parkland at Bignell Park.

Any routes developed at the northern extent of the corridor would likely directly impact on the Brickhills AAL. In landscape terms, route options would preferably be located immediately...
adjacent to the edge of Milton Keynes to minimise the impact on the designated landscape. An eastern route would impact on the openness of the London Metropolitan green belt and potentially on the setting of Woburn Abbey, with the potential loss of extensive areas of heathland and woodland.

### 4.2.5.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1-1</td>
<td>Any routes that are developed off the existing A34 alignment are likely to be very difficult to mitigate. Even if the existing route along the A34 can be followed, large adverse landscape and visual effects would remain due to the close proximity of sensitive receptors and landscapes. Route selection should have consideration for avoiding views from and the setting of the Cotswolds AONB and Blenheim Palace RPG grade I and World Heritage Site. Careful consideration to be given to the location of gantries, lighting and signs to avoid additional visual impacts, particularly close to sensitive visual receptors. Further consideration should be given to the limitations on mounding and planting in the vicinity of Oxford Airport which potentially mean that route options to the west of the corridor cannot be mitigated. Investigate opportunities to improve mitigation for existing receptors through measures such as planting new wet woodland blocks and tree belts at appropriate locations. Such measures could include consideration of opportunities to improve public access and ecological connectivity.</td>
</tr>
<tr>
<td>B1-2</td>
<td>It would be very difficult to mitigate options that cross the floodplain south of Bicester and Otmoor. Explore options that closely align with the existing M40 and pass to the north of Bicester, avoiding key constraints including Middleton Park and Bignell Park.</td>
</tr>
<tr>
<td>B1-3</td>
<td>Investigate alignments to avoid Claydon RPG and Addington Manor - possibly south of Winslow. Avoid direct and indirect impacts on the Quainton - Wing AAL.</td>
</tr>
<tr>
<td>B1-4</td>
<td>Keep route options as close as possible to the existing A4146 corridor to minimise severance of and direct impacts on the Brickhills AAL and other constraints and sensitive visual receptors that are not currently affected by infrastructure. Consideration should be given to creating a buffer/visual screen to reduce visual impacts on residents south of Milton Keynes.</td>
</tr>
</tbody>
</table>

### 4.2.6 Nature conservation

#### 4.2.6.1 Key findings

For all sections, in addition to direct habitat loss, there is the potential for significant effects on key sensitive features through factors such as habitat fragmentation, air quality changes, hydrological changes, and increased disturbance from changes in noise, vibration and lighting levels. Designated sites lying outside the corridor boundary may potentially be
affected by noise and visual disturbance, and changes to air quality as a result of construction and operational phases, or if hydrologically sensitive and connected to areas affected by construction and operational effects. These indirect effects are most likely in the areas where the route alignment is most constrained by designated sites.

Section B1-1

Section B1-1 includes an almost continuous belt of designated land comprising Oxford Meadows SAC and 6 SSSI bisected by the existing A34 north west of Oxford. It is considered unlikely that any route alignment through this area would avoid direct habitat loss from these Tier I constraints.

In addition to direct habitat loss, and common to all of the designated sites identified in the study area, is the potential for significant effects via habitat fragmentation; air quality changes; hydrological changes; and increased disturbance from changes in noise, vibration and lighting levels. This is likely to be more of a risk for route alignment options in the areas south of the A40 compared to north where the area of land designated for nature conservation is less extensive.
Direct habitat loss from SSSI, LNR and AW should be avoidable through route alignment. However, direct loss of parts of one or more LWS appear to be more difficult to avoid through route alignment given the presence of Bicester, centrally within this section.

The designated areas, in particular SSSI, AW and LWS, are located such that direct habitat loss could be avoidable through appropriate route alignment. However, route alignment options are considered to be constrained by the extents of residential areas in this and the adjacent sections.

This section appears to be relatively constrained in terms of potential route alignment options given the extent of residential areas. It may be possible to avoid direct habitat loss from within SSSI, NNR and LNR, but the extent of LWS and AW are such that direct loss of habitats within these designations may not be possible to avoid.

The extensive area of Tier I constraints at the southern end of the corridor is considered to be unavoidable with limited or no mitigation measure likely to be possible. The remaining sections have less extensive designated area, although, in combination with the distribution of residential areas present, it may be difficult for a route alignment to avoid all Tier I constraints.

### 4.2.6.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1-1</td>
<td>Whilst mitigation may be possible to address significant adverse effects to European sites, this is the most sensitive section with the Stage 1A corridor appraisal and, on a precautionary basis, it has been assessed as potentially unmitigable.</td>
</tr>
<tr>
<td>B1-2</td>
<td>There is the potential to avoid habitat loss to key sensitive features through appropriate route alignment. Mitigation for other effects on key sensitive features could include creation of compensatory habitats.</td>
</tr>
<tr>
<td>B1-3</td>
<td></td>
</tr>
<tr>
<td>B1-4</td>
<td></td>
</tr>
</tbody>
</table>

### 4.2.7 Geology and soils

#### 4.2.7.1 Key findings

There is the potential for significant effects relating to SSSIs, however careful route selection could avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.
MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGA in one location spans two-thirds of the corridor width and so it is unlikely to be possible to route around this when taking into account other environmental discipline constraints. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere. A number of operational quarries are recorded within B1-1 and without adequate mitigation there is the potential for activities to be disrupted at these and extraction may be compromised, however route selection could avoid this. It may also be possible to expedite extraction of minerals in advance of the works, although this would need further consultation and assessment.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses, however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

Section B1-2

There is the potential for significant effects relating to SSSIs, however careful route selection could avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs in one location span two-thirds of the corridor width and so it is unlikely to be possible to route around this when taking into account other environmental discipline constraints. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere. An operational quarry is recorded within B1-2; without adequate mitigation there is the potential for activities to be disrupted here and extraction may be compromised, however route selection could avoid this. It may also be possible to expedite extraction of minerals in advance of the works, although this would need further consultation and assessment.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses, however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

Section B1-3

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the width of the corridor in several locations and so are unlikely to be avoidable. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.
There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses (namely Calvert landfill), however this could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

Section B1-4

There is the potential for significant effects relating to the NNR site, however careful route selection could avoid this. There is no other mitigation that could be applied as this feature is only valuable in its current location and condition.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the corridor width and it is therefore unlikely that routing to avoid these features would be possible. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses in particular Bletchley landfill, however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is generally considered possible in terms of engineering and remediation, however in the case of Bletchley this would be a significant constraint given that the landfill serves Milton Keynes and has planning permission until 2022.

Overall

There is the potential for significant effects relating to SSSIs and the NNR site, however careful route selection could avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the width of the corridor in several locations and so routing to avoid would not be possible. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere. A number of operational quarries are recorded within the Sections; without adequate mitigation there is the potential for activities to be disrupted at these and extraction may be compromised, however route selection could avoid this. It may also be possible to expedite extraction of minerals in advance of the works, although this would need further consultation and assessment.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses in particular Bletchley and Calvert landfills, however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is generally considered possible in terms of engineering and remediation, however in the case of Bletchley this would be a significant constraint given that the landfill serves Milton Keynes and has planning permission till 2022.
4.2.7.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1-1</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span two-thirds of the corridor width in one location, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>B1-2</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span two-thirds of the corridor width in one location, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>B1-3</td>
<td>MSGAs in this section cannot be avoided by route selection, however mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>B1-4</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span the corridor width, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills however Bletchley landfill may represent more of a constraint from a regulatory perspective.</td>
</tr>
</tbody>
</table>

4.2.8 Road drainage and the water environment

4.2.8.1 Key findings

Section B1-1

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas to the west of Oxford.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality
Section B1-1 has the potential for significant effects on 19 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B1-1 has the potential for significant effects on the water quality of 19 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Section B1-1 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and spring discharges.

**Section B1-2**

**Flood Risk**

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas to the south-east of Bicester.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

**Geomorphology, WFD and Water Quality**

Section B1-2 has the potential for significant effects on 12 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B1-2 has the potential for significant effects on the water quality of 12 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Section B1-2 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and spring discharges.
Section B1-3

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas to the south-east of Winslow.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality

Section B1-3 has the potential for significant effects on 10 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B1-3 has the potential for significant effects on the water quality of 10 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater

Section B1-3 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE and spring discharges.

Section B1-4

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas in the outskirts of Bletchley.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.
The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

**Geomorphology, WFD and Water Quality**

Section B1-4 has the potential for significant effects on 5 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B1-4 has the potential for significant effects on the water quality of 5 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Section B1-4 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing the two SPZ1s within this section.

**Overall**

**Flood Risk**

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

**Geomorphology, WFD and Water Quality**

Section B1 has the potential for significant effects on 37 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies.
bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B1 has the potential for significant effects on the water quality of 37 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Corridor B1 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing the two SPZ1s within this corridor.

### 4.2.8.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1-1</td>
<td><strong>Flood Risk</strong></td>
</tr>
<tr>
<td></td>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
</tr>
<tr>
<td></td>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
<td></td>
<td>• May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
</tr>
<tr>
<td></td>
<td>• Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.</td>
</tr>
<tr>
<td></td>
<td>• Groundwater mitigation may be required where groundwater flow paths are impeded.</td>
</tr>
<tr>
<td></td>
<td><strong>Geomorphology, WFD and Water Quality</strong></td>
</tr>
<tr>
<td></td>
<td>• Crossing of large WFD water bodies to be avoided through design (embedded mitigation).</td>
</tr>
<tr>
<td></td>
<td>• Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.</td>
</tr>
<tr>
<td></td>
<td>• Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.</td>
</tr>
<tr>
<td></td>
<td><strong>Groundwater</strong></td>
</tr>
<tr>
<td></td>
<td>• Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.</td>
</tr>
<tr>
<td></td>
<td>• Groundwater abstractions may require monitoring and possible replacement if they are impacted by works.</td>
</tr>
<tr>
<td></td>
<td>• Pollution prevention control measures during construction and operation would mitigate potential quality impacts.</td>
</tr>
</tbody>
</table>
### Design, mitigation and enhancement consideration for Stage 1B

#### B1-2 Flood Risk
- Crossings should be made at locations with the smallest floodplain width.
- There are areas of significantly small fluvial flood risk, to the north of Bicester, which should ideally be explored in the initial instance.
- A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.
- May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.
- Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.
- Groundwater mitigation may be required where groundwater flow paths are impeded.

**Geomorphology, WFD and Water Quality**
- Crossing of large WFD water bodies to be avoided through design (embedded mitigation).
- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.
- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.

**Groundwater**
- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- Groundwater abstractions may require monitoring and possible replacement if they are impacted by works.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.

#### B1-3 Flood Risk
- Crossings should be made at locations with the smallest floodplain width.
- A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.
- May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.
- Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.
- Groundwater mitigation may be required where groundwater flow paths are impeded.

**Geomorphology, WFD and Water Quality**
### Section Design, mitigation and enhancement consideration for Stage 1B

<table>
<thead>
<tr>
<th>B1-4</th>
<th>Flood Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Crossing of large WFD water bodies to be avoided through design (embedded mitigation).</td>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
</tr>
<tr>
<td>• Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.</td>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
<td>• Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.</td>
<td>• May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
</tr>
</tbody>
</table>

**Groundwater**

- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- If present, unlicensed groundwater abstractions may require monitoring and possible replacement if they are impacted by works.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.

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**Geomorphology, WFD and Water Quality**

- Crossing of large WFD water bodies to be avoided through design (embedded mitigation).
- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.
- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.

**Groundwater**

- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- Groundwater abstractions (including those for public supply) may require monitoring and possible replacement if they are impacted by works.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.
### 4.3 Assessment Summary

#### 4.3.1 Intervention objectives assessment

**Table 4-17 Intervention objective 1 assessment – B1**

<table>
<thead>
<tr>
<th>Discipline</th>
<th>B1-1</th>
<th>B1-2</th>
<th>B1-3</th>
<th>B1-4</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>For sections B1-1, B1-2 and B1-4, it is assumed that traffic could be rerouted from the more densely populated areas (e.g. Oxford, Abingdon, Bicester, Milton Keynes etc.), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations), and on this basis would be beneficial overall. For section B1-3 it is assumed that the benefits in some locations would likely be of broadly similar extent to dis-benefits in other locations and on this basis is assessed as neutral. Overall, provided that the expressway could be routed away from the more densely populated areas discussed above, it is expected that net community benefits in terms of air quality would be possible.</td>
</tr>
<tr>
<td>Noise and Vibration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Overall potential net beneficial effect having regard for: Benefits: • Potential noise benefits between Bicester and Buckingham along the A4421 and between Buckingham and Milton Keynes along the A421 resulting from possible reduction in traffic on these roads. • Potential noise benefits on the A422 between Buckingham and Brackley and Buckingham and Old Stratford resulting from possible reduction in traffic on this road. Disbenefits: • Potential increases in noise for receptors adjacent to possible ‘on-line’ sections (A34, A421 – east of M1) due to possible increased traffic and speeds and road widening.</td>
</tr>
</tbody>
</table>
### Potential for adverse changes in noise at sensitive receptors in rural areas where new offline sections could form part of a new route option.

- Potential for adverse noise and vibration impacts at sensitive receptors associated with construction and online widening.

### Sections B1-1 and B1-4 both have a number of relatively rural settlements which are dispersed across much of the width of the corridor section, including some ribbon development along minor roads likely to be crossed by potential route options. Therefore, these sections have been assessed as amber as there is a likelihood for adverse effects on wellbeing for residents of some of these communities. Potential community constraints in the Woburn Sands area near Milton Keynes (section B1-4).

### Corridor B1 has been scored neutral overall having regard for potential beneficial effects on air quality and noise set against potential adverse effects on people and communities which it is assumed would be reduced through careful route design.

### Table 4-18 Intervention objective 2 assessment – B1

<table>
<thead>
<tr>
<th>Discipline</th>
<th>B1-1</th>
<th>B1-2</th>
<th>B1-3</th>
<th>B1-4</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Heritage</td>
<td>Red</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Section B1-1 is particularly constrained. A route through the eastern part of the corridor (A34 online widening) would likely result in the loss of a scheduled monument located on either side of the existing A34 (Seacourt medieval settlement). A route any further east could impact on two other scheduled monuments (Godstow Abbey and ring ditches, barrows and associated enclosures at Port Meadow). A route slightly to the west could impact on a grade I listed building at Wytham. A route through the western part of B1-1 could result in unmitigable significant effects on the</td>
</tr>
</tbody>
</table>
## Rationale

<table>
<thead>
<tr>
<th>Discipline</th>
<th>B1-1</th>
<th>B1-2</th>
<th>B1-3</th>
<th>B1-4</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Landscape and Visual</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1 does not contain any Tier I landscape constraints. Routes developed on the western side of section B1-1 would likely impact on views from and the setting of the Cotswolds AONB and Blenheim Palace RPG grade I and World Heritage Site. With landscape in mind, any route through section B1-4 would preferably to go west of Great Brickhill, Little Brickhill and Bow Brickhill immediately adjacent to the edge of Milton Keynes to reduce the impact on the AAL designated landscape. The London Metropolitan green belt partially extends across section B1-4 although a route to the west of this section would avoid this.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nature Conservation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section B1-1 includes an almost contiguous belt of land containing Oxford Meadows Special Area of Conservation (SAC); Wytham Woods SSSI; Cassington Meadows SSSI; Pixey and Yarnton Meads SSSI; Wolvercote Meadows SSSI; Port Meadow with Wolvercote Common and Green, SSSI and Hook Meadow and The Trap Grounds SSSI. Any A34 online highways work adjacent to a SAC would have the potential for significant adverse effects, especially if works were outside the highways boundary. Increasing traffic flow along the existing alignment may also lead to adverse effects due to changes in air quality and/or hydrology. Any route through the western part of the corridor would likely have significant effects on</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Rationale

Section B1-2 – It is considered that there is sufficient flexibility in the corridor to potentially avoid significant adverse effects on nature conservation constraints.

Section B1-3 – it is considered that habitat loss within the SSSI may be avoidable through careful route alignment. However, it may not be possible for any route to completely avoid habitat loss in one or more LWS or Ancient Woodland given their location within the section, particularly in the vicinity of Sheephouse Wood SSSI and Finemere Wood SSSI.

Section B1-4 – it is considered that habitat loss from within SSSIs, the NNR and LNR should be avoidable through careful route alignment. However, habitat loss may be unavoidable from one or more LWS and/or Ancient Woodland given the extent of designated areas in the north east of the section.

### Geology and Soils

The corridor contains a large coverage of Mineral Safeguarding Areas (MSGA’s) which would be unavoidable.

There are a number of geological SSSI’s along the corridor but it is considered that it may be possible to avoid these constraints through careful route design.

King’s Wood and Rushmere National Nature Reserve (NNR) located in section B1-4 is of geological interest but with careful route design it may be possible to avoid significant adverse effects on this constraint.

The corridor contains a number of operational quarries, authorised landfills and potentially contaminated land. It is considered it may be possible to avoid these features through careful route design.

### Road Drainage and Water Environment

Section B1-1 would cross FZ3b areas at various intervals along the section, as the Thames, River Cherwell and tributaries are wide spread. If this corridor is taken forward,
## Disciplines

<table>
<thead>
<tr>
<th>Discipline</th>
<th>B1-1</th>
<th>B1-2</th>
<th>B1-3</th>
<th>B1-4</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Red</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Red</td>
<td>an extremely wide clear span crossing would likely be required (could be up to 2km in length in order to avoid FZ3b. Records of historical flooding from the River Thames also demonstrate that areas have been flooded outside of flood zones 2 and 3. Within sections B1-2 and B1-3, any option would cross much smaller areas of FZ3b. In section B1-2, there are areas of significantly small fluvial flood risk to the north of Bicester. Within section B1-4, it is highly likely that a crossing would need to be made over the River Ouzel floodplain.</td>
</tr>
<tr>
<td>Overall</td>
<td>Grey</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Red</td>
<td>Corridor B1 has been scored red because this corridor does offer sufficient flexibility to avoid all Tier I constraints.</td>
</tr>
</tbody>
</table>

### 4.3.2 Overall findings

**Table 4-19 Summary of B1 environment assessment**

<table>
<thead>
<tr>
<th>Score</th>
<th>Intervention objective 1</th>
<th>Intervention objective 2</th>
<th>Intervention objective 3</th>
<th>Strategic objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grey - neutral</td>
<td>Red – highly disadvantageous</td>
<td>Grey - neutral</td>
<td>Red – highly disadvantageous</td>
<td></td>
</tr>
</tbody>
</table>
5. Corridor B2

5.1 Baseline conditions

5.1.1 Air quality

Section B2-1

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs:** The B2-1 area includes Abingdon AQMA (central Abingdon), and the southern part of the Oxford AQMA. Both have been declared due to exceedances in NO₂.

- **Designated Sites:** This area includes Dry Sandford Pit SSSI, Barrow Farm Fen SSSI, Sugworth SSSI and Cothill Fen SSSI and SAC.

- **Residential Receptors:** Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Oxford, Abingdon, Radley and Sunningwell.

- **Sensitive Receptors:** Within the B2-1 boundary, there are approximately 17,000 potential air quality sensitive receptors.

- **Clean Air Zone:** The section is approximately 2km from the potential Oxford CAZ.

- **PCM Model:** Defra PCM links within this area have been identified on A415 and A4183 in Abingdon. Concentrations are elevated but not exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data:** The Vale of White Horse District Council has 18 NO₂ monitoring locations within B2-1, in and around the centre of Abingdon. The latest monitoring data indicates elevated NO₂ concentrations, with one exceedance on the A415, and concentrations close to exceeding within the existing AQMA area.

- **Defra Background Concentrations:** The Defra background maps indicate 2018 background concentrations across the B2-1 area (at 1km square intervals) are below the relevant AQOs for NOx (10.1-19.9 μg/m³), NO₂ (7.7-14.3 μg/m³) and PM₁₀ (12.2-15.6 μg/m³).

There is potential for air quality benefits at sensitive receptors in Oxford and Abingdon, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Potential to improve journey routing in this area to reduce congestion (and thus emissions) within Oxford, and potentially reducing air quality concentrations within the AQMA.
Section B2-2

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs:** The B2-2 area includes the south-eastern part of the Oxford AQMA, which has been declared due to exceedances in annual NO$_2$ concentrations.

- **Designated Sites:** The area includes Brasenose Wood and Shotover Hill SSSI, Littleworth Brick Pit SSSI, Lyehill Quarry, Holton Wood SSSI, Waterperry Wood SSSI, Stanton Great Wood SSSI, Holly Wood SSSI, Shabbington Woods Complex SSSI, Otmoor SSSI, Murcott Meadows SSSI, Whitecross Green and Oriel Woods SSSI, Muswell Hill SSSI, Arncott Bridge Meadows SSSI, Rushbeds Wood and Railway Cutting SSSI, Long Herdon Meadow SSSI.

- **Residential Receptors:** Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Blackbird Leys (Oxford), Toot Baldon, Horspath, Garsington, Wheatley, Stanton St John, Boarstall, Worminghall, Oakley, Horton-cum-Studley, Arncott, Piddington, Murcott, Ambrosden, Blackthorn, Ludgershall, Marsh Gibbon.

- **Sensitive Receptors:** Within the B2-2 boundary, there are approximately 13,000 potential air quality sensitive receptors.

- **Clean Air Zone:** The section is approximately 5km from the potential Oxford CAZ.

- **PCM Model:** There are no Defra PCM links within this area. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data:** South Oxfordshire District Council undertake NO$_2$ monitoring at one location within B2-2 area. The latest monitoring data indicates concentrations below the AQO.

- **Defra Background Concentrations:** The Defra background maps indicate 2018 background concentrations across the B2-2 area (at 1km square intervals) are below the relevant AQOs for NOx (8.0-31.1 μg/m$^3$), NO$_2$ (6.2-20.8 μg/m$^3$) and PM$_{10}$ (11.3-19.0 μg/m$^3$). The NOx background concentration is slightly above the AQO of 30 μg/m$^3$ (in the centre of Oxford), however, this applies to designated sites, and there are no sites within this 1km grid square.

There is potential for air quality benefits at sensitive receptors in Oxford, Wheatley, Arncott and Marsh Gibbon, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).
Section B2-3

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- AQMAs: No AQMA areas have been declared within the B2-3 boundary by either Aylesbury Vale District Council, Cherwell District Council or Milton Keynes Borough Council.

- Designated Sites: This broad area includes Ham Home-Cum-Hamgreen Woods SSSI, Grendon and Doddershall Woods SSSI, Finemere Wood SSSI, Sheephouse Wood SSSI.

- Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Twyford, Steeple Claydon, Calvert Green, Winslow, Swanbourne, Granborough, Mursley, Little Horwood, and Westcott.

- Sensitive Receptors: Within the B2-3 boundary, there are approximately 8,500 potential air quality sensitive receptors.

- Clean Air Zone: The section is approximately 22km from the potential Oxford CAZ.

- PCM Model: There are no Defra PCM links within this area. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: Aylesbury Vale District Council undertake NO2 monitoring at one location within B2-3 area. The latest monitoring data indicates concentrations below the AQO.

- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the B2-3 area (at 1km square intervals) are below the relevant AQOs for NOx (7.5-12.8 μg/m³), NO2 (5.8-9.7 μg/m³) and PM10 (11.0-13.9 μg/m³).

There is potential for air quality benefits at sensitive receptors in Westcott and Winslow, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Section B2-4

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- AQMAs: No AQMA areas have been declared within the B2-4 boundary by either Aylesbury Vale District Council, Central Bedfordshire Council or Milton Keynes Borough Council.

- Designated Sites: This broad area includes Pokers Pond SSSI, Nares Gladley Marsh SSSI, Kings and Bakers Woods and Heath SSSI, Wavendon Heath Ponds SSSI.
- Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Bletchley, Great Brickhill, Little Brickhill, Stoke Hammond, Aspley Heath, Woburn Sands, south Milton Keynes, Bow Brickhill, Drayton Parslow, Lakes Estate, Newton Longville.

- Sensitive Receptors: Within the B2-4 boundary, there are approximately 25,000 potential air quality sensitive receptors.

- Clean Air Zone: The section is approximately 37km from the potential Oxford CAZ.

- PCM Model: Defra PCM links within this area have been identified on the A4146 and A5. Concentrations are elevated (but not exceeding) in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: Milton Keynes Borough Council undertake NO2 monitoring at two locations within the B2-4 area. The latest monitoring data indicates concentrations below the AQO.

- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the B2-4 area (at 1km square intervals) are below the relevant AQOs for NOx (8.0-19.0 μg/m³), NO2 (6.2-13.8 μg/m³) and PM10 (11.4-16.8 μg/m³).

There is potential for air quality benefits at sensitive receptors in Milton Keynes and Bletchley, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

5.1.2 Noise and vibration

Within the Corridor B2 study area there are 96,694 dwellings and 1,637 other sensitive receptors. The Corridor B2 study area contains the large settlements of Abingdon, the south east fringe of Oxford, Bletchley and the southeast of Milton Keynes, as well as numerous smaller towns and villages.

It is expected that receptors in close proximity to major roads and within urban areas are subject to high noise levels dominated by road traffic. Within this corridor’s study area, a number of residential settlements exist in close proximity to the A34 (e.g. Abingdon and Shippon), A40 (e.g. Wheatley), A41 (e.g. Westcott), A413 (e.g. Winslow), A4146 (e.g. Stoke Hammond), A5 (e.g. Little Brickhill and A5130 (e.g. Woburn Sands). Other major roads within this corridor study area include the A4074, M1 and M40.

Receptors located in more rural settings are expected to have their noise environment consisting of more local sources such as agriculture activities, road traffic on minor roads, railways and aircraft flights. The Corridor B2 study area is largely a rural corridor with many settlements and individual dwellings where non-traffic noise sources are more likely to dominate the noise environment.

There are numerous railway lines running through the Corridor B2 study area that would contribute to the surrounding noise environment: the Cherwell Valley line, the London
Marylebone to Oxford line, the Manchester to Bournemouth line, the London to Birmingham line, the London to Aylesbury line, the West London Route and Marston Vale line. In addition, Luton and Heathrow Airport have several flight paths and stacking areas through the Corridor B2 study area. The study area also contains the Abingdon Airfield and two rural runways (one west of Marsh Gibbon and the Slay Barn airstrip south of Wheatley).

Numerous SSSIs exist within the corridor study area. These include Sugworth, Barrow Farm, Culham Brake, Dry Sandford Pit, Cothill, Shabbington Woods, Waterperry Wood, Nares Gladley Marsh and Poker’s Pond Meadow.

The Corridor B2 study area contains a total of 45 NIAs. Three NIAs exist adjacent to the A34 between Abingdon and Oxford, six along the A40, four on the A41, two on the A413, three on the A421 (two to the west of Milton Keynes and one close to the M1), three adjacent to the A5130, and one on the A5. The remainder of the NIAs are within or around Oxford, Abingdon, and Milton Keynes. Three NIAs are designated due to rail noise on the London to Birmingham railway south of Milton Keynes.

5.1.3 People and communities

Section B2-1

Abingdon is located in the south-west of the section, while the southern outskirts of Oxford (Blackbird Leys area) coincide with the northern edge of the section. Villages within the corridor section are Shippon, Gozzard’s Ford, Sunningwell, Cothill, Radley, Nuneham Courtenay and the Woodland/Pebble Hill/Bigwood mobile home estates north of Radley. The western edge of Abingdon is bounded by the A34 which is a busy dual carriageway.

There are areas of land allocated for development near Radley and the southern fringe of Oxford, while Dalton Barracks is used by the MOD and allocated for residential development in the emerging Vale of White Horse Local Plan.

In terms of recreation and open space, the Tilsley Park leisure complex abuts the eastern side of the A34 in Abingdon, while there are some areas of Local Green Space within some settlements, notably Chippinghurst. Radley College golf course (private). Bagley Wood provides an area for informal recreation.

In terms of education, health and other sensitive community receptors, the Manor Preparatory School, School of St Helen and St Katharine, Larkmead School, Church of St Mary Magdalene and Stowford House nursing home are within 250m of the A34. Radley College, with its extensive grounds, is within the centre of the corridor (there is also a primary school within the village of Radley).

There are patches of best and most versatile agricultural land in the southern parts of the section (some of which has already been lost to development as Abingdon has expanded).

Section B2-2

This large corridor section includes Greater Leys, Blackbird Leys and Sandhills which are part of the outskirts of Oxford in the south-western part. Villages within the corridor section include Toot Baldon, Garsington, Wheatley, Horspath, Stanton St John, Horton-cum-Studley, Oakley, Brill, Boarstall, Murcott, Arncott, Piddington, Ludgershall, Wotton Underwood,
Blackthorn, Ambrosden, Marsh Gibbon and Launton. The A40 forms a bypass for Wheatley, while the M40 and A41 also cross the corridor section.

The main development allocations are on the outskirts of Oxford (south-west part of the section), and Bicester (north-west part of section). There is also a small residential allocation on the edge of Ambrosden.

The north-east part of the section is constrained by some linear areas of registered common land (Oakley/Brill area), while a further patch of common land is within a large country park (Shotover Country Park) located between Oxford and Horspath. Several large areas of woodland throughout the northern half of the corridor section are likely to be used for informal recreational purposes. There are also large golf courses located south of Horton-cum-Studley (Studley Wood Golf Club) and Boarstall (Magnolia Park Golf Club), and further small formal recreational facilities located within and on the outskirts of settlements. There is designated Local Green Space within Marsh Gibbon in the north point of the section.

There are large areas of best and most versatile agricultural land extending across much of the southern half of the section.

Section B2-3

There are no large settlements within this corridor section, with the exception of the outskirts of Milton Keynes which impinge on the very northern part of the section. The largest settlement wholly within the corridor section is the small market town of Winslow which is relatively central within the corridor section. There are several villages dispersed throughout the corridor section.

There is land allocated for development on the outskirts of Winslow and the edge of Milton Keynes.

There is a cluster of woodlands to the east of the section corridor which are likely used for informal recreational purposes, which also serves as a hub in the local PRoW network. To the far north of the section corridor, Tattenhoe Park and Windmill Hill Golf Course lie adjacent to the A421 on the outskirts of Milton Keynes. There are six designated Local Green Spaces within Winslow and six designated greenspaces in and around Steeple Claydon, including land around St Michael's church cemetery on the south east edge of the village. Common land, allotments, playing fields and other cemeteries are largely within or close to the very edge of settlements.

There is very little best and most versatile agricultural land within the corridor section.

Section B2-4

The outskirts of Milton Keynes and Bletchley coincide with the north-west edge of the section. There are several villages dispersed throughout the corridor including Great Brickhill, Little Great Brickhill, Bow Brickhill, Woburn Sands, Drayton Parslow, Stoke Hammond, Aspley Guise, Stewkley and Soulbury. The A5 crosses the section, bypassing Little Brickhill. The A4146 also crosses the section and is a two lane dual carriageway bypassing Stoke Hammond. The majority of the villages in the section are relatively rural and away from major highway infrastructure.

The main development allocations are along the fringe of Milton Keynes.
Key areas of open space and recreation within the corridor section include part of Woburn Safari Park, located north west of Woburn, and Stockgrove Country Park, located on the northern outskirts of Leighton Buzzard. There are four golf courses: Three Locks (near Bragenham), Woburn, Aspley Guise and Woburn Sands Golf Club and Wavendon Golf Academy. Crawley Park is located between Aspley Guise and Ridgmont and Caldecotte Lake is located between Bletchley and Wavendon. Numerous small areas of playing fields within and on the outskirts of Milton Keynes and the smaller settlements. Extensive areas of woodland and heathland are present throughout the section and likely to be used for informal recreation (including King's Wood, Buttermilk Wood, Back Wood, Wavendon Wood and Wavendon Heath). There are several small areas of registered common land within or close to Stoke Hammond, Great Brickhill and Aspley Guise.

The Lindens Residential Care Home is located on Stoke Road between Bletchley and Stoke Hammond. St James's Church and Husborne Crawley Lower School are on the edge of Husborne Crawley. Otherwise, educational facilities, health care facilities and care/nursing homes are largely located within or in close proximity to existing settlement boundaries.

Land surrounding Milton Keynes, Bletchley and Newton Longville largely comprises best and most versatile agricultural land (although also coincides with land allocated for development, so it is likely to be lost in the future baseline situation).

5.1.4 Cultural heritage

Section B2-1

There are 42 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section B2-1 comprising:

- 8 scheduled monuments
- 9 Grade I listed buildings
- 24 Grade II* listed building
- 1 Grade I Registered Park and Garden

There are a further 400 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section B2-1 comprising:

- 390 Grade II listed buildings
- 9 Conservation Areas
- 1 Grade II Registered Park and Garden

Abingdon itself contains a large number of High value cultural heritage assets comprising scheduled monuments and Grade I and II* listed buildings. The majority of these assets are located relatively central within the built up area of the town; however, the 3 settlement site scheduled monuments located on the fringes of the town to the north east and across the A34 to the west are situated in a more open environment.
Grade I and Grade II* listed buildings are also located within the villages of Radley, Marsh Baldon, Sunningwell, St. Helen Without, Sandford-on-Thames, Kennington, and Littlemore.

The Grade I Registered Park and Garden of Nuneham Courtenay extends approximately 450 metres into the Section B2-1 corridor from the south; however, it is situated in a rural landscape on low, undulating hills with a steep slope towards its western boundary created by the River Thames. This situation creates important long views west towards Abingdon and north towards Oxford.

Section B2-2

There are 72 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section B2-2 comprising:

- 12 scheduled monuments
- 17 Grade I listed buildings
- 39 Grade II* listed buildings
- 2 Grade I Registered Park and Gardens
- 2 Grade II* Registered Parks and Gardens

There are 621 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section B2-2 comprising:

- 609 Grade II listed buildings
- 12 Conservation Areas

There are a number of smaller, discrete scheduled monuments dotted across this corridor comprising 2 Deserted Medieval Villages, 3 moated sites, 2 churchyard crosses, and earthworks and pottery kilns.

There are Grade I and Grade II* listed buildings situated in Stanton, Beckley and Stowood, Boarstall, Holton, Ludgershall, Wheatley, Brill, Horton-cum-Studley, Marsh Gibbon, Garsington, Toot Baldon, Horspath, Oakley, Piddington, Ambroden, and Cuddesdon.

Shotover Park Grade I Registered Park and Garden is situated centrally to the corridor and incorporates 43 listed buildings (1 Grade I, 5 Grade II*, and 37 Grade II). It is situated on the east side of Shotover Hill on gently undulating land, set within an agricultural landscape.

The Wotton House Grade I Registered Park and Garden is situated almost entirely within the Section B2-2 corridor, but extends across into Section B2-3. It incorporates 24 listed buildings (4 Grade I, 1 Grade II*, and 19 Grade II) and a large part of the park is well screened by vegetation; however, the park is purposely aligned with views of the forested areas of Tittershall and Grove Woods to the north and east.

The Grade II* Registered Park and Garden of Garsington Manor is much smaller in size. Again, the rural setting and long panoramic views to the south to the Wittenham Clumps on
the Sinodun Hills, and beyond these the Berkshire Downs in the far distance, contribute to the value of this asset.

Beckley Park Grade II* Registered Park and Garden is also smaller in size and is located in an area of low-lying marshy land. The wider setting remains agricultural and wooded.
Section B2-3

There are 59 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section B2-3 comprising:

- 11 scheduled monuments
- 9 Grade I listed buildings
- 37 Grade II* listed buildings
- 2 Grade I Registered Park and Garden

There are a further 573 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section B2-3 comprising:

- 553 Grade II listed buildings
- 19 Conservation Areas
- 1 Grade II Registered Park and Garden

The majority of scheduled monuments within this corridor are smaller, discrete assets located within rural, open settings. This includes a later Bronze Age to Early Iron Age hillfort, which is unusual for its location on a low lying plateau rather than a summit or a ridge, and medieval period moated sites, villages and settlements, fishponds, and a standing cross.

There are Grade I and Grade II* listed buildings in Middle Claydon, Quainton, Winslow, North Marston, Adstock, Twyford, Hillesden, Westcott, Hoggeston, East Claydon, Grendon Underwood, Mursley, Swanbourne, Steeple Claydon, Little Horwood, Granborough, Edgcott, and Addington.

The Grade I Registered Park and Garden of Wotton House extends slightly into the Section B2-3 corridor from Section B2-2. The park is purposely aligned with views towards Grove Wood to the east.

Section B2-4

There are 52 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section B2-4 comprising:

- 11 scheduled monuments
- 4 Grade I listed buildings
- 36 Grade II* listed buildings
- 1 Grade I Registered Park and Garden

There are a further 414 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section B2-4 comprising:

- 394 Grade II listed buildings
• 19 Conservation Areas

• 1 Grade II Registered Park and Garden

The Roman town of Magiovinium scheduled monument is situated on the edge of Bletchley and Fenny Stratford and is divided by the Roman Watling Street. It is roughly bounded by the current A4146 and A5. There are 2 further scheduled monuments, a medieval manor and a shrunken medieval village, within the constituent towns of Milton Keynes.

The Danesborough Camp hillfort and the Motte castle 200m south east of Wavendon Manor scheduled monuments both survive well archaeologically and are good examples of their class.

‘The Hoult’ scheduled monument survives in earthwork form and comprises a relatively large site which extends approximately 200 metres into the corridor and is situated on open agricultural land. There is also a more discrete moated site scheduled monument at Stewkley.

There are Grade I and Grade II* listed buildings in West Bletchley, Stewkley, Newton Longville, Aspley Guise, Bletchley and Fenny Stratford, Soulbury, Husborne Crawley, Wavendon, Drayton Parslow, Great Brickhill, Stoke Hammond, Ridgmont, Little Brickhill, Bow Brickhill, and Aspley Heath.

The Grade I Registered Park and Garden of Woburn Abbey extends a maximum of 750 metres into the B2-4 corridor. Woburn Abbey is a large and complex site which incorporates 61 listed buildings (7 Grade I, 6 Grade II*, and 48 Grade II) on its grounds; most of which lay outside of the Section B2-4 corridor and study area. The setting of the park is largely agricultural, with some areas of woodland and the villages lying close by. It is bounded to the southwest, northwest, and north by the current A4012 road where it is enclosed by high, red-brick walls.

5.1.5 Landscape and visual

Section B2-1

There are no designated landscapes in this section of the corridor, although there are a number of other designations that are relevant to landscape. These include Oxford green belt which, although green belts are not a landscape designation, they are relevant to LVIA due to the need to consider effects on its openness.

Also of relevance are Nuneham Courtenay and Marsh Baldon conservation areas and many listed buildings including Radley College.

The area is characterised by the low lying river Thames floodplain and there are significant areas of ancient woodland within it.

A golf course and playing fields are associated with and adjacent to Radley College.

Sensitive visual receptors include residents on the northern edge of Abingdon, Radley and other rural settlements along with isolated farmsteads and properties; users of PRoW including Thames Path national trail.
Section B2-2

This section includes part of Brill-Winchendon Hills AAL which is noted for its ‘undulating hills and ridges, with magnificent panoramic views across the strongly scenic and rural landscape. Together with the Quainton-Wing Hills they form a series of low, generally open limestone hills with hilltop settlements, between the foot of the Chilterns escarpment and the dip slope of the Cotswolds’.

Poundon Hill LLA lies within this section. It should, however, be noted that the updated Vale of Aylesbury Local Plan (2013 – 2033) Policies Map (November 2017), which has not yet been adopted, no longer shows Poundon LLA. This accords with the Defining the special qualities of local landscape designations in Aylesbury Vale District – Final Draft Report (LUC, March 2016) that forms part of the landscape supporting evidence, and which recommends the Poundon Hill LLA is not worthy of local landscape designation.

Other relevant designations include Oxford green belt, Wotton House RPG grade I, Shotover House RPG grade I, Shotover Country Park, Garsington, Wheatley, Forest Hill, and Stanton St. John conservation areas and many listed buildings.

Part of the area also includes the low lying River Ray floodplain and there are numerous blocks of ancient woodland.

Sensitive visual receptors include residents in villages and scattered properties including residents of Ambrosden and Blackthorn, and users of PRoW and Shotover Country Park.

Section B2-3

The Quainton-Wing AAL lies within the southern part of the corridor which is noted for its ‘Undulating hills and ridges with distant panoramic views across the strongly rural and picturesque landscape’ forming ‘a series of low, generally open limestone hills with hilltop settlements, between the foot of the Chilterns escarpment and the dip slope of the Cotswolds. The prominent hills form a backdrop to many views in the district. Nucleated villages create texture, a sense of history, variety and rhythm. The strong sense of history is present in the many conservation areas, scheduled monuments and landscape features such as ridge and furrow and irregular enclosed fields’.

Other relevant designations include Claydon RPG Grade II and Claydon House (NT); along with Middle Claydon, Addington, Winslow, Great and Little Horwood, Swanbourne, Mursley and Whaddon conservation areas and many listed buildings.

The area is dissected by the disused railway line that is the subject of the East-West Rail Proposals. There is also an area of unregistered but attractive parkland at Addington Manor equestrian centre.

Sensitive visual receptors include residents of the villages of Twyford, Steeple Claydon, Middle Claydon, Verney Junction, Addington, the urban edge of Winslow, Great and Little Horwood, Swanbourne, Mursley and Whaddon.

Section B2-4

The majority of the western part of this section lies within the Brickhills AAL with the exception of a narrow area of non-designated land adjacent to the urban edge of Milton.
Keynes. Brickhills AAL is noted for its ‘distinct landform with wooded scarp slopes and interspersed agricultural areas and heathland’, and ‘open and panoramic views from the hilltops across the landscape of the Vale of Aylesbury to the Quainton Wing hills’.

To the east the AAL shares a boundary with the London Metropolitan green belt that extends beyond the extent of the corridor.

Other important designations include Woburn Abbey RPG grade I to the east of the corridor and Woburn, Aspley Heath, Aspley Guise and Husborne Crawley conservation areas. There is also a small area of common land south of Great Brickhill and the area is crossed by numerous PRoW including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths.

There are significant areas of woodland south and east of Brickhill and east of Woburn Abbey which includes areas of ancient woodland.

The area south of Aspley Heath includes extensive areas of heathland and woodland and includes Woburn Golf Course. Stockgrove Country Park also features within the area.

Sensitive visual receptors include residents on the southern edge of Milton Keynes, particularly the Lakes Estate area; residents in the rural villages and individual houses; and also users of PRoW and Stockgrove Country Park.

### 5.1.6 Nature conservation

There is a high number of designated sites within corridor B2, with large areas of ancient woodland dominating the corridor between the A40 and M40 (section B2-2).

**Section B2-1**

The key sensitive features within the corridor are Cothill Fen SAC, 3 SSSI, 23 AW, and cluster of veteran trees associated with Radley College grounds. As in section A-1, only a very small section of Cothill Fen SAC and its constituent SSSI intersect the corridor, immediately west of Abingdon Airfield. Two small SSSIs are situated on the west and southern edge of the corridor, one within Abingdon Airfield and the second to the airfield’s south west corner. The main constraint within the section is AW associated with Bagley Wood on the northern edge of the corridor near Kennington.

With respect to Tier III sites, 1 LNR, 13 LWS and 1 Proposed LWS lie within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise Cothill Fen SAC and Oxford Fen SAC, 10 SSSI, and 1 NNR. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 40 AW, 1 LNR, 27 LWS and 8 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

**Section B2-2**

The key sensitive features within the corridor are 12 SSSI and 46 AW, the distribution of which make the area heavily constrained. A large wooded area within the centre of the section is designated as both SSSI and AW, associated with Holly Wood; Stanton Great
Wood; Holton Wood; Waterperry Wood; Hell Coppice and woodland to its north. Whitecross Green Wood and Rushbeds Wood lie further to the north and north east respectively.

Further SSSI on the western boundary of the section include those associated with Shotover Country Park and Otmoor. Areas of AW lie either side of the M40. When considered together, these designations make the area between the M40 and the A40 very heavily constrained.

With respect to Tier III sites, Otmoor RSPB reserve; 47 LWS and 5 Proposed LWS lie within the section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 16 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 63 AW, 3 LNR, Otmoor RSPB reserve, 66 LWS and 8 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section B2-3

The key sensitive features within the corridor are 4 SSSI and 49 AW. As in section B1-3, the majority of these sites are located in the south western extent of the section. The SSSI are associated with woodland: Finemere Wood; Doddershall Wood; Grendon Wood and Lee Wood. These woods, plus other adjacent woodlands, are also designated AW. Further areas of AW are located to the north east extent of the section, adjacent to, and south of, the A421. With respect to Tier III sites, there are 35 LWS within the section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 8 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 71 AW and 44 LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section B2-4

The key sensitive features within the corridor are 4 SSSI, 21 AW, and 1 NNR. As with section B1-4, the largest area of SSSI is associated with Kings Wood and is divided by the sections southern boundary. The other SSSI are much smaller in size and are located just south west of Kings Wood, west of the A4146, and within New Wavendon Heath. Kings Wood is also designated AW, as is Black Wood, and Buttermilk Wood, which are adjacent to New Wavendon Heath, itself having an area of designated AW although separated from the heath by the A5130. Duncombe Wood is separated from Buttermilk Wood by the A5. Together these designations form a dense distribution of constraints within the eastern side of this section.

With respect to Tier III sites, 1 LNR and 38 LWS lie within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 4 SSSI and 1 NNR. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 27 AW, 1 LNR and 56 LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.
5.1.7 Geology and soils

Section B2-1

The bedrock geology of Section B2-1 broadly comprises a geological succession of sandstones, mudstones and some limestone of decreasing age, gently dipping to the south-east, from the oldest Upper Jurassic Ancholme Group and Corallian limestones to the Lower Cretaceous Lower Greensand.

Sand and gravel of various formations and alluvium around the River Thames are the most common superficial deposits in Section B2-1, with head deposits more common east of the River Thames.

The sites of geological importance located within Section B2-1 are:

- Cothill Fen: this is a mixed biological and geological SSSI, which is in a favourable condition, the tip of which slightly extends into the southwest of Section B2-1. The SSSI supports nationally rare calcareous fen and moss-rich mire communities together with associated wetland habitats; palaeovegetation can be interpreted from peat samples. Cothill Fen is also designated as a SAC.

- Dry Sandford Pit: this mixed biological and geological SSSI is situated in the southwest of Section B2-1 and is in a favourable condition. A sequence of limestone rocks, formed during the Jurassic period in shallow coastal waters and containing fossil ammonites, is exposed at this site. The site is also designated as a LGS, the area of which is greater than the SSSI footprint.

- Sugworth: a geological SSSI in favourable condition sited adjacent to the A34 in the centre of Section B2-1. The site is designated for its rare inland interglacial sediments containing various fossil remains.

Two Oxfordshire MSGAs are located within Section B2-1: one for soft sand in the west (Corallian) and one for sharp sand and gravel in the east (superficial sand and gravel); the latter spans approximately two thirds of the corridor width.

The EA website identifies Radley PFA Lagoons as an authorised landfill which extends into Section B2-1, southeast of Radley.

The EA website also lists a number of relatively small historical landfills (the largest has a total area of approximately 5.74 ha), that are mainly in southwestern and central parts of Section B2-1. A detailed review of potentially contaminative land uses is not possible at this stage, but notable current and historical land uses include Abingdon Airfield/Dalton Barracks (a semi-active historical RAF site) and Oxford sewage treatment works.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA.

There are no active, dormant or historic mineral extraction sites recorded in the area based on BritPits data gained from the BGS.

Section B2-2
The bedrock geology of Section B2-2 again comprises a succession of sandstones, mudstones and some limestone of decreasing age, gently dipping to the south-east, with Upper Jurassic Ancholme Group present across much of the northern section, and Corallian limestones to the south and east. There are inliers of Great Oolite limestone in the north, and some outliers of Portland Group and Lower Cretaceous Wealden around Shotover and Muswell Hill.

Superficial deposits are absent from the majority of Section B2-2, but alluvium is present around watercourses such as the River Ray and River Thame with pockets of river terrace deposits, and head deposits common in the southwest.

The sites of geological importance located within Section B2-2 are summarised below:

- **Littleworth Brick Pit**: a geological SSSI in unfavourable recovering condition, situated to the south of the A40 in the south of the section. The site is famous for its ammonite faunas and offers an unrivalled section for the study of Kimmeridge Clay strata.

- **Lyehill Quarry**: a geological SSSI in favourable condition, north of the A40 in the south of the section. The quarries expose the most extensive sections in the Wheatley Limestone.

- **Muswell Hill**: a geological SSSI in favourable condition, in the north of the section. The site has considerable potential for research in Jurassic/Cretaceous dating and palaeoecology.

- **Shotover**: a relatively large LGS in the southwest of the section, at which Jurassic deposits can be found and the relationship between springs and permeability’s of strata is manifest.

- **Wheatley Recreation Ground**: a disused quarry south of the A40 designated as a LGS, where a rare exposure of Wheatley limestone is found.

It should be noted that not all data relating to LGS was available at the time of writing, however these will be available at Stage 1B.

The proposed Buckinghamshire MSGA seemingly in association with sand and gravel is present in the south and east of Section B2-2, spanning over two thirds of the corridor width at the eastern extent. There are no active, dormant or historical quarries recorded in the area.

The EA website identifies 4 relatively small (<5 ha) historical landfills are located in Section B2-2, the largest being near Wheatley. Other potentially contaminative current and historical land uses include RAF Oakley, Otmoor Range, Mini Plant Oxford, Graven Hill and Arncott Ordnance depots, Piddington Depot, St George’s Barracks, Pear Tree Farm and several sewage works.

One site determined as potentially contaminated land under Part IIA of the Environmental Protection Act 1990 is located in Stanton St John in the western centre of the section. The site is described as a former quarry but no further details have been found at the time of writing.
The Groundsure COMAH data show three historical NIHHS sites (two of which mostly overlap) are located to the west of the section. Two are for Cowley (gas) Holder Station but no details are available for the other site.

Section B2-3

The bedrock is composed mainly of mudstone, siltstone and sandstone of the Upper Jurassic Ancholme Group. At Quainton there is an isolated outlier of Late Jurassic Portland and Purbeck Group limestone, calcareous sandstone and interbedded mudstone.

Superficial deposits are mainly confined to northern and eastern parts of Section B2-3. They mainly comprise glacial and glaciofluvial sands, with alluvium present in association with watercourses in the north.

There are no sites of geological importance within Section B2-3, however it should be noted that information relating to LGS is not yet available; this will be available in Stage 1B.

Proposed Buckinghamshire MSGAs for sand and gravel are mapped across a large proportion of Section B2-3, spanning the width of the corridor in places. Two Milton Keynes MSGAs for sand and gravel are located in the north-eastern extent of the section.

One dormant quarry, Woodham Brickworks, mining clay and shale of the Weymouth Member is present in the southwest of the section. A historical quarry, Calvert Brickworks, which mined clay and shale of the Peterborough Member is located in the west of the section (and is now the site of Calvert Landfill).

The EA website identifies an authorised landfill named Calvert Landfill that is located in the west of the section. The EA website also lists several historical landfills within Section B2-3, with the largest not far to the northwest of the authorised Calvert Landfill.

Other potentially contaminative current and historical land uses include RAF Little Horwood and a large (approximately 7 ha) electricity grid substation. Although not shown in Groundsure data, a former RAF airfield, RAF Westcott, was located in the southern extents of Section B2-3. An historical COMAH site is also listed at this location against British Aerospace Ro Plc.

The Groundsure COMAH data show the Aylesbury Compressor Station historical NIHHS COMAH site is listed in the south-west of Section B2-3, the British Aerospace Westcott site is also a historical COMAH site which is located just beyond the study area at approximately 270m south of the corridor boundary.

Section B2-4

Bedrock geology in Section B2-4 comprises, mudstone, siltstone and sandstone of the Ancholme Group in the west and north of the section, and sandstone and mudstone of the Lower Cretaceous Lower Greensand Formation in the east to southeast.

Glacial till dominates the superficial geology in the west of Section B2-4, with glaciofluvial deposits also common. Alluvium and river terrace deposits surround the River Ouzel and Grand Union Canal. East of these watercourses, head deposits of clay, silt sand and gravel are common, as are glacial till, glaciofluvial deposits and chalky boulder clay in the north.
The King’s Wood and Rushmere NNR is located within the eastern centre of Section B2-4; north of Leighton Buzzard. The site lies on an unusual mixture of soils. Much of the wildlife interest is a result of the varied geology of the Lower Greensand and Boulder Clay, which produces different soil conditions for the various habitats. At the time of writing information relating to LGS was not yet available, however this will be available for Stage 1B.

A Milton Keynes MSGA for sand and gravel extends into the north of the section around Bletchley, with proposed Buckinghamshire MSGAs for sand and gravel to the south and the Bedfordshire MSGA for Woburn Sands south. Collectively, these areas span the width of the corridor. Another Bedfordshire MSGA for Woburn Sands is present in the northeast of the section and a Bedfordshire MSGA for river valley/glacial sand and gravel extends approximately 10m into the section within the north.

An active quarry is recorded named Bletchley Rail Depot to the northwest of the section. This is recorded in BritPits data as an active quarry however it is expected that this is associated with transport of crushed limestone resources rather than actual quarrying. Rammanere Heath, a dormant quarry within the Woburn Sands Formation, is located in the east of the section.

The EA website identifies 4 authorised landfills that are located within the study area for Section B2-4: Bletchley Landfill located in the northwest, and Rislip Farm located in the south. Sheepcote and Stone Lane Quarry are located adjacent the corridor boundary. Bletchley Landfill is significant in size and currently serves Milton Keynes with planning permission till 2022.

The EA website also lists a number of historical landfills in Section B2-4, that are distributed across the section and with the largest surrounding the authorised Bletchley Landfill. Other potentially contaminative current and historical land uses include brick works, industrial estates and a rifle range.

A site formerly determined as contaminated land under Part IIA of the Environmental Protection Act 1990 is located within the northwest of the section at Buckingham House in Bletchley. The contamination was caused by a heating oil leak from underground pipework but was remediated. Another site in Bletchley formerly determined as contaminated land under Part IIA is listed in George Street, caused by diesel leaking from a disused underground tank; the site has now been remediated.

A current COMAH site is located just outside of the study area (280m from the corridor boundary) registered to Evonik Goldschmidt UK, which is noted to be a Lower Tier Operator.

5.1.8 Road drainage and the water environment

Section B2-1

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3
associated with the watercourses in the study area, detailed in Table 5-1. There are rivers within this section that have significant areas of Flood Zone 3b (functional floodplain), including:

- River Thames - Flows south of Oxford and meanders around south-east of Abingdon where it then meanders back in easterly direction towards the A4074
- River Oak (a tributary of the River Thames) – flows north-easterly direction towards Abingdon central where it joins the River Thames.

Flood Zone 2 and 3 associated with the River Thames is extensive within this section.

**Table 5-1 Quantitative Analysis of Rivers and Fluvial Flood Risk**

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.0</td>
<td>94.0</td>
<td>8.0</td>
<td>10.9</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be an approximately 3% increase in the area identified as Flood Zone 3. The Flood Zone map indicates that areas in east of Abingdon are likely to be at greater risk from fluvial flooding over the lifetime of the development.

**Surface Water**

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 1.8% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 3.5% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

**Groundwater**

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASTGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 31% of the study area is within an area of medium to high risk (see Table 5-2).

**Table 5-2 Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
</table>
Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 5-3.

**Table 5-3 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Source</th>
<th>Flow Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmoor Reservoir</td>
<td>Flows south of Oxford and meanders around south-east of Abingdon</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of previous recorded flooding events from the sea, river, groundwater. According to the EA data set 8.3% of the study area has been recorded to have flooded historically. There are records of flooding outside of the existing Flood Zone 2 and 3 associated with the River Thames, identifying additional areas South of Oxford to be at risk.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

Geomorphology, WFD and Water Quality

Table 5-4 shows the WFD operational catchments and WFD water body catchments which lie within Section B2-1.

**Table 5-4: WFD operational and WFD water body catchments within Section B2-1**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames</td>
<td>Gloucestershire and the Vale</td>
<td>Ock</td>
<td>Northfield Brook (Source to Thames) at Sandford</td>
<td>Poor</td>
<td>Yes</td>
</tr>
</tbody>
</table>
## Groundwater

**Section B2-1:**

- Crosses 2 Secondary A bedrock aquifers
- Crosses 2 Secondary A superficial deposit aquifers
- Contains 2 licensed groundwater abstractions
- Contains 5 potential GWDTE
- Contains approximately 1 spring as marked on the OS 1:25,000 map

## Flood Risk

### Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 5-5. There are rivers within this section that have significant areas of Flood Zone 3b (functional floodplain), including:

- River Thame (a tributary of the River Thames) – flows south-west of the Wheatley Interchange and joins the River Thames at Dorchester-On-Thames
- River Ray (a tributary of the River Thames) – flows in a south-westerly direction from the A41 towards the south of M40
Flood Zone 2 and 3 associated with the River Thame and River Ray (including the Otmoor) is extensive within this section.

**Table 5-5 Quantitative Analysis of Rivers and Fluvial Flood Risk**

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>190.1</td>
<td>291.8</td>
<td>15.2</td>
<td>18.1</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 3% increase in the area identified as Flood Zone 3. The Flood Zone map indicates that areas in south-east Bicester are likely to be within a greater risk from fluvial flooding over the lifetime of the development.

**Surface Water**

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 4.2% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 7.6% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

**Groundwater**

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASTGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 19% of the study area is within an area of medium to high risk (see Table 5-6).

**Table 5-6 Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
</table>
| High (> 75%) | 9.8 | • South east of Oxford  
• Settlements near to the River Thame i.e. Ickford  
• Settlements near River Ray i.e. Merton |
| Medium (50 – 75%) | 9.7 | • Settlements near to the River Thame i.e. Worminghall  
• Settlements near River Ray i.e. Blackthorn |

**Reservoir Failure**
EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 5-7.

**Table 5-7 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Flows west from Wilstone Reservoir past north-Aylesbury heading south-west towards Thame. It then flows past the M40 and heads in a south-westerly direction towards Warborough.</td>
<td></td>
</tr>
<tr>
<td>2  Flows from North Dorton along the A41 down to Lower Arncott</td>
<td></td>
</tr>
</tbody>
</table>

**Historic Flooding**

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA data set 3.6% of the study area has been recorded to have flooded historically. There are no records of flooding to have occurred outside of the existing Flood Zone 2 and 3.

**Other Flood Sources**

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**

Table 5-8 shows the WFD operational catchments and WFD water body catchments which lie within Section B2-2.

**Table 5-8: WFD operational and WFD water body catchments within Section B2-2**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Great Ouse Upper</td>
<td>Padbury Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Cherwell</td>
<td>Cherwell (Ray to Thames) and Wood Eaton Brook</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bayswater Brook</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oxon Ray</td>
<td>Gubbins hole and Broadmoor ditch to Ray (Oxon)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Groundwater

Section B2-2:

- crosses 4 Secondary A bedrock aquifers
crosses 2 Secondary A superficial deposit aquifers
contains 10 potential GWDTE
contains approximately 43 springs as marked on the OS 1:25,000 map

Section B2-3

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 5-9. There are rivers within this section that have significant areas of Flood Zone 3b (functional floodplain), including:

- River Ray (a tributary of the River Thames) – flows in a south-westerly direction from the A41 towards the south of M40
- Padbury Brook (a tributary of the River Great Ouse) – flows in south-easterly direction from the A421, near M40 J10. It then meanders and heads north towards Buckingham before joining the River Great Ouse
- Claydon Brook (a tributary of the River Great Ouse) – flows in a south-westerly direction past the A413, joining the Padbury Brook
- River Thame (tributaries) – flow south-east joining the River Thame running parallel to the A418.

Flood Zone 2 and 3 associated with the River Ray is extensive within this section.

Table 5-9 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>48.5</td>
<td>325.8</td>
<td>3.9</td>
<td>4.8</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 1% increase in the area identified as Flood Zone 3. The Flood Zone map indicates that areas in north-west of Winslow are likely to be within a greater risk from fluvial flooding over the lifetime of the development.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section...
identifies that 4.4% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 7.2% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASTGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 12% of the study area is within an area of medium to high risk (see Table 5-10).

Table 5-10 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>1.1</td>
<td>• No major settlements</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>11.1</td>
<td>• North-east of Winslow</td>
</tr>
</tbody>
</table>

Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 5-11.

Table 5-11 Reservoir Breach Extents

<table>
<thead>
<tr>
<th>Flow Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Flows from North Dorton along the A41 down to Lower Arncott</td>
</tr>
<tr>
<td>2 Flows north-east from Buckingham towards north-west of Milton Keynes, following the River Great Ouse.</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA data set 0.5% of the study area has been recorded to have flooded historically. There are records of flooding outside Flood Zones 2 and 3 associated with a tributary of the River Great Ouse to the south of the A421.

Other Flood Sources

HE565628-JAC-EGN-SCHW_MT-RP-LE-0009 | Rev P01
September 2018
The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**

Table 5-12 shows the WFD operational catchments and WFD water body catchments which lie within Section B2-3.

**Table 5-12: WFD operational and WFD water body catchments within Section B2-3**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Great Ouse Upper</td>
<td>Horwood Tributary</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook (DS Granborough)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Padbury Brook (The Twins)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Padbury Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Beachampton Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook Tributary</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weald Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouse (Brackley to Buckingham)</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Ouse and Milton Keynes</td>
<td></td>
<td>Ouzel US Caldecote Mill</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Newton Longville Brook</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Loughton Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Oxon Ray</td>
<td>Gubbins hole and Broadmoor ditch to Ray (Oxon)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ray and tributaries NorthEast of Grendon Underwood</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tetchwick Brook, Source to Ray and tribs</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td>Hardwick Brook (Source to Thame)</td>
<td>Moderate</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fleet Marston Brook, Denham Brook, Pitchcott Brook west</td>
<td>Poor</td>
<td>Yes</td>
</tr>
</tbody>
</table>
River Basin District | WFD Management Catchment | WFD Operational Catchment | WFD Water Body Catchment | WFD Water Body Status (Cycle 2, 2016) | Large WFD Water Body Crossing
--- | --- | --- | --- | --- | ---
 | | | Dorton, Chearsley and Waddesdon Brooks | Poor | No

**Groundwater**

**Section B2-3:**

- Crosses 3 Secondary A bedrock aquifers
- Crosses 3 Secondary A superficial deposit aquifers
- Contains 3 potential GWDTE
- Contains approximately 12 springs as marked on the OS 1:25,000 map

**Section B2-4**

**Flood Risk**

**Fluvial**

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 5-13. There is one main river within this section that has significant areas of Flood Zone 3b (functional floodplain):

- River Ouzel (a tributary of the River Great Ouse) – flows from south-west Leighton Buzzard through Milton Keynes where it joins the River Great Ouse.

Flood Zone 2 and 3 associated with the River Ouzel is relatively small within this section.

**Table 5-13 Quantitative Analysis of Rivers and Fluvial Flood Risk**

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.9</td>
<td>210.5</td>
<td>3.9</td>
<td>4.8</td>
</tr>
</tbody>
</table>

The detailed hydraulic model for Central Bedfordshire Council has been used to assess the potential future extent of Flood Zone 3 as a result of climate change (upper end, 65% climate change allowance has been assessed). In the absence of hydraulic modelling for all other areas the extent of Flood Zone 2 has been adopted to assess future Flood Zone 3 extent. The assessment identifies that there will be approximately 1% increase in the area identified.
as Flood Zone 3. The Flood Zone map indicates that areas in the outskirts of Bletchley are likely to be within a greater risk from fluvial flooding over the lifetime of the development.

**Surface Water**

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 2.2% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 4.2% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

**Groundwater**

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASTGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 20% of the study area is within an area of medium to high risk (see Table 5-14).

**Table 5-14 Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>6.1</td>
<td>• North Leighton Buzzard</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>13.5</td>
<td>• South-east of Bletchley</td>
</tr>
</tbody>
</table>

**Reservoir Failure**

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 5-15.

**Table 5-15 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Flows north through Milton Keynes Center where it continues to follow the River Great Ouse</td>
</tr>
<tr>
<td>2 Flows north east from Woburn towards the M1 where it continues to flow in parallel with the M1 where it continues to follow the River Ouzel</td>
</tr>
</tbody>
</table>
Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA data set 2.5 % of the study area has been recorded to have flooded historically. There are records of flooding outside of the existing Flood Zone 2 and 3 associated with the River Ouzel, identifying additional areas on the outskirts of Bletchley towards Leighton Buzzard to be at risk.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

Geomorphology, WFD and Water Quality

Table 5-16 shows the WFD operational catchments and WFD water body catchments which lie within Section B2-4.

### Table 5-16: WFD operational and WFD water body catchments within Section B2-4

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Ivel</td>
<td>Flit tributary</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Running Waters-Steppingley</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Great Ouse Upper</td>
<td>Claydon Brook</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ouzel and Milton Keynes</td>
<td>Broughton Brook</td>
<td>Poor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ouzel US Caldecote Mill</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ledburn Brook</td>
<td>Moderate</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Newton Longville Brook</td>
<td>Poor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loughton Brook</td>
<td>Moderate</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clipstone Brook Tributary</td>
<td>Good</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ouzel (US Clipstone Brook)</td>
<td>Moderate</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Thames</td>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td>Hardwick Brook (Source to Thame)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Section B2-4 also traverses 1 artificial WFD water body, the Grand Union Canal, Milton Keynes trough pound.
Groundwater

Section B2-4:

- Crosses a sandstone Principal bedrock aquifer (underlies 25 to 50% of the section)
- Crosses 1 Secondary A bedrock aquifer
- Crosses 3 Secondary A superficial deposit aquifers
- Contains 2 SPZ1s associated with licenced potable abstractions
- Contains 2 SPZ2s associated with licenced potable abstractions
- Contains 2 SPZ3s associated with licenced potable abstractions
- Contains 9 licensed groundwater abstractions
- Contains 3 potential GWDTE
- Contains approximately 9 springs as marked on the OS 1:25,000 map

5.2 Environmental assessment

5.2.1 Air quality

5.2.1.1 Key findings

Section B2-1

Basic Screening Exercise

Based on a review of provisional traffic data, an assessment of the changes in AADT traffic within corridor section B2-1 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link).

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes through Abingdon could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information
The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

The projected Defra background concentrations for 2025 do not identify exceedances in NOx (7.9-15.8 μg/m³), NO₂ (6.1-11.7 μg/m³) and PM₁₀ (11.8-15.2 μg/m³).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Oxford and Abingdon), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section B2-2

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section B2-2 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). In this corridor section, this includes road links around Oxford.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- There are no PCM road links in this area.
- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.1-26.6 μg/m³), NO₂ (4.8-18.3 μg/m³) and PM₁₀ (10.9-18.7 μg/m³).

Section Impacts

It is assumed that the benefits in some locations may be balanced by dis-benefits in similar locations with similar air quality concentrations, although traffic may be rerouted from the
more densely populated areas (e.g. Oxford and Bicester), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This may result in improvements in air quality concentrations at some sensitive receptors.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed. On this basis, the corridor section has been assessed as neutral.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section B2-3

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section B2-3 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). In this section, this includes road links north of Winslow.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate main routes through Winslow that could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- There are no PCM road links in this area.
- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.3-14.5 μg/m³), NO₂ (4.9-10.8 μg/m³) and PM₁₀ (11.0-16.4 μg/m³).

Section Impacts

It is assumed that the benefits in some locations may be balanced by dis-benefits in similar locations with similar air quality concentrations, although traffic may be rerouted from the more densely populated areas (e.g. Buckingham, Winslow and Aylesbury), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This may result in improvements in air quality concentrations at some sensitive receptors.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road.
alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed. On this basis, the corridor section has been assessed as neutral.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section B2-4

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section B2-4 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). In this corridor section, this includes road links on the A4146 and A5.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate main routes to the south of Milton Keynes that could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.3-14.5 μg/m³), NO₂ (4.9-10.8 μg/m³) and PM₁₀ (11.0-16.4 μg/m³).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Milton Keynes), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.
Overall

The available information highlights the AQMAs within Corridor B2 (Abingdon, and Oxford), and the ongoing exceedances of the relevant AQOs. The corridor includes parts of large urban areas including Abingdon, Oxford, Bicester, Winslow and Milton Keynes, as well as a number of designated sites.

Corridor B2 has approximately 58,000 air quality sensitive receptors that could be impacted (both adversely and beneficially) by route options through this corridor. The monitoring exceedances within the AQMAs highlights the opportunity to reduce congestion in these areas and potentially improve air quality within the AQMAs.

5.2.1.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2-1</td>
<td>Avoidance of AQMAs (and journey re-routing through them).</td>
</tr>
<tr>
<td></td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
<tr>
<td>B2-2</td>
<td>Avoidance of AQMAs (and journey re-routing through them).</td>
</tr>
<tr>
<td></td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
<tr>
<td>B2-3</td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
<tr>
<td>B2-4</td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
</tbody>
</table>

5.2.2 Noise and vibration

5.2.2.1 Key findings

The effect of traffic noise on sensitive receptors is very sensitive to exact alignment, which is not known at this early stage of scheme development. The qualitative key findings for this study area are based on indicative predictions on how sensitive receptors could be impacted based on whether the ultimate route alignment is ‘on-line’ (following an existing main road) or ‘off-line’ (creating a new main road).

If the route alignment was to be ‘on-line’ for the relevant sections of the A34 and A4146 within the study area, then there is potential for sensitive receptors nearby to these roads (e.g. Abingdon, Shippon and Stoke Hammond), including a number of NIAs, to experience adverse noise effects as traffic possibly moves closer, and/or traffic flows and speeds increase. Significant adverse effects are possible.

Should the route alignment move ‘off-line’ from the A34 and A4146, then sensitive receptors near these roads would have the potential to experience beneficial effects. The beneficial effects would be dependent on whether vehicles would be diverted away from the A34 and A4146, thus reducing the amount of traffic on those roads, with the ‘off-line’ alignment. Settlements set back from the A34 (i.e. Sunningwell and Bayworth) and the A4146 (i.e. Little Brickhill and Great Brickhill) could be adversely affected should an ‘off-line’ route alignment be introduced near to such settlements.

The sensitive receptors located in the large rural areas where the route either would, or has the potential to be, ‘off-line’ may experience adverse effects due to the introduction of a new noise source. These include Little London, Radley, Sandford-on-Thames, Blackbird Leys,
Garsington, Horspath, Littleworth, the west side of Wheatley, Forest Hill, Stanton St John, Horton-cum-Studley, Arnott (including nearby army barracks), Ambrosden, Blackthorn, Marsh Gibbon, Launton, Twyford, Charndon, Calvert, Steeple Claydon, East Claydon, Addington, Winslow, Little Horwood, and Mursley. This also includes numerous individual receptors throughout the rural areas. The ultimate route alignment is key in determining the potential effect for such receptors.

For the larger settlements of Abingdon, eastern fringe of Oxford, Bicester, Bletchley and the southeast of Milton Keynes, the sensitive receptors on the boundaries of these settlements could be adversely affected through the introduction of a new route. The effects would depend on the proximity of the route alignment to the settlement boundaries. The same sensitive receptors could potentially be beneficially affected if the route alignment bypasses the larger settlements. Similar effects could occur for the NIAs in the settlements.

The indicative traffic data shows potential noise benefits between Bicester and Buckingham along the A4421 and between Buckingham and Milton Keynes along the A421, resulting from possible reduction in traffic on these roads. In addition, potential noise benefits are observed between Abingdon and Thame (A415, B4015 and the A329) resulting from possible reductions in traffic on these roads. Furthermore, several roads to the east of Leighton Buzzard (A4012 and A505), within Oxford (A4142 and B4495), east of Milton Keynes (A4146 and A421), within Aylesbury (town centre roads) and Bicester (A4095, B4100 and B4030) show potential noise benefits. Receptors located nearby to these roads, including a number of NIAs, could therefore potentially experience noise reductions from the corridor option.

The indicative traffic data shows potential adverse noise effects for a number of minor roads on the road network. Receptors located nearby to these roads could experience noise increases from this corridor option.

The construction of a new or improved highway requires the use of noise and vibration emitting plant. Sensitive receptors that will be situated close to the ultimate route alignment would have the potential to be exposed to adverse noise and vibration impacts from such works. This would particularly apply to those receptors in proximity to potential ‘off-line’ carriageway alignments within the large rural areas that could be associated with Corridor B2.

Sensitive receptors located adjacent to existing ‘on-line’ road sections where road widening would be likely as a result of the scheme (e.g. sections of the A34 and A4146), would already be exposed to high ambient noise levels. Nevertheless, potential adverse impacts may still be possible for nearby receptors.

Given the transient nature of the majority of the construction activities, any adverse noise and vibration impacts experienced by sensitive receptors would be limited in duration. This reduces the potential for significant effects to arise. Nevertheless, any impacts would be minimised through the use of specific mitigation measures and controlled via the relevant Local Authority’s Environmental Health departments.

### 5.2.2.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2-1</td>
<td>The typical mitigation measures that would be considered are as follows:</td>
</tr>
</tbody>
</table>
### Design, mitigation and enhancement consideration for Stage 1B

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2-2</td>
<td>Thin Surfacing (Low Noise Road Surfacing) – In accordance with HD 213/11, low noise surfacing provides a benefit, relative to traditional Hot Rolled Asphalt of 3.5 dB(A) at speeds of 75kph and above. Such a measure can be considered a holistic mitigation measure, as it reduces noise at source for the entire scheme.</td>
</tr>
<tr>
<td>B2-3</td>
<td>Noise Bunds and Noise Barriers – Earth bunds or noise barriers of sufficient length and height can provide attenuation above 10 dB(A). It is anticipated that such measures would be employed through the scheme, with noise barriers more likely at ‘on-line’ sections and within built-up areas, and bunds employed within the more rural areas.</td>
</tr>
</tbody>
</table>

It is anticipated that all work would be undertaken to the guidance detailed in BS 5228: 2009+A1:2014 – Parts 1 and 2. These standards contain various measures to mitigate noise and vibration from construction works and centre around the principle of a ‘best practicable means’ approach.

### 5.2.3 People and communities

#### 5.2.3.1 Key findings

For all sections there is potential for a new route to cause significant effects on sensitive receptors. Potential impacts include the loss of land and property for some residents, landowners and businesses and loss of amenity to local recreational assets (including PRoW) and communities from the introduction of new expressway infrastructure into areas that are currently relatively rural. Such impacts may give rise to effects on physical and mental health, access, land use and viability of businesses.

**Section B2-1**

There is potential loss of amenity and adverse effects on wellbeing for residents in communities close to where new highway infrastructure may be introduced, notably the Woodland, Pebble Hill and Bigwood park home estates and properties along Sugworth Lane (north of Radley).

A route in this area could potentially result in land-take from Radley College’s grounds and golf course.

Some loss of best and most versatile agricultural land is considered likely in this section.

**Section B2-2**

There is very limited scope to avoid constraints between Oxford and Wheatley. It is likely that there would be significant adverse effects including some community severance and loss of property associated with routes developed in this area.

Some loss of best and most versatile agricultural land is considered likely in this section.

**Section B2-3**

...
Development of route in this section would likely result in the loss of some isolated residential properties, with consequent adverse wellbeing effects on individuals. Careful route alignment would avoid significant effects on existing communities.

Section B2-4

This section is very constrained in the Woburn Sands area. Development of a route here would likely result in significant adverse effects caused by community severance and loss of amenity for local communities.

Overall

The constrained nature of the Wheatley and Woburn Sands areas means that there is likely to be significant community severance from route options within this corridor. However, throughout the rest of the corridor, significant community severance can be avoided.

5.2.3.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2-1</td>
<td>Select a route alignment that minimises impacts on nearby communities, whilst maintaining viability of recreational assets. Good route alignment is required to minimise impacts on agricultural viability, for example by maintaining tenable field sizes. Any proposed widening of the A34 or other existing roads should seek to avoid sensitive features such as playing fields and cemeteries.</td>
</tr>
<tr>
<td>B2-2</td>
<td>Selecting a route that passes east of Wheatley may mitigate significant severance. Potential to mitigate effects through good highway alignment, landscaping and noise abatement. Good route alignment is required to minimise impacts on agricultural viability, for example by maintaining tenable field sizes.</td>
</tr>
<tr>
<td>B2-3</td>
<td>Potential to mitigate effects through good highway alignment, landscaping and noise abatement.</td>
</tr>
<tr>
<td>B2-4</td>
<td>Seek to avoid community severance. Should this not be achievable, then seek to build in cycle and pedestrian networks between communities severed by the new route, to create improved active travel opportunities between local community destinations. This could contribute to health benefits in the longer term.</td>
</tr>
</tbody>
</table>

5.2.4 Cultural heritage

5.2.4.1 Key findings

Section B2-1

The settlement site scheduled monuments in this area are generally located on the edges of the corridor and in locations that are not likely to be in close proximity to any route of the Proposed Development. There is likely to be no significant effect on these assets or their settings; however, it should be noted that the concentration of settlement sites in this area could indicate a high potential for associated unknown archaeological remains of potentially High value.
The Castle Mound at Fitzharris, the remains of Barton, the remains of Abingdon Abbey, and the Ock and Abingdon Bridges scheduled monuments are within the town of Abingdon and are all therefore unlikely to be situated within close proximity to the Proposed Development. The setting of the Ock Bridge has views to the west over the Ock valley, however, the current A34 is not currently visible from this location and any development here would likely be online or offline further to the west. Therefore, there is likely to be no significant effect on these assets or on their settings.

Within Abingdon, the 278 listed buildings, 1 Grade II Registered Park and Garden, and 3 Conservation Areas are at least partially screened from new development, particularly if any route were to remain online with the current A34. However, there is still the potential for significant adverse effects on the setting of these assets through noise and visual intrusion during construction and operation. The remaining listed buildings within the corridor are located within villages or small clusters of buildings and vegetation that would typically provide good screening from the Proposed Development. However, these groupings are limited in size and tend to be surrounded by arable fields, and some Grade II assets are situated in more isolated locations. Route placement and proximity to these assets would highly influence the degree of adverse effects on each designated asset. Overall, there is the potential for a significant adverse effect on the setting of the designated listed buildings within the corridor through noise and visual intrusion during construction and operation.

A cluster of 13 listed buildings (12 Grade II, 1 Grade II*) are located within 350 metres of the current A34 in an area where online development is possible. In particular, the Grade II Manor Preparatory School and Manor Cottage, as well as the Grade II* listed barn associated with the Manor Preparatory School, are within 100 metres of the current A34 and, although they are currently well screened, there is the potential for significant effects to their setting from noise and visual intrusion during construction and operation of any online development.

The Grade I Registered Park and Garden of Nuneham Courtenay extends approximately 450 metres into the Section B2-1 corridor from the south; however, it is situated on low, undulating hills with a steep slope towards its western boundary created by the River Thames. This situation creates important long views west towards Abingdon and north towards Oxford. There is the potential for adverse effects to the setting of this asset through noise and visual intrusion during construction and operation and through the disruption of long views to the west and north.

Section B2-2

The moated sites, the Brill earthworks and pottery kilns, the Deserted Medieval Villages and the town cross scheduled monuments are discrete and well defined assets, some of which are sheltered by the surrounding built environment, and could be avoided through careful design. It should be noted that the presence of Deserted Medieval Village assets may be indicative of further associated unknown archaeological remains of High value outside of the scheduled area.

The listed buildings tend to be grouped in small clusters of designated assets and have varying levels of screening from the surrounding built environment and vegetation. There are, however, a moderate number of listed buildings that are situated independently within a more rural environment. Overall, the spread of these assets across the Section B2-2 corridor suggests that adverse impacts to the setting of these assets should be avoidable through...
careful design; however, all of the listed buildings have the potential for adverse effects to their setting from noise and visual intrusion during construction and operation. Furthermore, there is a density of assets along the current A40 that includes the Grade I Registered Shotover Park and the Wheatley Conservation Area (which includes 50 listed buildings). The potential for route options in this area is therefore limited to the eastern and western edges of the corridor; both of which may still have significant effects on other designated assets.

The Shotover Grade I Registered Park and Garden is screened by vegetation on all sides, and is bounded by the current A40 to the north. However, given the width of the park across the corridor, its central location, and the further limitations on route options imposed by the neighbouring town of Wheatley (including the Wheatley Conservation Area), it would be difficult to design the route to avoid affecting key elements of the historic landscape and to minimise any increases in visual and noise intrusion on the setting of this asset. Furthermore, while Shotover Park itself provides screening for those designated buildings contained within the grounds (comprising the Grade I listed country house, 2 Grade II* listed temples and a Grade II* listed obelisk), the potential for significant effects from noise and visual intrusion during construction and operation cannot be ruled out.

The Grade I Registered Park and Garden of Wotton House extends from within the Section B2-2 corridor and into Section B2-3. A large part of the park is well screened by vegetation. However, the park is purposely aligned with views of the forested areas of Tittershall and Grove Woods to the north and it is situated to command important views to the west, both of which have a potential to be affected by the Proposed Development. Views to the west from the Park are unscreened and the Proposed Development has the potential for significant effects on the setting of the asset from noise and visual intrusion during construction and operation.

Section B2-3

The scheduled monuments within the Section B2-3 corridor are primarily small and discrete. Although there is the potential for adverse effects on the assets and their settings, these could be avoided through careful design.

Most listed buildings in Section B2-3 are dispersed along the corridor as singular or small groups of assets and are typically situated within very small to small villages and have limited screening. There is therefore a potential significant adverse effect due to noise and visual intrusion during construction and operation on the setting of these assets. The listed buildings are spread out evenly across the corridor; however, the density is such that mitigation through design may be possible.

The Grade I Registered Park and Garden of Wotton House has an avenue that extends into the corridor. A large part of the park is well screened by vegetation, and the majority of the registered land lies within the Section B2-2 corridor; however, there is still the potential for an adverse effect on the setting of this asset within the Section B2-3 corridor through noise and visual intrusion during construction and operation.

The Grade I Registered Park and Garden of Waddesdon Manor lies to the south of Section B2-3 within the 1km study area, and also has important views to the north which would extend to within the corridor itself. Sensitive design would be required in order to not impact the setting of these High value assets.
The Roman town of Magiovinium scheduled monument flanks the Roman Road of Watling street and is roughly bordered by the river Ouzel, the current A4146 and the current A5. The nature of this site suggests the potential for further unknown archaeological remains of High value associated with this asset that lie outside of the scheduling boundary. Proposed Development online or offline within the vicinity of the A4146, and to the current roundabout would have a potential significant effect on this asset through the removal of archaeological deposits during construction.

‘The Hoult’ scheduled monument extends slightly into the Section B2-4 corridor from the south. It survives in earthwork form and is situated on open agricultural land. Surviving medieval and post-medieval cultivation earthworks in combination with moated sites are rare, and there is the potential for a significant adverse effect to this asset through the removal of scheduled archaeological remains.

The other scheduled monuments within the Section B2-4 corridor are located in positions that are unlikely to be situated within close proximity to the Proposed Development. There is therefore unlikely to be a significant effect on these assets; however, the Danesborough Camp hillfort is specifically located on a prominent hill and the setting of this asset may be significantly affected through noise and visual intrusion during construction and operation.

Sixty-four listed buildings within Section B2-4 are within the built up areas of Bletchley and Milton Keynes and are unlikely to be situated within close proximity to the Proposed Development. It is therefore unlikely that there would be a significant effect on the setting of these assets. The rest of the listed buildings within the corridor are located within small town and village Conservation Areas with a small number of assets situated independently in more rural settings. These assets have varying levels of screening from vegetation and neighbouring properties; however, there is a potential for a significant adverse effect on the setting of these assets through noise and visual intrusion during construction and operation. The spread of the assets is such that mitigation through design should be possible; however, it may be more difficult within the northern section of the corridor where 4 Conservation Areas are situated linearly from east to west.

The Grade I Registered Park and Garden of Woburn Abbey extends a maximum of 750 metres into the B2-4 corridor. The park is bounded on the north by Turnpike Road, and is well screened in this area by dense vegetation. However, without further assessment of the potential noise and visibility of the Proposed Development it is not possible to completely rule out the potential for a significant adverse effect on the Registered Park and Garden and the associated designated asset through noise and visual intrusion during construction and operation.

Overall

Overall, the spread and nature of the cultural heritage assets within Corridor B2 suggests the potential for a significant adverse effect for which mitigation may be possible.

### 5.2.4.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2-1</td>
<td>The overall spread and density of the cultural heritage assets in Section B2-1 should allow for a route design that could mitigate the potential significant adverse effects.</td>
</tr>
</tbody>
</table>
### Design, mitigation and enhancement consideration for Stage 1B

<table>
<thead>
<tr>
<th>Section</th>
<th>Consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2-1</td>
<td>Of particular note for Section B2-1 is the Grade II* listed barn within the grounds of the Manor Preparatory School, which is immediately next to the current A34. Any online development would need to be sensitively designed in order to mitigate any noise and visual intrusion. Furthermore, careful design would be needed in order to mitigate any impact on the setting of the Grade I Registered Nuneham Park and the important long views to the north.</td>
</tr>
<tr>
<td>B2-2</td>
<td>The spread and density of assets over most of the Section B2-2 corridor could allow for a suitable route option through this corridor. Of particular note for Section B2-2 is the Shotover Park Grade I Registered Park and Garden which is located very centrally to the corridor and within a narrow section that is further limited by the neighbouring town and Conservation Area of Wheatley. Very sensitive design would be required to mitigate any adverse effects on the setting of this assets, particularly in consideration of the intrusion already posed by the current A40. Also of note for Sections B2-2 and B2-3 is the Grade I Registered Park and Garden of Wotton House, which has an avenue that extends into the Section B2-3 corridor and noted views north within the section B2-2 corridor. Sensitive design would be required in order to not impact the setting of this High value asset.</td>
</tr>
<tr>
<td>B2-3</td>
<td>Overall, the dispersed nature of the assets within Section B2-3 has the potential for appropriate design mitigation. Of particular note for Sections B2-2 and B2-3 is the Grade I Registered Park and Garden of Wotton House, which has an avenue that extends into the Section B2-3 corridor and noted views north within the Section B2-2 corridor. The Section B2-3 study area also incorporates the Grade I Registered Park and Garden of Waddesdon Manor which also has important views to the north that extend into the corridor. Sensitive design would be required in order to not impact the setting of these High value assets.</td>
</tr>
<tr>
<td>B2-4</td>
<td>The assets within Section B2-4 are generally evenly spread out across the corridor and should allow for a route that could mitigate the potential significant adverse effect. Of particular note for Corridor B2-4 is the Roman town of Magiovinium and Roman fort along the current A4146. Any online development would be likely to have a significant adverse effect on this asset through the removal of archaeological remains. There is also a high density of cultural heritage assets within the north of the corridor including the Grade I Registered Park and Garden of Woburn Abbey, 4 Conservation Areas and 1 scheduled monument that are situated linearly from east to west and which may restrict the potential for suitable route options in this area; however, mitigation of any potential significant adverse effects may still be possible.</td>
</tr>
</tbody>
</table>
5.2.5 Landscape and visual

5.2.5.1 Key findings

Section B2-1

The corridor runs to the north of Abingdon and south and south east of Oxford. For routes developed in this corridor, adverse visual impacts would likely to affect the residents and users of PRoW including the Thames Path national trail.

To the west, new or improved routes would be set in the context of the existing built up area and A34 corridor. However, where the corridor crosses the railway and River Thames and River Thame floodplains it is likely to require extensive lengths of embankment or viaduct that could be at odds with the low lying landscape and highly visible. Additionally, there could potentially be secondary landscape impacts if borrow pits are needed to create embankments.

There is also a potential for impacts on Radley golf course and Radley College sports fields and the nearby ancient woodland.

Section B2-2

The eastern part of this section is particularly sensitive. Routes developed in this section could directly impact on the Brill-Winchendon AAL and common land at Brill Common. There is also potential for indirect impacts on the panoramic views from and the setting of the AAL arising from any route that is located in this area. There is also potential for impacts on the network of ancient woodlands of Bernwood Forest to the west of the M40.

The section of the corridor immediately east of Oxford through to the M40 features Shotover House RPG grade I. Wotton House RPG grade I lies to the east of the corridor. Route developed in this section would potentially result in direct impacts on these constraints and indirect impacts are possible on the setting of and views from the historic parks.

Areas of greenspace such as Shotover Country Park and a number of golf courses could be difficult to mitigate.

The corridor includes high ground at Arncott Hill. This is an area associated with industrial and commercial development and, as such, sensitive visual receptors are limited. Having regard for the topography and scattered ancient woodlands, it would be difficult to find a route through this area.

The area north of Arncott is characterised by the low lying landscape of the River Ray floodplain and routes developed in this area would likely to require an extensive length of embankment or viaduct that would be highly visible. Additionally, there could potentially be secondary landscape impacts if borrow pits are needed to create embankments.

Section B2-3

The southern part of this section is particularly sensitive. Routes developed here would potentially result in direct impacts on the Brill-Winchendon Hills AAL and Quainton–Wing AAL or indirect impacts on the panoramic views from and the setting of the AALs. Additionally, there is potential for impacts on the network of ancient woodlands of Bernwood Forest to the
west of the M40. Wotton House RPG grade I lies partially within the corridor, and would be susceptible to direct or indirect impacts. There are also potential impacts on the setting of and views from Waddesdon Manor RPG grade I that lies just outside the corridor.

There are less landscape constraints to the north of the corridor. However, routes developed in this section could result in impacts on the setting of and views from Claydon RPG grade II and Claydon House; and also on the unregistered but attractive parkland at Addington Manor.

Section B2-4

The corridor crosses the Brickhills AAL which would be affected by routes developed in this section. Route alignments here would pass the through the London Metropolitan green belt and may have an impact on its sense of openness. There is also the potential for direct and indirect impacts on Woburn Abbey RPG grade I including impacts on views and on its setting. There are extensive areas of heathland and woodland south of Aspley Heath which includes Woburn Golf Course that could be difficult to mitigate. Whilst the woodland cover provides potential for screening there are numerous PRoWs in this area including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths.

The corridor passes to the south of the Lakes Estate on the southern edge of Milton Keynes. Whilst this area is already affected by the A4146, there is potential for increase visual impacts from the expressway due to the requirements for signs and gantries and from new junction arrangements.

Between the A5 and M1 there are a number of constraints including numerous settlements some with conservation area status, extensive areas of heathland and woodland south of Aspley Heath and a number of golf courses that could be difficult to mitigate if additional land is required for compensation. Routes developed in this section would require grade separated junctions with the A5 and M1 and also a crossing for the railway line, which could result in landscape and visual impacts on residents and users of PRoW and open space.

Overall

The eastern parts of Corridor B2 are particularly sensitive. There is potential for direct impacts on Quainton–Wing AAL, Brill-Winchendon Hills AAL and registered common land at Brill Common for routes developed in this corridor. These include indirect effects on the setting of these distinctively undulating areas that are noted for their panoramic views. There is also potential for impacts on the networks of ancient woodlands around Radley, Bernwood Forest and Brickhills. Other sensitive constraints in this part of the corridor include Shotover House RPG grade I and Wotton House RPG grade I where there is potential for significant adverse effects including impacts on views and setting. Waddesdon Manor RPG grade I that lies just outside of the corridor could also be affected. There are also potential adverse effects where the corridor crosses the floodplains of the River Thames, River Thame and River Ray, and Otmoor. A route through these areas would be at odds with the low lying landscape and highly visible.

The landscape is less constrained to the north and west of the corridor, although landscape and visual impacts would be likely on the setting of and views from Claydon RPG grade II and Claydon House; and also on the unregistered but attractive parkland at Addington Manor.
from routes developed in this corridor. It may be difficult to find a route through the high ground at Arncott Hill due to the topography and scattered ancient woodlands.

Throughout the corridor there are other areas of sensitive landscape. Amongst these are areas of greenspace such as Shotover Country Park and a number of golf courses and sports fields at Radley College.

Any routes developed at the northern extent of the corridor would likely directly impact on the Brickhills AAL. In landscape terms, route options would preferably be located immediately adjacent to the edge of Milton Keynes to minimise the impact on the designated landscape. An eastern route would impact on the openness of the London Metropolitan green belt and potentially on the setting of Woburn Abbey, with the potential loss of extensive areas of heathland and woodland.

Overall, large adverse landscape and visual effects are likely to arise that cannot be mitigated. However, it is likely that a route can be found that avoids direct loss of the most sensitive constraints of the AALs, common land, RPGs, ancient woodlands and visually sensitive low lying open land.

### 5.2.5.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2-1</td>
<td>Follow existing A34 as closely as possible and as far as practicable, having regard for other environmental constraints, seek to avoid routes that directly impact on Radley College, associated playing fields and the golf course. Keep vertical alignment as low as possible in the landscape to minimise visual impact, particularly where crossing the railway. Careful consideration to be given to the location of gantries, lighting and signs to avoid additional visual impacts, particularly close to sensitive visual receptors.</td>
</tr>
<tr>
<td>B2-2</td>
<td>Route selection should avoid Shotover RPG grade I, Shotover Country Park, Wotton House RPG grade I, blocks of ancient woodland and Brill-Winchendon Hills AAL. The least damaging option would be to align as closely as possible to the existing M40.</td>
</tr>
<tr>
<td>B2-3</td>
<td>Investigate alignments to avoid Claydon RPG and Addington Manor - possibly south of Winslow. Avoid direct and indirect impacts on the Quainton - Wing AAL.</td>
</tr>
<tr>
<td>B2-4</td>
<td>Keep route options as close as possible to the existing A4146 corridor to minimise severance of and direct impacts on the Brickhills AAL and other constraints and sensitive visual receptors that are not currently affected by infrastructure. Consideration should be given to creating a buffer/visual screen to reduce visual impacts on residents south of Milton Keynes.</td>
</tr>
</tbody>
</table>
5.2.6 Nature conservation

5.2.6.1 Key findings

For all sections, in addition to direct habitat loss, there is the potential for significant effects on key sensitive features through factors such as habitat fragmentation, air quality changes, hydrological changes, and increased disturbance from changes in noise, vibration and lighting levels. Designated sites lying outside the corridor boundary may potentially be affected by noise and visual disturbance, and changes to air quality as a result of construction and operational phases, or if hydrologically sensitive and connected to areas affected by construction and operational effects. These indirect effects are most likely in the areas where the route alignment is most constrained by designated sites.

Section B2-1

Much of this section corresponds with Section A-1 and the potential impacts are considered to be the same. Direct habitat loss from within the Cothill Fen SAC, SSSI and LNR should be avoidable through route alignment. However, direct loss of AW, veteran trees and LWS appears to be more difficult to avoid as there are significant extents of these designations north of Radley College with limited route alignment opportunities given the presence of urban areas.
Section B2-2

Direct habitat loss from SSSI, AW and LWS appears to be unavoidable given the extent of these areas within the corridor. It should be possible to avoid any direct impact on Otmoor RSPB reserve through appropriate route alignment. However, this section has large areas designated with both Tier I and II constraints making any route alignment choices potentially difficult.

Section B2-3

Much of this section corresponds with Section B1-3 and the potentially impacts are considered to be the same. The designated areas, in particular SSSI, AW and LWS, are located such that direct habitat loss could be avoidable through appropriate route alignment. However, route alignment options are considered to be constrained by the extents of residential areas in this and the adjacent sections.

Section B2-4

Much of this section corresponds with Section B1-4 and the potential impacts are considered to be the same. The section is relatively constrained in terms of potential route alignment options given the extent of residential areas. It may be possible to avoid direct habitat loss from within SSSI, NNR and LNR, but the extent of LWS and AW are such that direct loss of habitats within these designations may not be possible to avoid.

5.2.6.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2-1</td>
<td>There is the potential to avoid most habitat loss to key sensitive features through appropriate route alignment. Mitigation for other effects on key sensitive features could include creation of compensatory habitats, habitat screening by planting/fencing, and appropriate drainage, dust suppression and lighting strategies.</td>
</tr>
<tr>
<td>B2-2</td>
<td>There appears to be limited opportunity to habitat loss to key sensitive features through appropriate route alignment. Mitigation for this and other effects on key sensitive features could include creation of compensatory habitats, habitat screening by planting/fencing, and appropriate drainage, dust suppression and lighting strategies.</td>
</tr>
<tr>
<td>B2-3</td>
<td>There is the potential to avoid most habitat loss to key sensitive features through appropriate route alignment. Mitigation for other effects on key sensitive features could include creation of compensatory habitats, habitat screening by planting/fencing, and appropriate drainage, dust suppression and lighting strategies.</td>
</tr>
<tr>
<td>B2-4</td>
<td></td>
</tr>
</tbody>
</table>

Overall

The extensive area of designated sites with Section B1-2 mean that avoiding direct effects on Tier I and II constraints route alignment option would be difficult.
5.2.7 Geology and soils

5.2.7.1 Key findings

Section B2-1

There is the potential for significant effects relating to SSSIs, however as these are relatively small then careful route selection could likely avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these sand and gravel resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs in one location span two-thirds of the corridor width and so it is unlikely to be possible to route around these when taking into account other environmental discipline constraints. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses (in particular Radley PFA Lagoons and Abingdon Airfield), however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, however it is expected that these impacts could be mitigated.

Section B2-2

There is the potential for significant effects relating to SSSIs, however as these are relatively small then careful route selection could likely avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span two-thirds of the corridor width and so it is unlikely to be possible to route around these when taking into account other environmental discipline constraints. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with potentially contaminative historical and current land uses, however these could be avoided by route selection. If the route were to cross a historic land use there may be engineering challenges and costs to consider, although it is expected that these impacts could be mitigated.

Section B2-3

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the width of the corridor in several locations and so it is unlikely to be possible to route around these. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses (namely Calvert landfill and Westcott British
Aerospace site), however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, however it is expected that the associated impacts could be mitigated.

Section B2-4

There is the potential for significant effects relating to the NNR site, however careful route selection could avoid this. There is no other mitigation that could be applied as this feature is only valuable in its current locations and current conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the corridor width and so it would not be possible to avoid these features. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses in particular Bletchley landfill, however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is generally considered possible in terms of engineering and remediation, however in the case of Bletchley this would be a significant constraint given that the landfill serves Milton Keynes and has planning permission till 2022.

Overall

There is the potential for significant effects relating to SSSI and the NNR site, however careful route selection could avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the corridor width in some locations and so would not be possible to avoid these features. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses, in particular within Corridor B2, Calvert landfill, Bletchley landfill, Westcott British Aerospace site, RAF sites, sewage works and the Mini Motors site, however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account, in particular in respect to Bletchley landfill which serves Milton Keynes. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, however it is expected that the associated impacts could be mitigated.
5.2.7.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2-1</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span the width of the corridor, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources.</td>
</tr>
<tr>
<td>B2-2</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span two-thirds of the corridor width, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>B2-3</td>
<td>MSGAs in this section cannot be avoided by route selection however mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>B2-4</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span the corridor width, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills, however Bletchley landfill may represent more of a constraint from a regulatory perspective.</td>
</tr>
</tbody>
</table>

5.2.8 Road drainage and the water environment

5.2.8.1 Key findings

Section B2-1

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas in east of Abingdon.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality
Section B2-1 has the potential for significant effects on 4 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B2-1 has the potential for significant effects on the water quality of 4 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Section B2-1 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and a spring discharge.

**Section B2-2**

**Flood Risk**

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas in south-east Bicester.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

**Geomorphology, WFD and Water Quality**

Section B2-2 has the potential for significant effects on 14 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B2-2 has the potential for significant effects on the water quality of 14 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Section B2-2 has the potential for significant effects due to a reduction in groundwater arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE and spring discharges.
Section B2-3

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas in north-west of Winslow.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality

Section B2-3 has the potential for significant effects on 10 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B2-3 has the potential for significant effects on the water quality of 10 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater

Section B2-3 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE and spring discharges.

Section B2-4

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas in the outskirts of Bletchley.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.
The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

**Geomorphology, WFD and Water Quality**

Section B2-4 has the potential for significant effects on 5 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B2-4 has the potential for significant effects on the water quality of 5 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Section B2-4 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing the two SPZ1s within this section.

**Overall**

**Flood Risk**

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

**Geomorphology, WFD and Water Quality**

Section B2 has the potential for significant effects on 28 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water
bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B2 has the potential for significant effects on the water quality of 28 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Corridor B-2 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing the two SPZ1s within this corridor.

### 5.2.8.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2-1</td>
<td><strong>Flood Risk</strong></td>
</tr>
<tr>
<td></td>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
</tr>
<tr>
<td></td>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
<td></td>
<td>• May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
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<td></td>
<td>• Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.</td>
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<td>• Groundwater mitigation may be required where groundwater flow paths are impeded.</td>
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<tr>
<td></td>
<td><strong>Geomorphology, WFD and Water Quality</strong></td>
</tr>
<tr>
<td></td>
<td>• Crossing of large WFD water bodies to be avoided through design (embedded mitigation).</td>
</tr>
<tr>
<td></td>
<td>• Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.</td>
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<td>• Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.</td>
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<td></td>
<td><strong>Groundwater</strong></td>
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<tr>
<td></td>
<td>• Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.</td>
</tr>
<tr>
<td></td>
<td>• Groundwater abstractions may require monitoring and possible replacement if they are impacted by works.</td>
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<tr>
<td></td>
<td>• Pollution prevention control measures during construction and operation would mitigate potential quality impacts.</td>
</tr>
</tbody>
</table>
### Section 2-2: Flood Risk

- The route should be positioned away from the River Ray, where practicable.
- Crossings should be made at locations with the smallest floodplain width.
- There are areas of significantly small fluvial flood risk, at Horton-cum-Studley, which should ideally be explored in the initial instance.
- A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.
- May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.
- Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.
- Groundwater mitigation may be required where groundwater flow paths are impeded.

### Geomorphology, WFD and Water Quality

- Crossing of large WFD water bodies to be avoided through design (embedded mitigation).
- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.
- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.

### Groundwater

- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.

### Section 2-3: Flood Risk

- Crossings should be made at locations with the smallest floodplain width.
- A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.
- May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.
- Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.
- Groundwater mitigation may be required where groundwater flow paths are impeded.

### Geomorphology, WFD and Water Quality

- Crossing of large WFD water bodies to be avoided through design
### Section Design, mitigation and enhancement consideration for Stage 1B

(embedded mitigation).

- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.
- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.

#### Groundwater

- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- If present, unlicensed groundwater abstractions may require monitoring and possible replacement if they are impacted by works.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.

#### B2-4 Flood Risk

- Crossings should be made at locations with the smallest floodplain width.
- A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.
- May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.
- Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.
- Groundwater mitigation may be required where groundwater flow paths are impeded.

#### Geomorphology, WFD and Water Quality

- Crossing of large WFD water bodies to be avoided through design (embedded mitigation).
- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.
- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.

#### Groundwater

- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- Groundwater abstractions (including those for public supply) may require monitoring and possible replacement if they are impacted by works.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.
5.3 Assessment Summary

5.3.1 Intervention objectives assessment

Table 5-17 Intervention objective 1 assessment – B2

<table>
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<tr>
<td>Air Quality</td>
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<td>For sections B2-1 and B2-4 it is assumed that traffic could be rerouted from the more densely populated areas (e.g. Oxford, Abingdon, Bicester, Milton Keynes etc.), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations), and on this basis would be beneficial overall. For sections B2-2 and B2-3 it is assumed that the benefits in some locations likely be of broadly similar extent to dis-benefits in other locations and on this basis is assessed as neutral. Overall, providing that the expressway could be routed away from the more densely populated areas mentioned above, it is expected that net community effects in terms of air quality would likely be neutral.</td>
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<tr>
<td>Noise and Vibration</td>
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<td>Overall potential net beneficial effect having regard for: Benefits: • Potential positive noise benefits between Bicester and Buckingham along the A4421 and between Buckingham and Milton Keynes along the A421 resulting from possible reduction in traffic on these roads. • Potential positive noise benefits between Abingdon and Thame (A415, B4105 and the A329) resulting from possible reductions in traffic on these roads. Disbenefits: • Potential increases in noise for receptors adjacent to possible ‘on-line’ sections (A34, A421 – east of M1) due to possible increased traffic and speeds and road widening. Potential for adverse changes in noise at</td>
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September 2018
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<tbody>
<tr>
<td><strong>Overall</strong></td>
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<td></td>
<td>Corridor B2 has been scored neutral overall having regard for potential beneficial effects on air quality and noise set against potential adverse effects on people and communities which it is assumed would be reduced through careful route design.</td>
</tr>
</tbody>
</table>

**Table 5-18 Intervention objective 2 assessment – B2**

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Cultural Heritage</td>
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<td></td>
<td>It appears that B2 has sufficient flexibility in the corridor to allow for mitigation of significant effects on cultural heritage assets through careful route design.</td>
</tr>
<tr>
<td>Landscape and Visual</td>
<td></td>
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<td></td>
<td>There are no Tier I landscape constraints within B2. With landscape in mind, any route through section B2-4 would preferably to go west of Great Brickhill, Little Brickhill and Bow Brickhill immediately adjacent to the edge of Milton Keynes to reduce the impact on the AAL designated landscape. The London Metropolitan green belt partially extends across section A2-4 although a route to the west of this section would avoid this.</td>
</tr>
</tbody>
</table>
## Nature Conservation

Section B2-2 - habitat loss from some SSSIs, ancient woodland and LWS and severance appears to be unavoidable given the extent of these features within the corridor. In addition to potential effects on Tier I nature conservation habitats, Otmoor RSPB reserve is sited just outside the corridor boundary north of Beckley and is a highly sensitive area.

## Geology and Soils

The corridor contains a large coverage of Mineral Safeguarding Areas (MSGA’s) which would be unavoidable.

There are a number of geological SSSI’s along the corridor but it is considered that it may be possible to avoid these constraints through careful route design.

King’s Wood and Rushmere National Nature Reserve (NNR) located in section B1-4 is of geological interest but it is considered there is flexibility within the corridor to possibly avoid this constraint through careful route design.

B2 contains a number of authorised landfills and potentially contaminated land. It is considered it may be possible to avoid these features through careful route design.

## Road Drainage and Water Environment

Within all sections, the corridor has the potential to cross areas of FZ 3b, particularly in sections B2-1 and B2-4 where a crossing of the River Thames and the River Ouzel would be required.

## Overall

Corridor B2 has been scored red because this corridor does offer sufficient flexibility to avoid all Tier I nature conservation constraints.

### Overall findings

#### Table 5-19 Summary of B2 environment assessment

<table>
<thead>
<tr>
<th></th>
<th>Intervention objective 1</th>
<th>Intervention objective 2</th>
<th>Intervention objective 3</th>
<th>Strategic objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>Grey – neutral</td>
<td>Red – highly</td>
<td>Grey – neutral</td>
<td>Red – highly</td>
</tr>
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</table>

September 2018
<table>
<thead>
<tr>
<th>Intervention objective 1</th>
<th>Intervention objective 2</th>
<th>Intervention objective 3</th>
<th>Strategic objective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>disadvantageous</td>
<td>disadvantageous</td>
<td>disadvantageous</td>
</tr>
</tbody>
</table>
6. Corridor B3

6.1 Baseline conditions

6.1.1 Air quality

Section B3-1

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs:** The B3-1 area includes Abingdon AQMA (central Abingdon), and the southern part of the Oxford AQMA. Both have been declared due to exceedances in NO₂.

- **Designated Sites:** This area includes Dry Sandford Pit SSSI, Barrow Farm Fen SSSI, Sugworth SSSI and Cothill Fen SSSI and SAC.

- **Residential Receptors:** Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Oxford, Abingdon, Radley, Toot Baldon, Sunningwell, Garsington and Cuddesdon.

- **Sensitive Receptors:** Within the B3-1 boundary, there are approximately 20,500 potential air quality sensitive receptors.

- **Clean Air Zone:** The section is approximately 2km from the potential Oxford CAZ.

- **PCM Model:** Defra PCM links within the B3-1 area have been identified on A415 and A4183 in Abingdon. Concentrations are elevated but not exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data:** The Vale of White Horse District Council has 18 NO₂ monitoring locations within B3-1, in and around the centre of Abingdon. The latest monitoring data indicates elevated NO₂ concentrations, with one exceedance on the A415, and concentrations close to exceeding within the existing AQMA area.

- **Defra Background Concentrations:** The Defra background maps indicate 2018 background concentrations across the B3-1 area (at 1km square intervals) are below the relevant AQOs for NOx (9.8-19.9 μg/m³), NO₂ (7.5-14.3 μg/m³) and PM₁₀ (12.2-15.6 μg/m³).

There is potential for air quality benefits at sensitive receptors in Oxford and Abingdon, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Potential to improve journey routing in this area to reduce congestion (and thus emissions) within Oxford, and potentially reducing air quality concentrations within the AQMA.
Section B3-2

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs:** No AQMA areas have been declared within the B3-2 boundary by either Aylesbury Vale District Council, Cherwell District Council and South Oxfordshire District Council.

- **Designated Sites:** The area includes Holton Wood SSSI, Waterperry Wood SSSI, Holly Wood SSSI, Shabbington Woods Complex SSSI, Otmoor SSSI, Murcott Meadows SSSI, Whitecross Green and Oriel Woods SSSI, Muswell Hill SSSI, Arncott Bridge Meadows SSSI, Rushbeds Wood and Railway Cutting SSSI, Long Herdon Meadow SSSI.

- **Residential Receptors:** Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Wheatley, Waterstock, Worminghall, Oakley, Boarstall, Horton-cum-Studley, Arncott, Piddington, Murcott, Ambrosden, Blackthorn, Ludgershall, Marsh Gibbon.

- **Sensitive Receptors:** Within the B3-2 boundary, there are approximately 6,000 potential air quality sensitive receptors.

- **Clean Air Zone:** The section is approximately 10km from the potential Oxford CAZ.

- **PCM Model:** There are no Defra PCM links within this area. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data:** There are no monitoring locations within the B3-2 area.

- **Defra Background Concentrations:** The Defra background maps indicate 2018 background concentrations across the B3-2 area (at 1km square intervals) are below the relevant AQOs for NOx (8.0-12.5 μg/m³), NO₂ (6.2-9.5 μg/m³) and PM₁₀ (11.3-15.6 μg/m³).

There is potential for air quality benefits at sensitive receptors in Oxford, Wheatley and Bicester, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Section B3-3

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs:** No AQMA areas have been declared within the B3-3 boundary by either Aylesbury Vale District Council, Cherwell District Council or Milton Keynes Borough Council.
• Designated Sites: This broad area includes Ham Home-Cum-Hamgreen Woods SSSI, Grendon and Doddershall Woods SSSI, Finemere Wood SSSI, Sheephouse Wood SSSI.

• Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Twyford, Steeple Claydon, Calvert Green, Winslow, Swanbourne, Granborough, Mursley, Little Horwood, Westcott, Waddesdon, Ashendon, Whitchurch, Oving.

• Sensitive Receptors: Within the B3-3 boundary, there are approximately 10,000 potential air quality sensitive receptors.

• Clean Air Zone: The section is approximately 22km from the potential Oxford CAZ.

• PCM Model: There are no Defra PCM links within this area. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

• Monitoring Data: Aylesbury Vale District Council undertake NO\textsubscript{2} monitoring at one location within B3-3 area. The latest monitoring data indicates concentrations below the AQO.

• Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the B3-3 area (at 1km square intervals) are below the relevant AQOs for NO\textsubscript{x} (7.4-12.8 \(\mu\)g/m\textsuperscript{3}), NO\textsubscript{2} (5.8-9.7 \(\mu\)g/m\textsuperscript{3}) and PM\textsubscript{10} (10.9-13.9 \(\mu\)g/m\textsuperscript{3}).

There is potential for air quality benefits sensitive receptors in Winslow, Waddesdon, Aylesbury and Whitchurch, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Section B3-4

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

• AQMAs: No AQMA areas have been declared within the B3-4 boundary by either Aylesbury Vale District Council, Central Bedfordshire Council or Milton Keynes Borough Council.

• Designated Sites: This broad area includes Pokers Pond SSSI, Nares Gladley Marsh SSSI, Kings and Bakers Woods and Heath SSSI, Wavendon Heath Ponds SSSI.

• Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Bletchley, Great Brickhill, Little Brickhill, Stoke Hammond, Aspley Heath, Woburn Sands, south Milton Keynes, Bow Brickhill, Drayton Parslow, Lakes Estate, Newton Longville.
• Sensitive Receptors: Within the B3-4 boundary, there are approximately 25,000 potential air quality sensitive receptors.

• Clean Air Zone: The section is approximately 34km from the potential Oxford CAZ.

• PCM Model: Defra PCM links within this area have been identified on the A4146 and A5. Concentrations are elevated (but not exceeding) in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

• Monitoring Data: Milton Keynes Borough Council undertake NO\textsubscript{2} monitoring at two locations within the B3-4 area. The latest monitoring data indicates concentrations below the AQO.

• Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the B3-4 area (at 1km square intervals) are below the relevant AQOs for NO\textsubscript{x} (7.8-19.0 \(\mu\text{g/m}^3\)), NO\textsubscript{2} (6.0-13.8 \(\mu\text{g/m}^3\)) and PM\textsubscript{10} (11.4-16.8 \(\mu\text{g/m}^3\)).

There is potential for air quality benefits at sensitive receptors in Milton Keynes and Bletchley, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

6.1.2 Noise and vibration

Within the Corridor B3 study area there are 87,353 dwellings and 1,494 other sensitive receptors. The Corridor B3 study area contains the large settlements of Abingdon, the south east fringe of Oxford, Bletchley and the south east boundary of Milton Keynes, as well as numerous smaller towns and villages.

It is expected that receptors in close proximity to major roads and within urban areas are subject to high noise levels dominated by road traffic. Within this corridor's study area, a number of residential settlements exist in close proximity to the A34 (e.g. Abingdon and Shippon), A40 (e.g. Wheatley), A41 (e.g. Westcott), A413 (e.g. Winslow), A4146 (e.g. Stoke Hammond), A5 (e.g. Little Brickhill and A5130 (e.g. Woburn Sands). Other major roads within this corridor study area include the A4074, M1 and M40.

Receptors located in more rural settings are expected to have their noise environment consisting of more local sources such as agriculture activities, road traffic on minor roads, railways and aircraft flights. The Corridor B3 study area is largely a rural corridor with many settlements and individual dwellings where non-traffic noise sources are more likely to dominate the noise environment.

There are numerous railway lines running through the Corridor B3 study area that would contribute to the surrounding noise environment: the Cherwell Valley line, the London Marylebone to Oxford line, the Manchester to Bournemouth line, the London to Birmingham line, the London to Aylesbury line, the West London Route, and Marston Vale line. In addition, Luton and Heathrow Airport have several flight paths and stacking areas through the Corridor B3 study area. The study area also contains the Abingdon Airfield and two rural runways (one west of Marsh Gibbon and the Slay Barn airstrip, south of Wheatley).
Numerous SSSIs exist within the corridor study area. These include Sugworth, Barrow Farm, Culham Brake, Dry Sandford Pit, Cothill, Shabbington Woods, Waterperry Wood, Nares Gladley Marsh and Poker's Pond Meadow.

The Corridor B3 study area contains a total of 40 NIAs. There are four along the A40, four on the A41, two on the A413, three on the A421 (two to the west of Milton Keynes and one close to the M1), three adjacent to the A5130, and one on the A5. The remainder of the NIAs are within or around Oxford, Abingdon, and Milton Keynes. Three NIAs are designated due to rail noise on the London to Birmingham railway line south of Milton Keynes.

6.1.3 People and communities

Section B3-1

Abingdon is located in the south-west of the section, while the southern outskirts of Oxford (Blackbird Leys area) coincide with the northern edge of the section. Other key settlements within the west part of the corridor section are Shippon, Gozzard’s Ford, Cothill, Sunningwell, Nuneham Courtenay, Radley, Marsh Baldon and the Woodland/Pebble Hill/Bigwood mobile home estates north of Radley, while Nuneham Courtenay, Toot Baldon, Garsington, Chippinghurst, Denton and Cuddesdon are within the eastern part of the section. The western edge of Abingdon is bounded by the A34 which is a busy dual carriageway. However, the other settlements within the section are largely unaffected by major highway infrastructure.

There are areas of land allocated for development near Radley and the southern fringe of Oxford, while Dalton Barracks is used by the MOD and allocated for residential development in the emerging Vale of White Horse Local Plan.

In terms of recreation and open space, the Tilsley Park leisure complex abuts the eastern side of the A34 in Abingdon, while there are some areas of Local Green Space within some settlements, notably Chippinghurst. Radley College golf course, Bagley Wood.

In terms of education, health and other sensitive community receptors, the Manor Preparatory School, School of St Helen and St Katharine, Larkmead School, Church of St Mary Magdalene and Stowford House nursing home are within 250m of the A34. Radley College, with its extensive grounds, is within the centre of the corridor (there is also a primary school within the village of Radley).

There are patches of best and most versatile agricultural land in the southern and eastern parts of section (some of which has been lost to the development of Abingdon).

Section B3-2

This section includes the villages of Wheatley, Waterstock, Tiddington, Worminghall, Hortontcum-Studley, Oakley, Brill, Boarstall, Murcott, Arncott, Piddington, Chilton, Dorton, Wotton Underwood, Ludgershall, Ambrosden, Blackthorn and Marsh Gibbon.

There is land allocated for industrial development on the south-east outskirts of Bicester and a small area allocated for residential development on the edge of Ambrosden.
There are some linear areas of registered common land in the centre of the section between Oakley and Brill. There are large golf courses located south of Horton-cum-Studley (Studley Wood Golf Club), Boarstall (Magnolia Park Golf Club) and Waterstock, and smaller playing fields/parks on the outskirts of settlements. In the southwestern corner of the section corridor there are several areas of woodland likely used for informal recreational purposes. There are two designated Local Green Spaces within Marsh Gibbon in the north of section.

The main areas of best and most versatile agricultural land present within the corridor section are around the Wheatley to Waterstock area.

Section B3-3

There are no large settlements within this corridor section, with the exception of the outskirts of Milton Keynes which impinge on the very northern part of the section. The largest settlement wholly within the corridor section is the small market town of Winslow which is relatively central within the corridor section. There are several villages dispersed throughout the corridor section including Ashendon, Waddesdon, Whitchurch, Westcott, Godington, Edgcott, Calvert, Twyford, Adstock, Addington, Middle Claydon, East Claydon, Botolph Claydon, Granborough, North Marston, Swanbourne, Mursley and Little Norwood.

There is land allocated for development on the outskirts of Winslow and the edge of Milton Keynes.

There is a cluster of woodlands to the east of the section corridor which are likely used for informal recreational purposes, which also serves as a hub in the local PRoW network. To the far north of the section corridor, Tattenhoe Park and Windmill Hill Golf Course lie adjacent to the A421 on the outskirts of Milton Keynes. There are six designated Local Green Spaces within Winslow and six designated greenspaces in and around Steeple Claydon, including land around St Michael's church cemetery on the south east edge of the village. Common land, allotments, playing fields and other cemeteries are largely within or close to the very edge of settlements.

There are two areas of best and most versatile agricultural land near the southern edge of the section, in the Ashendon and Whitchurch areas.

Section B3-4

The outskirts of Milton Keynes and Bletchley coincide with the north-west edge of the section. There are several villages dispersed throughout the corridor including Great Brickhill, Little Great Brickhill, Bow Brickhill, Woburn Sands, Drayton Parslow, Stoke Hammond, Aspley Guise, Stewkley, Soulbury, Creslow, Dunton and Whitchurch in the far south-west of the section. The A5 crosses the section, bypassing Little Brickhill. The A4146 also crosses the section and is a two lane dual carriageway bypassing Stoke Hammond. The majority of the villages in the section are relatively rural and away from major highway infrastructure.

The main development allocations are along the fringe of Milton Keynes.

Key areas of open space and recreation within the corridor section include part of Woburn Safari Park, located north west of Woburn, and Stockgrove Country Park, located on the northern outskirts of Leighton Buzzard. There are four golf courses: Three Locks (near Bragenham), Woburn, Aspley Guise and Woburn Sands Golf Club and Wavendon Golf Academy. Crawley Park is located between Aspley Guise and Ridgmont and Caldecotte.
Lake is located between Bletchley and Wavendon. Numerous small areas of playing fields within and on the outskirts of Milton Keynes and the smaller settlements. Extensive areas of woodland and heathland are present throughout the section and likely to be used for informal recreation (including King's Wood, Buttermilk Wood, Back Wood, Wavendon Wood and Wavendon Heath). There are several small areas of registered common land within or close to Stoke Hammond, Great Brickhill and Aspley Guise.

The Lindens Residential Care Home is located on Stoke Road between Bletchley and Stoke Hammond. St James's Church and Husborne Crawley Lower School, are on the edge of Husborne Crawley. Otherwise, educational facilities, health care facilities and care/nursing homes are largely located within or in close proximity to existing settlement boundaries.

Land surrounding Milton Keynes, Bletchley and Newton Longville largely comprises best and most versatile agricultural land (although also coincides with land allocated for development, so it is likely to be lost in the future baseline situation).

### Cultural heritage

**Section B3-1**

There are 55 designated cultural heritage assets of High value within the Section B3-1 corridor and 1 kilometre study area comprising:

- 9 scheduled monuments
- 10 Grade I listed buildings
- 34 Grade II* listed buildings
- 1 Grade I Registered Park and Garden
- 1 Grade II* Registered Park and Garden

There are a further 511 designated cultural heritage assets of Medium value within the Section B3-1 corridor and 1 kilometre study area comprising:

- 499 Grade II listed buildings
- 11 Conservation Areas
- 1 Grade II Registered Park and Garden

Abingdon itself contains a large number of High value cultural heritage assets comprising scheduled monuments and Grade I and II* listed buildings. The majority of these assets are located relatively central within the built up area of the town; however, the 3 settlement site scheduled monuments located on the fringes of the town to the north east and across the A34 to the west are situated in a more open environment.

Grade I and Grade II* listed buildings are also located within the villages of Garsington, Cuddesdon and Denton, Radley, Marsh Baldon, Sunningwell, Toot Baldon, Great Milton, Kennington, Littlemore, Sandford-on-Thames, and St. Helen Without. Garsington also contains a village cross scheduled monument.

The Grade I Registered Park and Garden of Nuneham Courtenay extends approximately 450 metres into the Section B3-1 corridor from the south; however, it is situated in a rural landscape on low, undulating hills with a steep slope towards its western boundary created...
by the River Thames. This situation creates important long views west towards Abingdon and north towards Oxford. The Grade II* Registered Park and Garden of Garsington Manor is much smaller in size, but located more centrally within the corridor. Again, the rural setting and long panoramic views to the south to the Wittenham Clumps on the Sinodun Hills, and beyond these the Berkshire Downs in the far distance, contribute to the value of this asset.

Section B3-2

There are 64 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section B3-2 comprising:

- 13 scheduled monuments
- 17 Grade I listed buildings
- 31 Grade II* listed buildings
- 2 Grade I Registered Park and Garden
- 1 Grade II* Registered Park and Garden

There are a further 655 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section B3-2 comprising:

- 643 Grade II listed buildings
- 12 Conservation Areas

There are a number of smaller, discrete scheduled monuments dotted across this corridor comprising 2 Deserted Medieval Villages, 3 moated sites, a churchyard cross, a medieval bridge, and earthworks and pottery kilns.


The Wotton House Grade I Registered Park and Garden, is situated almost entirely within the Section B3-2 corridor, but extends across into Section B3-3. It incorporates 24 listed buildings (4 Grade I, 1 Grade II*, and 19 Grade II) and a large part of the park is well screened by vegetation; however, the park is purposely aligned with views of the forested areas of Tittershall and Grove Woods to the north and east.

Section B3-3

There are 66 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section B3-3 comprising:

- 12 scheduled monuments
- 13 Grade I listed buildings
- 39 Grade II* listed buildings
- 2 Grade I Registered Park and Gardens
There are a further 650 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section B3-3 comprising:

- 625 Grade II listed buildings
- 23 Conservation Areas
- 2 Grade II Registered Park and Garden

The majority of scheduled monuments within this corridor are smaller, discrete assets located within rural, open settings. This includes a later Bronze Age to Early Iron Age hillfort, which is unusual for its location on a low lying plateau rather than a summit or a ridge, and medieval period moated sites, villages and settlements, fishponds, a motte and bailey castle, and a standing cross.

There are Grade I and Grade II* listed buildings in Middle Claydon, Quainton, Winslow, North Marston, Adstock, Twyford, Hillesden, Westcott, Hoggeston, East Claydon, Grendon Underwood, Mursley, Swanbourne, Steeple Claydon, Little Horwood, Granborough, Edgcott, and Addington.

The Grade I Registered Park and Garden of Wotton House extends slightly into the Section B3-3 corridor from Section B3-2. The park is purposely aligned with views towards Grove Wood to the east.

The Waddesdon Manor Grade I Registered Park and Garden extends approximately 2.3 kilometres into the corridor from the south. The Grade I listed buildings of Waddesdon Manor house are situated on Lodge Hill above the surrounding parkland and long views extend from various parts of Lodge Hill, including west towards Wotton Underwood and beyond, and east to Aylesbury and the Chiltern Hills in the distance.

Section B3-4

There are 60 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section B3-4 comprising:

- 14 scheduled monuments
- 5 Grade I listed buildings
- 40 Grade II* listed buildings
- 1 Grade I Registered Park and Garden

There are a further 454 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section B3-4 comprising:

- 433 Grade II listed buildings
- 20 Conservation Areas
- 1 Grade II Registered Park and Garden

The Roman town of Magiovinium scheduled monument is situated on the edge of Bletchley and Fenny Stratford and is divided by the Roman Watling Street. It is roughly bounded by the current A4146 and A5. There are 2 further scheduled monuments, a medieval manor and a shrunken medieval village, within the constituent towns of Milton Keynes.
The Danesborough Camp prehistoric hillfort and the medieval Motte castle 200m south east of Wavendon Manor scheduled monuments both survive well archaeologically and are good example of their class.

Further medieval scheduled monuments within this section of the corridor include the Bolebec motte and bailey castle, the medieval hamlet of Littlecote, and the site of the Deserted village at Creslow.

‘The Hoult’ scheduled monument survives in earthwork form and comprises a relatively large site which extends approximately 200 metres into the corridor and is situated on open agricultural land. There is also a more discrete moated site scheduled monument at Stewkley.

There are Grade I and Grade II* listed buildings in West Bletchley, Stewkley, Newton Longville, Aspley Guise, Bletchley and Fenny Stratford, Soulbury, Husborne Crawley, Wavendon, Drayton Parslow, Great Brickhill, Stoke Hammond, Ridgmont, Little Brickhill, Bow Brickhill, and Aspley Heath.

The Grade I Registered Park and Garden of Woburn Abbey extends a maximum of 750 metres into the B3-4 corridor. Woburn Abbey is a large and complex site which incorporates 61 listed buildings (7 Grade I, 6 Grade II*, and 48 Grade II) on its grounds; most of which lay outside of the Section B3-4 corridor and study area. The setting of the park is largely agricultural, with some areas of woodland and the villages lying close by. It is bounded to the southwest, northwest, and north by the current A4012 road where it is enclosed by high, red-brick walls.

6.1.5 Landscape and visual

Section B3-1

There are no designated landscapes in this section of the corridor, although there are a number of other designations that are relevant to landscape. These include Oxford green belt. Although green belts are not a landscape designation, they are relevant to LVIA due to the need to consider effects on its openness.

Also of relevance are Nuneham Courtenay, Marsh Baldon, Toot Baldon, Garsington, Little Milton, Great Milton conservation areas and numerous listed buildings whose setting may be affected by the proposals.

The area is characterised by the low lying river Thames floodplain and there are significant areas of ancient woodland within it.

A golf course and playing fields are associated with and adjacent to Radley College.

Sensitive visual receptors include residents on the northern edge of Abingdon, in rural settlements including Garsington, Denton and Cuddesdon, and isolated farmsteads and properties; and users of public rights of way (PRoW) including the Thames Path national trail.

Section B3-2

This section includes part of Brill-Winchendon Hills AAL which is noted for its ‘undulating hills and ridges, with magnificent panoramic views across the strongly scenic and rural landscape.'
Together with the Quainton-Wing Hills they form a series of low, generally open limestone hills with hilltop settlements, between the foot of the Chilterns escarpment and the dip slope of the Cotswolds’.

Poundon Hill LLA lies within this section. It should, however, be noted that the updated Vale of Aylesbury Local Plan (2013 – 2033) Policies Map (November 2017), which has not yet been adopted, no longer shows Poundon LLA. This accords with the Defining the special qualities of local landscape designations in Aylesbury Vale District – Final Draft Report (LUC, March 2016) that forms part of the landscape supporting evidence, and which recommends the Poundon Hill LLA is not worthy of local landscape designation.

Other relevant designations include the Oxford green belt and Wotton House RPG grade I. There are also significant blocks of ancient woodland, including Bernwood Forest ancient woodland immediately adjacent to the M40.

The area is characterised by the low lying River Ray floodplain.

Sensitive visual receptors include residents in villages and scattered properties including residents of Ambrosden and Blackthorn, and users of PRoW. Some visual receptors already experience views of the M40.

**Section B3-3**

The Quainton - Wing AAL lies within the southern part of the corridor which is noted for its ‘Undulating hills and ridges with distant panoramic views across the strongly rural and picturesque landscape’ forming ‘a series of low, generally open limestone hills with hilltop settlements, between the foot of the Chilterns escarpment and the dip slope of the Cotswolds. The prominent hills form a backdrop to many views in the district. Nucleated villages create texture, a sense of history, variety and rhythm. The strong sense of history is present in the many conservation areas, scheduled monuments and landscape features such as ridge and furrow and irregular enclosed fields’.

Other relevant designations include Claydon RPG grade II and Claydon House (NT); along with Middle Claydon, Addington, Winslow, Great and Little Horwood, Swanbourne, Mursley and Whaddon conservation areas and many listed buildings.

The area is dissected by the disused railway line that is the subject of the East-West Rail Proposals. There is also an area of unregistered but attractive parkland at Addington Manor equestrian centre.

Sensitive visual receptors include residents of the villages of Twyford, Steeple Claydon, Middle Claydon, Verney Junction, Addington, the urban edge of Winslow, Great and Little Horwood, Swanbourne, Mursley and Whaddon.

**Section B3-4**

The majority of the western part of this section lies within the Brickhills AAL with the exception of a narrow area of non-designated land adjacent to the urban edge of Milton Keynes. Brickhills AAL is noted for its ‘distinct landform with wooded scarp slopes and interspersed agricultural areas and heathland’, and ‘open and panoramic views from the hilltops across the landscape of the Vale of Aylesbury to the Quainton Wing hills’.
To the east the AAL shares a boundary with the London Metropolitan green belt that extends beyond the extent of the corridor.

Other important designations include Woburn Abbey RPG grade I to the east of the corridor and Woburn, Aspley Heath, Aspley Guise and Husborne Crawley conservation areas. There is also a small area of common land south of Great Brickhill and the area is crossed by numerous PRoW including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths.

There are significant areas of woodland south and east of Brickhill and east of Woburn Abbey which includes areas of ancient woodland.

The area south of Aspley Heath includes extensive areas of heathland and woodland and includes Woburn Golf Course. Stockgrove Country Park also features within the area.

Sensitive visual receptors include residents on the southern edge of Milton Keynes, particularly the Lakes Estate area; residents in the rural villages and individual houses; and also users of PRoW and Stockgrove Country Park.

6.1.6 Nature conservation

There are two key areas within corridor B3, with numerous sites of nature conservation interest: east of Bletchley and south of Bicester. The southern eastern edge of the corridor generally has fewer designated areas along its length.

Section B3-1

The key sensitive features within the corridor are Cothill Fen SAC; 3 SSSI, 27 AW, and a cluster of veteran trees associated with Radley College grounds. As with section A-1, only a very small section of Cothill Fen SAC and its constituent SSSI intersect the corridor, immediately west of Abingdon Airfield. Two small SSSIs are situated on the west and southern edge of the corridor, one within Abingdon Airfield and the second to the airfield’s south west corner. The main constraint within the section is AW associated with Bagley Wood on the northern edge of the corridor near Kennington.

With respect to Tier III sites, 1 LNR, 14 LWS and 3 Proposed LWS lie within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise Cothill Fen SAC and Oxford Meadows SAC, 12 SSSI, and 1 NNR. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 45 AW, 1 LNR, 29 LWS and 9 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section B3-2

The key sensitive features within the corridor are 9 SSSI and 38 AW. As with section B2-2, the area between the M40 and the A40 is heavily constrained as a result of the presence of both SSSI and AW designated sites. These are associated with Holton Wood; Waterperry Wood; Hell Coppice and woodland to its north. Whitecross Green Wood and Rushbeds Wood lie further to the north and north east respectively although the alignment of the section
means Rushbeds Wood is centralised within it. The SSSI associated with Otmoor is located on the western boundary of the section.

With respect to Tier III sites, Otmoor RSPB reserve, 48 LWS and 2 Proposed LWS lie within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 15 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 58 AW, Otmoor RSPB reserve, 61 LWS and 4 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section B3-3

The key sensitive features within the corridor are 4 SSSI and 49 AW. Although this section is wider than section B2-3 along its southern boundary, there are no Tier I designations within this additional area so the constraints for each section are the same, albeit with a greater opportunity for route alignment in section B3-3. With respect to Tier III sites, 38 LWS lie within the section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 8 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 71 AW and 45 LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section B3-4

The key sensitive features within the corridor are 4 SSSI, 21 AW and 1 NNR. This section is slightly larger at the south western extent than section B2-4 and there are no Tier I constraints within this additional area. The constraints for each section are therefore the same, albeit that there is potentially more opportunity for route alignment given the larger area in section B3-4. With respect to Tier III sites, 1 LNR and 38 LWS lie within the section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 4 SSSI and 1 NNR. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 27 AW, 1 LNR and 58 LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

6.1.7 Geology and soils

Section B3-1

The bedrock geology of Section B3-1 broadly comprises a geological succession of sandstones, mudstones and some limestone of decreasing age, gently dipping to the south-east, from the oldest Upper Jurassic Ancholme Group and Corallian limestones to the Lower Cretaceous Gault Formation. Superficial deposits are absent from large parts of Section B3-1 but sand and gravels and alluvium are common where they do occur, with Diamicton head deposits also common east of the River Thames.

The sites of geological importance present within Section B3-1 are summarised below:
Cothill Fen: this is a mixed biological and geological SSSI, which is in a favourable condition, the tip of which slightly extends into the southwest of Section B3-1. The SSSI supports nationally rare calcareous fen and moss-rich mire communities together with associated wetland habitats; palaeovegetation can be interpreted from peat samples. Cothill Fen is also designated as a SAC.

Dry Sandford Pit: this mixed biological and geological SSSI is situated in the southwest of section B3-1 and is in a favourable condition. A sequence of limestone rocks, formed during the Jurassic period in shallow coastal waters and containing fossil ammonites, is exposed at this site. The site is also designated as a LGS, the area of which is greater than the SSSI footprint.

Sugworth: a geological SSSI in favourable condition sited adjacent to the A34 in the southwest of Section B3-1. The site is designated for its rare inland interglacial sediments containing various fossil remains.

Two MSGAs are present in Section B3-1: one designated for soft sand in the southwest of the section and another in the centre designated for sharp sand and gravel; the latter covers two-thirds of the width of the corridor.

The EA website identifies Radley PFA Lagoons, an authorised landfill site that extends into Section B3-1, southeast of Radley.

The EA website also lists a number of relatively small historical landfills (the largest has a total area of approximately 5.7 ha), mainly in southwestern and central parts of Section B3-1. A detailed review of potentially contaminative land uses is not possible at this stage, but notable current and historical land uses include Abingdon Airfield/Dalton Barracks (a semi-active historical RAF site) and Oxford sewage treatment works.

Groundsure COMAH data indicate that a site located just a few metres within the 250m buffer zone of the corridor was historically listed under the Notification of Installations Handling Hazardous Substances Regulations 1982 (NIHHS hereafter), registered to Johnson and Company.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA.

There are no active, dormant or historic mineral extraction sites recorded in the area based on BritPits data provided by the BGS.

Section B3-2

The bedrock geology of Section B3-2 is similar to B2-2 with a succession of sandstones, mudstones and some limestone of decreasing age, gently dipping to the southeast, with Upper Jurassic Ancholme Group present across much of the northern section, and Corallian limestones to the south and east. There are inliers of Great Oolite limestone in the north, and some outliers of Portland Group and Lower Cretaceous Wealden around Shotover and Muswell Hill, and Gault at Long Crendon.

Superficial deposits are mostly absent from Section B3-2 but alluvium and river terrace deposits are present in association with watercourses in the area.
The Muswell Hill geological SSSI is located within the centre of Section B3-2 and is in favourable condition. The site has considerable potential for research in Jurassic/Cretaceous dating and palaeogeography.

The Buckinghamshire proposed MSGA is present within Section B3-2, almost spanning the width of the corridor in a couple of locations. There are no operational, dormant or historical quarries recorded in the area.

The EA website identifies an authorised landfill (Wheatley Railway Cutting, that is present in the southeast of Section B3-2. The EA website also lists 4 small historical landfills that are in Section B3-2. Other potentially contaminative current and historical land uses include RAF Oakley, Arncott Ordnance Depot, Piddington Depot, Graven Hill, Otmoor Range, St George’s Barracks, sewage works and Pear Tree Farm airfield.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA. No COMAH sites are recorded.

Section B3-3

The bedrock is composed mainly of mudstone, siltstone and sandstone of the Upper Jurassic Ancholme Group. At Quainton and Oving there are outliers of Late Jurassic Portland and Purbeck Group limestone, calcareous sandstone and interbedded mudstone.

Superficial deposits are absent from over half of Section B3-3, particularly in the southwest. Where present, they comprise mainly glacial till, glacial sand and gravel and alluvium around watercourses.

There are no sites of geological importance within Section B3-3, however it should be noted that data for LGS in the area are not yet available; these will be available at Stage 1B.

The proposed Buckinghamshire MSGA for sand and gravel is present across a large proportion of Section B3-3, almost spanning the width of the corridor in places. Milton Keynes MSGA for sand and gravel is located in the north-eastern extent of the section.

A dormant quarry, Woodham Brickworks, mining clay and shale of the Weymouth Member, is located within the west of the section. An historical quarry which mined clay and shale of the Peterborough Member, Calvert Brickworks (now Calvert Landfill), is also located within the west of the section.

The EA website identifies an authorised landfill, Calvert Landfill, that is located in the west of Section B3-3. The EA website also lists 6 historical landfills, which are present within Section B1-3, the largest of which are not far to the northeast of Calvert Landfill.

Other potentially contaminative current and historical land uses include RAF Little Horwood and a large (approximately 7 ha) electricity grid substation. Although not shown in Groundsure data, a former RAF airfield, RAF Westcott, was located in the southwest of Section B3-3. Two historical COMAH sites are also listed at this location associated with Westcott British Aerospace and Aylesbury Compressor Station.

Section B3-4
Bedrock geology in Section B3-4 comprises, mudstone, siltstone and sandstone of the Ancholeme Group in the west and north of the section, and sandstone and mudstone of the Lower Cretaceous Lower Greensand Formation in the east to southeast.

Glacial till dominates the superficial geology in the west of Section B3-4, with glaciofluvial deposits also common. Alluvium and river terrace deposits surround the River Ouzel and Grand Union Canal. East of these watercourses, head deposits of clay, silt sand and gravel are common, as are glacial till, glaciofluvial deposits and chalky boulder clay in the north.

The King’s Wood and Rushmere NNR is located within the eastern centre of Section B3-4; north of Leighton Buzzard. The site lies on an unusual mixture of soils. Much of the wildlife interest is a result of the varied geology of the Lower Greensand and Boulder Clay, which produces different soil conditions for the various habitats.

A Milton Keynes MSGA for sand and gravel extends into the north of the section around Bletchley, with proposed Buckinghamshire MSGAs for sand and gravel to the south and a Bedfordshire MSGA for Woburn Sands southeast of this. Collectively, these areas span the width of the corridor. Another Bedfordshire MSGA for Woburn Sands is present in the northeast of the section and a Bedfordshire MSGA for river valley/glacial sand and gravel extends approximately 10m into the section within the north. An additional proposed Buckinghamshire MSGA for sand and gravel is located within the southwest of the section.

An active quarry is recorded named Bletchley Rail Depot to the northwest of the section. This is recorded in BritPits data as an active quarry however it is expected that this is associated with transport of crushed limestone resources rather than actual quarrying. Rammamere Heath, a dormant quarry within the Woburn Sands Formation, is located in the east of the section.

The EA website identifies 4 authorised landfills that are located within the study area for Section B3-4: Bletchley Landfill located in the northwest, and Rislip Farm located in the south. Sheepcote and Stone Lane Quarry are located adjacent the corridor boundary. Bletchley Landfill is significant in size and currently serves Milton Keynes with planning permission till 2022.

The EA website also lists a number of historical landfills in Section B3-4, that are distributed across the section and with the largest surrounding the authorised Bletchley Landfill. Other potentially contaminative current and historical land uses include brick works, industrial estates and a rifle range.

A site formerly determined as contaminated land under Part IIA of the Environmental Protection Act 1990 is located within the northwest of the section at Buckingham House in Bletchley. The contamination was caused by a heating oil leak from underground pipework but was remediated. Another site in Bletchley formerly determined as contaminated land under Part IIA is listed in George Street, caused by diesel leaking from a disused underground tank; the site has now been remediated.

A current COMAH site is located just outside of the study area (280m from the corridor boundary) registered to Evonik Goldschmidt UK, which is noted to be a Lower Tier Operator.

### Road drainage and the water environment

Section B3-1

HE565628-JAC-EGN-SCHW_MT-RP-LE-0009 | Rev P01

September 2018
Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 6-1. There are two rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):

- River Thames - Flows south of Oxford and meanders around south-east of Abingdon where it then meanders back in easterly direction towards the A4074
- River Thame (a tributary of the River Thames) - flows in a south-west of the Wheatley Interchange and joins the River Thames at Dorchester-On-Thames.

Flood Zone 2 and 3 associated with the River Thames and River Thame are extensive within this section.

Table 6-1 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th></th>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50.6</td>
<td>136.6</td>
<td>7.6</td>
<td>10.5</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be an approximately 3% increase in the area identified as Flood Zone 3. The Flood Zone map indicates that areas to the south and south-east of Oxford are likely to be at greater risk from fluvial flooding over the lifetime of the development.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 2.1% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 4.0% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASIGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 29% of the study area is within an area of medium to high risk (see Table 6-2).
Table 6-2 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>12.6</td>
<td>• South and east of Abingdon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South-east Oxford</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>15.9</td>
<td>• Central Abingdon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South-east Oxford</td>
</tr>
</tbody>
</table>

Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 6-3.

Table 6-3 Reservoir Breach Extents

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows south of Oxford and meanders around south-east of Abingdon</td>
</tr>
<tr>
<td>2</td>
<td>Flow west of the town, Thame past the M40 and flows in a south-westerly direction towards Warborough</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of previous recorded flooding events from the sea, river and groundwater. According to the EA data set 7.7% of the study area has been recorded to have flooded historically. Flooding has occurred outside Flood Zones 2 and 3 along the identified rivers, it demonstrates that additional areas to the south of Oxford may be at risk of flooding.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

Geomorphology, WFD and Water Quality
Table 6-4 shows the WFD operational catchments and WFD water body catchments which lie within Section B3-1.

**Table 6-4: WFD operational and WFD water body catchments within Section B3-1**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames</td>
<td>Gloucestershire and the Vale</td>
<td>Ock</td>
<td>Northfield Brook (Source to Thames) at Sandford</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Thames (Evenlode to Thame)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ock and tributaries (Land Brook confluence to Thames)</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sandford Brook (source to Ock)</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frilford and Marcham Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td>Thame (Scotsgrove Brook to Thames)</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Baldon Brook (South of Oxford)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Haseley Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Holton Brook and tributaries</td>
<td>Moderate</td>
<td>No</td>
</tr>
</tbody>
</table>

**Groundwater**

Section B3-1:

- Crosses 4 Secondary A bedrock aquifers
- Crosses 2 Secondary A superficial deposit aquifers
- Contains 2 licensed groundwater abstractions
- Contains 4 potential GWDTE
- Contains approximately 10 springs as marked on the OS 1:25,000 map

**Section B3-2**

**Flood Risk**

**Fluvial**

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3
associated with the watercourses in the study area, detailed in Table 6-5. There are two rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):

- River Thame - (a tributary of the River Thames) – flows south-west of the Wheatley Interchange and joins the River Thames at Dorchester-On-Thames
- River Ray - (a tributary of the River Thames) – flows in a south-westerly direction from the A41 towards the south of M40.

Flood Zone 2 and 3 associated with the River Thame and River Ray (including the Otmoor) are extensive within this section.

**Table 6-5 Quantitative Analysis of Rivers and Fluvial Flood Risk**

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>212.8</td>
<td>277.2</td>
<td>16.9</td>
<td>20.0</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 3% increase in the area identified as Flood Zone 3. The Flood Zone map indicates that areas to the south-east of Bicester are likely to be within a greater risk from fluvial flooding over the lifetime of the development.

**Surface Water**

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 4.9% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 8.7% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

**Groundwater**

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASIGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 21% of the study area is within an area of medium to high risk (see Table 6-6).

**Table 6-6 Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
</table>

HE565628-JAC-EGN-SCHW_MT-RP-LE-0009 | Rev P01
September 2018
Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 6-7.

Table 6-7 Reservoir Breach Extents

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows west from Wilstone Reservoir past north-Aylesbury heading south-west towards Thame. It then flows past the M40 and heads in a south-westerly direction towards Warborough.</td>
</tr>
<tr>
<td>2</td>
<td>Flows from North Dorton along the A41 down to Lower Arncott</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA data set 3.6% of the study area has been recorded to have flooded historically. There are no records of flooding outside of the existing Flood Zone 2 and 3.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

Geomorphology, WFD and Water Quality
Table 6-8 shows the WFD operational catchments and WFD water body catchments which lie within Section B3-2.

**Table 6-8: WFD operational and WFD water body catchments within Section B3-2**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Great Ouse Upper</td>
<td>Padbury Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Oxon Ray</td>
<td>Gubbinshole and Broadmoor ditch to Ray (Oxon)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Summerstown Ditch and Launton and Cutters Brook</td>
<td>Bad</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Oxon Ray (upstream A41 to Cherwell) including Otmoor</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Langford Brook (Bicester to Ray inc Gagle Brook)</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ray and tributaries NorthEast of Grendon Underwood</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tetchwick Brook, Source to Ray and tribs</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ludgershall Brook and Muswellhill Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Langford Brook (source to downstream A41)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td>Thame</td>
<td>Thame (Aylesbury to Scotsgrove Brook)</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Thame (Scotsgrove Brook to Thames)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Latchford Brook at Tetsworth</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Peppershill and Shabbington Brooks</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Worminghall Brook and tributaries</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dorton, Chearsley and Waddesdon Brooks</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Holton Brook and tributaries</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Groundwater*
Section B3-2:

- Crosses a limestone Principal bedrock aquifer (underlies less than 10% of the section)
- Crosses 3 Secondary A bedrock aquifers
- Crosses 2 Secondary A superficial deposit aquifers
- Contains 1 licensed groundwater abstraction
- Contains 7 potential GWDTE
- Contains approximately 26 springs as marked on the OS 1:25,000 map

Section B3-3

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 6-9. There are four rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):

- River Ray (a tributary of the River Thames) – flows in a south-westerly direction from the A41 towards the south of M40
- Padbury Brook (a tributary of the River Great Ouse) – flows in south-easterly direction from the A421, near M40 J10. It then meanders and heads north towards Buckingham before joining the River Great Ouse
- Claydon Brook (a tributary of the River Great Ouse) – flows in a south-westerly direction past the A413, joining the Padbury Brook
- Tributaries of the River Thame – flow south-east joining the River Thame running parallel to the A418.

Flood Zone 2 and 3 associated with the River Ray is extensive within this section.

**Table 6-9 Quantitative Analysis of Rivers and Fluvial Flood Risk**

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>71.8</td>
<td>371.1</td>
<td>4.4</td>
<td>5.4</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be...
approximately 1% increase in the area identified as Flood Zone 3. The Flood Zone map indicates that areas to the south-east of Winslow are likely to be within a greater risk from fluvial flooding over the lifetime of the development.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 4.7% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 7.6% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASTGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 12% of the study area is within an area of medium to high risk (see Table 6-10).

**Table 6-10 Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>1.0</td>
<td>• No major settlements</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>11.1</td>
<td>• North-east Winslow</td>
</tr>
</tbody>
</table>

Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 6-11.

**Table 6-11 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Flows from North Dorton along the A41 down to Lower Arncott</td>
</tr>
<tr>
<td>2 Flows north-east from Buckingham towards north-west of Milton Keynes, following the River Great Ouse.</td>
</tr>
</tbody>
</table>
Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA dataset 0.6% of the study area has been recorded to have flooded historically. There are records of flooding outside Flood Zones 2 and 3 associated with a tributary of the River Great Ouse to the south of the A421.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

Geomorphology, WFD and Water Quality

Table 6-12 shows the WFD operational catchments and WFD water body catchments which lie within Section B3-3.

Table 6-12: WFD operational and WFD water body catchments within Section B3-3

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Great Ouse Upper</td>
<td>Horwood Tributary</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook (DS Granborough)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Padbury Brook (The Twins)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Padbury Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Beachampton Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook Tributary</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weald Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouse (Brackley to Buckingham)</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Ouzel and Milton Keynes</td>
<td>Ouzel US Caldecote Mill</td>
<td></td>
<td>Ouzel US Caldecote Mill</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Newton Longville Brook</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Loughton Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Oxon Ray</td>
<td>Gubbinshole and Broadmoor ditch to Ray (Oxon)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ray and tributaries NorthEast of Grendon Underwood</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tetchwick Brook, Source to Ray and</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Groundwater

#### Section B3-3:

- Crosses a limestone Principal bedrock aquifer (underlies less than 10% of the section)
- Crosses 3 Secondary A bedrock aquifers
- Crosses 3 Secondary A superficial deposit aquifers
- Contains 3 potential GWDTE
- Contains approximately 22 springs as marked on the OS 1:25,000 map

#### Section B3-4

**Flood Risk**

**Fluvial**

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 6-13. There is one Main River within this section that has areas of Flood Zone 3b (functional floodplain):

- River Ouzel (a tributary of the River Great Ouse) – flows from south-west Leighton Buzzard through Milton Keynes where it joins the River Great Ouse.

Flood Zone 2 and 3 associated with the River Ouzel is moderate within this section.
Table 6-13 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>36.0</td>
<td>217.6</td>
<td>2.9</td>
<td>3.5</td>
</tr>
</tbody>
</table>

The detailed hydraulic model for Central Bedfordshire Council has been used to assess the potential future extent of Flood Zone 3 as a result of climate change (upper end, 65% climate change allowance has been assessed). In the absence of hydraulic modelling for all other areas the extent of Flood Zone 2 has been adopted to assess future Flood Zone 3 extent. The assessment identifies that there will be approximately 1% increase in the area identified as Flood Zone 3. The Flood Zone map indicates that areas in the outskirts of Bletchley are likely to be within a greater risk from fluvial flooding over the lifetime of the development.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 2.3% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 4.3% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s AStGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 18% of the study area is within an area of medium to high risk (see Table 6-14).

Table 6-14 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>5.7</td>
<td>• North Leighton Buzzard</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>12.4</td>
<td>• South-east of Bletchley</td>
</tr>
</tbody>
</table>

Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding...
should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 6-15.

**Table 6-15 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows north through Milton Keynes Center where it continues to follow the River Great Ouse</td>
</tr>
<tr>
<td>2</td>
<td>Flows north-east from Woburn towards the M1 where it continues to flow in parallel with the M1 where it continues to follow the River Ouzel</td>
</tr>
</tbody>
</table>

**Historic Flooding**

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA data set 2.4% of the study area has been recorded to have flooded historically. There are records of flooding outside of the existing Flood Zone 2 and 3 associated with the River Ouzel, identifying additional areas on the outskirts of Bletchley towards Leighton Buzzard to be at risk.
Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However, further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

Geomorphology, WFD and Water Quality

Table 6-16 shows the WFD operational catchments and WFD water body catchments which lie within Section B3-4.

Table 6-16: WFD operational and WFD water body catchments within Section B3-4

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Ivel</td>
<td>Flit tributary</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Running Waters-Steppingley</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Great Ouse Upper</td>
<td>Claydon Brook</td>
<td></td>
<td></td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td>Ouse and Milton Keynes</td>
<td>Broughton Brook</td>
<td></td>
<td>Poor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ouzel US Caldecote Mill</td>
<td></td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ledburn Brook</td>
<td></td>
<td>Moderate</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Newton Longville Brook</td>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loughton Brook</td>
<td></td>
<td>Moderate</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clipstone Brook Tributary</td>
<td></td>
<td>Good</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ouzel (US Clipstone Brook)</td>
<td></td>
<td>Moderate</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Thames</td>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td>Hardwick Brook (Source to Thame)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fleet Marston Brook, Denham Brook, Pitchcott Brook west</td>
<td>Poor</td>
<td>No</td>
</tr>
</tbody>
</table>

Section B3-4 also traverses 1 artificial WFD water body, Grand Union Canal, Milton Keynes trough pound.

Groundwater

Section B3-4:

- Crosses a sandstone Principal bedrock aquifer (underlies 25 to 50% of the section)
- Crosses 1 Secondary A bedrock aquifer
- Crosses 3 Secondary A superficial deposit aquifers
• Contains 2 SPZ1s associated with licenced potable abstractions
• Contains 2 SPZ2s associated with licenced potable abstractions
• Contains 2 SPZ3s associated with licenced potable abstractions
• Contains 9 licensed groundwater abstractions
• Contains 3 potential GWDTE
• Contains approximately 15 springs as marked on the OS 1:25,000 map

6.2 Environmental assessment

6.2.1 Air quality

6.2.1.1 Key findings

Section B3-1

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section B3-1 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes routes to the north of Abingdon.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The changes in traffic flow look to provide reductions in traffic within part of the Abingdon AQMAs.

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

• The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential Oxford CAZ, which may be in place by then.

• The projected Defra background concentrations for 2025 do not identify exceedances in NOx (7.6-15.8 μg/m³), NO₂ (5.9-11.7 μg/m³) and PM₁₀ (11.8-15.2 μg/m³).

Section Impacts
It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Oxford and Abingdon), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section B3-2

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section B3-2 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes J8a of the M40.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- There are no PCM links in this corridor section.
- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.1-9.2 μg/m³), NO₂ (4.8-7.0 μg/m³) and PM₁₀ (10.9-15.2 μg/m³).

Section Impacts

It is assumed that the benefits in some locations may be balanced by dis-benefits in similar locations with similar air quality concentrations, although traffic may be rerouted from the more densely populated areas (e.g. Bicester), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This may result in improvements in air quality concentrations at some sensitive receptors.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance
of these potential impacts cannot be assessed. On this basis, the corridor section has been assessed as neutral.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section B3-3

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section B3-3 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes links to the north of Winslow.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate main routes through Winslow that could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- There are no PCM links in this corridor section.
- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (5.7-10.3 μg/m³), NO2 (4.5-7.8 μg/m³) and PM10 (10.5-13.5 μg/m³).

Section Impacts

It is assumed that the benefits in some locations may be balanced by dis-benefits in similar locations with similar air quality concentrations, although traffic may be rerouted from the more densely populated areas (e.g. Buckingham, Winslow and Aylesbury), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This may result in improvements in air quality concentrations at some sensitive receptors.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed. On this basis, the corridor section has been assessed as neutral.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section B3-4
Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section B3-4 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes links on the A4146 and A5.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes to the south of Milton Keynes could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.1-14.5 μg/m³), NO₂ (4.7-10.8 μg/m³) and PM₁₀ (11.0-16.4 μg/m³).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Milton Keynes), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Overall

The available information highlights the AQMAs within Corridor B3 (Abingdon, and Oxford), and the ongoing exceedances of the relevant AQOs. The corridor includes parts of large urban areas including Abingdon, Oxford, Thame, Bicester, Winslow and Milton Keynes, as well as a number of designated sites.

Corridor B3 has approximately 60,000 air quality sensitive receptors that could be impacted (both adversely and beneficially) by route options through this corridor. The monitoring
exceedances within the AQMAs highlights the opportunity to reduce congestion in these areas and potentially improve air quality within the AQMAs.

### 6.2.1.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3-1</td>
<td>Avoidance of AQMAs (and journey re-routing through them).</td>
</tr>
<tr>
<td></td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
<tr>
<td>B3-2</td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
<tr>
<td>B3-3</td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
<tr>
<td>B3-4</td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
</tbody>
</table>

#### 6.2.2 Noise and vibration

##### 6.2.2.1 Key findings

The effect of traffic noise on sensitive receptors is very sensitive to exact alignment, which is not known at this early stage of scheme development. The qualitative key findings for this study area are based on indicative predictions of how sensitive receptors could be impacted based on whether the ultimate route alignment is ‘on-line’ (following an existing main road) or ‘off-line’ (creating a new main road).

If the route alignment was to be ‘on-line’ for the relevant sections of the A34, M40 and A4146 within the study area, there is potential for sensitive receptors nearby to these roads (e.g. Abingdon, Shippon and Stoke Hammond), including a number of NIAs, to experience adverse noise effects as traffic possibly moves closer, and/or traffic flows and speeds increase. Significant adverse effects are possible.

Should the route alignment move ‘off-line’ from the A34, M40 and A4146, then sensitive receptors near these roads would have the potential to experience beneficial effects. The beneficial effects would be dependent on whether vehicles would be diverted away from the A34, M40 and A4146, thus reducing the amount of traffic on those roads, with the ‘off-line’ alignment. Settlements set back from the A34 (i.e. Sunningwell and Bayworth), M40 (i.e. Oakley and Boarstall), and the A4146 (i.e. Little Brickhill and Great Brickhill) could be adversely affected should an ‘off-line’ route alignment be introduced near to such settlements.

The sensitive receptors located in the large rural areas where the route either would, or has the potential to be, ‘off-line’ may experience adverse effects due to the introduction of a new noise source. These include Little London, Radley, Sandford-on-Thames, Blackbird Leys, Toot Baldon, Garsington, Cuddesdon Worminghall, Chilton, Brill, Arncott (including the Army barracks), Ambrosden, Blackthorn, Piddington, Ludgershall, Marsh Gibbon and Launton, Twyford, Charndon, Calvert, Steeple Claydon, East Claydon, Addington, Winslow, Little Horwood, and Mursley. This also includes numerous individual receptors throughout the rural areas. The ultimate route alignment is key in determining the potential effect for such receptors.

For the larger settlements of Abingdon, the southeast of Oxford, Bicester, Bletchley and the southeast of Milton Keynes, the sensitive receptors on the boundaries of these settlements...
could be adversely affected through the introduction of a new route. The effects would depend on the proximity of the route alignment to the settlement boundaries. The same sensitive receptors could potentially be beneficially affected if the route alignment bypasses the larger settlements. Similar effects could occur for the NIAs in the settlements.

The indicative traffic data shows potential noise benefits between Bicester and Buckingham along the A4421 and between Buckingham and Milton Keynes along the A421, resulting from possible reduction in traffic on these roads. In addition, potential noise benefits are observed between Abingdon and Thame (A415, B4015 and the A329) resulting from possible reductions in traffic on these roads. Furthermore, several roads to the east of Leighton Buzzard (A4012 and A505), within Oxford (A4142 and B4495), east of Milton Keynes (A4146 and A421), within Aylesbury (town centre roads) and Bicester (A4095, B4100 and B4030) show potential noise benefits. Receptors located nearby to these roads, including a number of NIAs, could therefore potentially experience noise reductions from the corridor option.

The indicative traffic data shows potential adverse noise effects for a number of minor roads on the road network. Receptors located nearby to these roads could experience noise increases from this corridor option.

The construction of a new or improved highway requires the use of noise and vibration emitting plant. Sensitive receptors that will be situated close to the ultimate route alignment would have the potential to be exposed to adverse noise and vibration effects from such works. This would particularly apply to those receptors in proximity to potential ‘off-line’ carriageway alignments within the large rural areas that could be associated with Corridor B3.

Sensitive receptors located adjacent to existing ‘on-line’ road sections where road widening would be likely as a result of the scheme (e.g. sections of the A34, M40 and A4146), would already be exposed to high ambient noise levels. Nevertheless, potential adverse effects may still be possible for nearby receptors.

Given the transient nature of the majority of the construction activities, any adverse noise and vibration effects experienced by sensitive receptors would be limited in duration. This reduces the potential for significant effects to arise. Nevertheless, any effects would be minimised through the use of specific mitigation measures and controlled via the relevant Local Authority’s Environmental Health departments.

### 6.2.2.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3-1</td>
<td>The typical mitigation measures that would be considered are as follows:</td>
</tr>
<tr>
<td></td>
<td>• Thin Surfacing (Low Noise Road Surfacing) – In accordance with HD 213/11, low noise surfacing provides a benefit, relative to traditional Hot Rolled Asphalt of 3.5 dB(A) at speeds of 75kph and above. Such a measure can be</td>
</tr>
</tbody>
</table>
considered a holistic mitigation measure, as it reduces noise at source for the entire scheme.

- Noise Bunds and Noise Barriers – Earth bunds or noise barriers of sufficient length and height can provide attenuation above 10 dB(A). It is anticipated that such measures would be employed through the scheme, with noise barriers more likely at ‘on-line’ sections and within built-up areas, and bunds employed within the more rural areas.

It is anticipated that all work would be undertaken to the guidance detailed in BS 5228: 2009+A1:2014 – Parts 1 and 2. These standards contain various measures to mitigate noise and vibration from construction works and centre around the principle of a ‘best practicable means’ approach.

### 6.2.3 People and communities

#### 6.2.3.1 Key findings

**Section B3-1**

For all sections there is potential for a new route to cause significant effects on sensitive receptors. Potential impacts include the loss of land and property for some residents, landowners and businesses and loss of amenity to local recreational assets (including PRoW) and communities from the introduction of new expressway infrastructure into areas that are currently relatively rural. Such impacts may give rise to effects on physical and mental health, access, land use and viability of businesses.

**Section B3-1**

There is potential loss of amenity and adverse effects on wellbeing for residents in communities close to where new highway infrastructure would be introduced, notably the Woodland, Pebble Hill and Bigwood park home estates and properties along Sugworth Lane (north of Radley).

A route in this area could potentially result land-take from Radley College’s grounds and golf course.

Some loss of best and most versatile agricultural land is considered likely in this section.

**Section B3-2**

Whilst there is potential for loss of best and most versatile land within the southern part of this section, there is scope to avoid most other people and community constraints.

**Section B3-3**

Development of route in this section would likely result in the loss of some isolated residential properties, with consequent adverse wellbeing effects on individuals. Careful route alignment would avoid significant effects on existing communities.

**Section B3-4**
This section is very constrained in the Woburn Sands area. Development of a route here would likely result in significant adverse effects caused by community severance and loss of amenity for local communities.

Overall

The constrained nature of the Woburn Sands area means that there is likely to be significant community severance from route options within this corridor. However, throughout the rest of the corridor there is scope to avoid significant community severance.
6.2.3.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3-1</td>
<td>Select a route alignment that minimises impacts on nearby communities, whilst maintaining viability of recreational assets. Good route alignment is required to minimise impacts on agricultural viability, for example by maintaining tenable field sizes. Any proposed widening of the A34 or other existing roads should seek to avoid sensitive features such as playing fields and cemeteries.</td>
</tr>
<tr>
<td>B3-2</td>
<td>Good route alignment is required to minimise impacts on agricultural viability, for example by maintaining tenable field sizes.</td>
</tr>
<tr>
<td>B3-3</td>
<td>Design to minimise disruption to local communities as far as practicable.</td>
</tr>
<tr>
<td>B3-4</td>
<td>Seek to avoid community severance. Should this not be achievable, then seek to build in cycle and pedestrian networks between communities severed by the new route, to create improved active travel opportunities between local community destinations. This could contribute to health benefits in the longer term.</td>
</tr>
</tbody>
</table>

6.2.4 Cultural heritage

6.2.4.1 Key findings

Section B3-1

The 3 settlement site scheduled monuments are moderately discrete areas on the fringes of the corridor which could be avoided with careful design; although it should be noted that the presence of this type of asset may be indicative of further associated unknown archaeological remains of potentially High value outside of the scheduled area. The 5 scheduled monuments within Abingdon and the 1 scheduled monument within Garsington are well screened by the current built environment, and are unlikely to be significantly affected.

Within Abingdon the 278 listed buildings, 1 Grade II Registered Park and Garden, and 3 Conservation Areas are at least partially screened from new development, particularly if the route were to remain online with the current A34. However, there is still the potential for significant adverse effects on the setting of these assets through noise and visual intrusion during construction and operation. The remaining listed buildings are primarily located in groups within smaller villages which provide some screening; however, those on the fringes of the built up area or on higher ground have a higher potential to be more adversely affected by noise and visual intrusion during operation and construction. Those listed buildings within Toot Baldon, Garsington, and Cuddesdon Denton are also located relatively central to the corridor, meaning that they are more likely to be next to any new development and to be adversely affected. There are also a small number of Grade II listed buildings that are located independently in more rural settings which may be significantly affected by noise and visual intrusion from construction and operation of any offline development.

A cluster of 13 listed buildings (12 Grade II, 1 Grade II*) are located within 350 metres of the current A34 in an area where online development is possible. In particular, the Grade II Manor Preparatory School and Manor Cottage, as well as the Grade II* listed barn associated with the Manor Preparatory School, are within 100 metres of the current A34 and, although they are currently well screened, there is the potential for significant effects to their ...
setting from noise and visual intrusion during construction and operation of any online development.

The Grade I Registered Park and Garden of Nuneham Courtenay extends approximately 450 metres into the Section B3-1 corridor from the south; however, it is situated on low, undulating hills with a steep slope towards its western boundary created by the River Thames. This situation creates important long views west towards Abingdon and north towards Oxford. The Grade II* Registered Park and Garden of Garsington Manor is much smaller in size, but is located more centrally within the corridor. Again, the rural setting and long panoramic views to the south to the Wittenham Clumps on the Sinodun Hills, and beyond these the Berkshire Downs in the far distance, contribute to the value of this asset.

Section B3-2

The moated sites, the Brill earthworks and pottery kilns, and the town cross scheduled monuments are discrete and well defined assets, some of which are sheltered by the surrounding built environment, and which could be avoided through careful design. The Thomley and Boarstall Deserted Medieval Villages are both located within 500 metres of the current M40 and any online development has the potential for an adverse impact on these assets through the removal of archaeological remains. It should be noted that the presence of assets of an occupational nature may be indicative of further associated unknown archaeological remains of potentially high value outside of the scheduled area.

The listed buildings tend to be grouped in small clusters of designated assets and have varying levels of screening from the surrounding built environment and vegetation. There are, however, a moderate number of listed buildings that are situated independently within a more rural environment. The spread of these assets across the Section B3-2 corridor suggests that adverse impacts to the setting of these assets should be avoidable through careful design of any possible offline sections; however, all of the listed buildings have the potential for adverse effects to their setting from noise and visual intrusion during construction and operation. The majority of listed buildings within this corridor are situated a good distance from the current M40 and have at least partial screening. Online development would therefore be unlikely to cause a significant adverse effect on these assets. A small number of Grade II listed buildings are within 500m of the current M40; significant effects from noise and visual intrusion during construction and operation on these assets cannot be ruled out if near to an area of online development.

The Grade I Registered Park and Garden of Wotton House extends from within the Section B3-2 corridor and into Section B3-3. A large part of the park is well screened by vegetation. However, the park is purposely aligned with views of the forested areas of Tittershall and Grove Woods to the north and it is situated to command important views to the west, both of which have a potential to be affected by the Proposed Development. Views to the west from the Park are unscreened and the Proposed Development has the potential for significant effects on the setting of the asset from noise and visual intrusion during construction and operation.

Section B3-3

The scheduled monuments within the Section B3-3 corridor are primarily small and discrete or situated in locations where the Proposed Development would be unlikely to have a significant adverse effect on the asset (such as on the very edge of the corridors or within currently built up areas). Although there is the potential for adverse effects on some of the
assets and their settings, these could be avoided through careful design. It should be noted that the presence of settlement sites within this corridor may be indicative of further associated unknown archaeological remains of potentially High value outside of the scheduled area.

Most listed buildings in Section B3-3 are dispersed along the corridor as singular or small groups of assets and are typically situated within very small to small villages and have limited screening. There is therefore a potential significant adverse effect due to noise and visual intrusion during construction and operation on the setting of these assets. The listed buildings are spread out unevenly across the corridor; however, the density is such that mitigation through design may be possible.

The Grade I Registered Park and Garden of Wotton House has an avenue that extends into the corridor. A large part of the park is well screened by vegetation, and the majority of the registered land lies within the Section B3-2 corridor; however, there is still the potential for an adverse effect on the setting of this asset within the Section B3-3 corridor through noise and visual intrusion during construction and operation.

The Grade I Registered Park and Garden of Waddesdon Manor extends approximately 2.3 kilometres into the corridor from the south. A large part of the park is situated on a hill commanding surrounding views. The park and house gains limited screening in the form of vegetation bordering its north-west extent, and from the current village to the north. However, there is the potential for major adverse effects on this asset through the disruption of long views, and noise and visual intrusion during construction and operation.

Section B3-4

The Roman town of Magiovinium scheduled monument flanks the Roman Road of Watling street and is roughly bordered by the river Ouzel, the current A4146 and the current A5. The nature of this site suggests the potential for further unknown archaeological remains of High value associated with this asset that lie outside of the scheduling boundary. Proposed Development online or offline within the vicinity of the A4146, and to the current roundabout would have a potential significant effect on this asset through the removal of archaeological deposits during construction.

‘The Hoult’ scheduled monument extends slightly into the Section B3-4 corridor from the south. It survives in earthwork form and is situated on open agricultural land. Surviving medieval and post-medieval cultivation earthworks in combination with moated sites are rare, and there is the potential for a significant adverse effect to this asset through the removal of scheduled archaeological remains.

The Medieval hamlet of Littlecote and the site of a Deserted Medieval Village at Creslow may be adversely affected by the Proposed Development through the removal of archaeological remains during construction as they are situated within rural and open surroundings; however, it would be possible to mitigate this effect through design. It should be noted that the nature of these sites may also indicate the potential for further archaeological remains of potentially High value to be located beyond the scheduling boundary. The other scheduled monuments within the Section B3-4 corridor are located in positions that are unlikely to be situated within close proximity to the Proposed Development. There is therefore unlikely to be a significant effect on these assets; however, the Danesborough Camp hillfort is specifically located on a prominent hill and the setting of this asset may be significantly affected through noise and visual intrusion during construction and operation.
Sixty-four listed buildings within Section B3-4 are within the built up areas of Bletchley, Milton Keynes and are unlikely to be situated within close proximity to the Proposed Development. It is therefore unlikely that there would be a significant effect on the setting of these assets. The rest of the listed buildings within the corridor are located within small town and village Conservation Areas with a small number of assets situated independently in more rural settings. These assets have varying levels of screening from vegetation and neighbouring properties; however, there is a potential for a significant adverse effects on the setting of these assets through noise and visual intrusion during construction and operation. The spread of the assets is such that mitigation through design should be possible; however, it may be more difficult within the northern section of the corridor where 4 Conservation Areas are situated linearly from east to west.

The Grade I Registered Park and Garden of Woburn Abbey extends a maximum of 750 metres into the B3-4 corridor. The park is bounded on the north by Turnpike Road, and is well screened in this area by dense vegetation. However, without further assessment of the potential noise and visibility of the Proposed Development it is not possible to completely rule out the potential for a significant adverse effect on the Registered Park and Garden and the associated designated asset through noise and visual intrusion during construction and operation.

Overall, the spread and nature of the assets within Corridor B3 suggests the potential for significant adverse effects for which mitigation may be possible.

6.2.4.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3-1</td>
<td>The overall spread and density of the cultural heritage assets in Section B3-1 should allow for a route design that could mitigate the potential significant adverse effects. Of specific note for Section B3-1 is the Nuneham Courtenay Grade I Registered Park which is located on low, undulating hills with a steep slope towards the western boundary created by the River Thames. This situation creates important long views west towards Abingdon and north towards Oxford which would require particular attention in order to mitigate appropriately through design.</td>
</tr>
<tr>
<td>B3-2</td>
<td>The assets within Section B3-2 are evenly spread out across the corridor but are of a low enough density to allow for a suitable route that could mitigate the potential significant adverse effects. Of particular note for Sections B3-2 and B3-3 is the Grade I Registered Park and Garden of Wotton House, which has an avenue that extends into the Section B3-3 corridor and noted views west and north within the Section B3-2 corridor. Sensitive design would be required in order to not impact the setting of this High value asset.</td>
</tr>
<tr>
<td>B3-3</td>
<td>The assets within Section B3-3 are evenly spread out across the corridor but are of a low enough density to allow for a suitable route that could mitigate the potential significant adverse effects.</td>
</tr>
</tbody>
</table>
Of particular note for Sections B3-2 and B3-3 is the Grade I Registered Park and Garden of Wotton House, which has an avenue that extends into the Section B3-3 corridor and noted views north within the Section B3-2 corridor. Section B3-3 also incorporates the Grade I Registered Park and Garden of Waddesdon Manor which also has important views to the north. Sensitive design would be required in order to not impact the setting of these High value assets.

**B3-4**

Overall, the dispersed nature of the assets within Corridor B3-4 has the potential to allow for a suitable route that could mitigate the potential significant adverse effects.

Of particular note for Corridor B3-4 is the Roman town of Magiovinium and Roman fort along the current A4146. Any online development would be likely to have a significant adverse effect on this asset through the removal of archaeological remains. There is also a high density of cultural heritage assets within the north of the corridor comprising the Grade I Registered Park and Garden of Woburn Abbey and 4 Conservation Areas that are situated linearly from east to west restricting the potential for suitable route options in this area.

### 6.2.5 Landscape and visual

#### 6.2.5.1 Key findings

**Section B3-1**

If a route option was developed to the east of the corridor where the landscape is more open and less built up there would potentially be adverse landscape and visual impacts on the setting of the North Wessex Downs and Chilterns AONBs due to the relationship of the designated landscape with the adjacent low lying landscapes and the likelihood of extensive views to and from the AONB. Users of PRoW within the AONBs, including the Ridgeway and Icknield Way national trails, would potentially experience long distance views from high ground.

The corridor runs to the north of Abingdon and south and south east of Oxford and includes the villages of Garsington, Denton and Cuddesdon that are located on undulating higher ground to the north west the corridor. Routes developed in this section could result in adverse visual impacts affecting the residents of these areas along with those in scattered rural properties, and users of PRoW including the Thames Path national trail.

To the west, new or improved routes would be set in the context of the existing built up area and A34 corridor. However, where the corridor crosses the railway and River Thames and River Thame floodplains it is likely to require extensive lengths of embankment or viaduct that could be at odds with the low lying landscape and highly visible. Additionally, there could potentially be secondary landscape impacts if borrow pits are needed to create embankments.
In this section there would be potential for impacts on Radley golf course and Radley College sports fields and the nearby ancient woodland.

Section B3-2

The eastern part of this section is particularly sensitive. There are potential direct impacts on a substantial area of the Brill-Winchendon AAL and registered common land at Brill Common if routes are developed here. There is also potential for indirect impacts on the panoramic views from and the setting of the AAL arising from any route that is located in this area. Additionally, there is potential for impacts on the network of ancient woodlands of Bernwood Forest to the west of the M40.

The central part of the corridor is already impacted upon by the M40. Development of an expressway would create a second piece of major infrastructure in this area; aligning the new route as closely to the M40 would limit the effects of major infrastructure on the wider landscape.

Wotton House RPG grade I lies to the east of the corridor. There is potential for direct impacts on the historic park and indirect impacts on the setting of and views from the historic park.

The corridor includes high ground at Arncott Hill. This is an area associated with industrial and commercial development and, as such, sensitive visual receptors are limited. Having regard for the topography and scattered ancient woodlands it would be difficult to find a route through this area.

The area north of Arncott is characterised by the low lying landscape of the River Ray floodplain and routes developed in this area would likely to require an extensive length of embankment or viaduct that would be highly visible. Additionally, there could potentially be potential secondary landscape impacts if borrow pits are needed to create embankments.

Section B3-3

The southern part of this section is particularly sensitive. Routes developed here would potentially result in direct impacts on the Brill-Winchendon Hills AAL and Quainton–Wing AAL or indirect impacts on the panoramic views from and the setting of the AALs. Additionally, there is potential for impacts on the network of ancient woodlands of Bernwood Forest to the west of the M40. Wotton House RPG grade I and Waddesdon Manor RPG grade I lie partially within the corridor, and there is potential for direct or indirect impacts on this area.

There are less landscape constraints to the north of the corridor. However, routes developed in this section could result in impacts on the setting of and views from Claydon RPG grade II and Claydon House; and also on the unregistered but attractive parkland at Addington Manor.

Section B3-4

The corridor crosses the Brickhills AAL which would be affected by routes developed in this section. Route alignments here would pass through the London Metropolitan green belt and may have an impact on its sense of openness. There is also the potential for direct and indirect impacts on Woburn Abbey RPG grade I including impacts on views and on its setting.
There are extensive areas of heathland and woodland south of Aspley Heath which includes Woburn Golf Course that could be difficult to mitigate.

Whilst the woodland cover provides potential for screening there are numerous PRoWs in this area including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths.

The corridor passes to the south of the Lakes Estate on the southern edge of Milton Keynes. Whilst this area is already affected by the A4146, there is potential for increase visual impacts from the expressway due to the requirements for signs and gantries and from new junction arrangements.

Between the A5 and M1 there are a number of constraints including numerous settlements some with conservation area status, extensive areas of heathland and woodland south of Aspley Heath and a number of golf courses that could be difficult to mitigate if additional land is required for compensation. Routes developed in this section would require grade separated junctions with the A5 and M1 and also a crossing for the railway line, which could result in landscape and visual impacts on residents and users of PRoW and open space.

**Overall**

Development of a route southern and eastern parts of Corridor B3 could result in direct impacts on Quainton–Wing AAL, a substantial area of the Brill-Winchendon Hills AAL and registered common land at Brill Common as well as indirect effects on the setting of these distinctively undulating areas that are noted for their panoramic views. There is also potential for impacts on the networks of ancient woodlands around Radley, Bernwood Forest and Brickhills. Other sensitive constraints in this part of the corridor include Wotton House RPG grade I and Waddesdon Manor RPG grade where there is potential for significant adverse effects including impacts on views and setting. There are also potential adverse effects where the corridor crosses the floodplains of the River Thames, River Thame and River Ray, and Otmoor. A route through these areas would be at odds with the low lying landscape and highly visible.

The landscape is less constrained to the north and west of the corridor, although a route developed here could affect the setting of and views from Claydon RPG grade II and Claydon House and also on the unregistered but attractive parkland at Addington Manor. It may also be difficult to find a route through the high ground at Arnecott Hill due to the topography and scattered ancient woodlands.

Throughout the corridor there are other areas of sensitive landscape. Amongst these are areas of greenspace such as Shotover Country Park and a number of golf courses and sports fields at Radley College.

Any routes developed at the northern extent of the corridor would likely directly impact on the Brickhills AAL. In landscape terms, route options would preferably be located immediately adjacent to the edge of Milton Keynes to minimise the impact on the designated landscape. An eastern route would impact on the openness of the London Metropolitan green belt and potentially on the setting of Woburn Abbey, with the potential loss of extensive areas of heathland and woodland.

Overall, routes developed in this section would likely result in large adverse landscape and visual effects that cannot be mitigated. However, it is likely that a route could be found that
avoids direct loss of the most sensitive constraints of the AALs, common land, RPGs, ancient woodlands and visually sensitive low lying open land.

6.2.5.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3-1</td>
<td>Follow existing A34 as closely as possible and as far as practicable, having regard for other environmental constraints, seek to avoid routes that directly impact on Radley College, associated playing fields and the golf course. Keep vertical alignment as low as possible in the landscape to minimise visual impact. Careful consideration to be given to the location of gantries, lighting and signs to avoid additional visual impacts, particularly close to sensitive visual receptors.</td>
</tr>
<tr>
<td>B3-2</td>
<td>Route selection should seek to avoid blocks of ancient woodland and Brill-Winchendon Hills AAL. The least damaging option would from a landscape perspective would be to align as closely as possible to the existing M40. Careful consideration to be given to the location of gantries, lighting and signs to avoid additional visual impacts, particularly close to sensitive visual receptors.</td>
</tr>
<tr>
<td>B3-3</td>
<td>Investigate alignments to avoid Claydon RPG and Addington Manor - possibly south of Winslow. Seek to avoid direct and indirect impacts on the Quainton - Wing AAL.</td>
</tr>
<tr>
<td>B3-4</td>
<td>Keep route options as close as possible to the existing A4146 corridor to reduce severance of and direct impacts on the Brickhills AAL and other constraints and sensitive visual receptors that are not currently affected by infrastructure. Consideration should be given to creating a buffer/visual screen to reduce visual impacts on residents south of Milton Keynes.</td>
</tr>
</tbody>
</table>

6.2.6 Nature conservation

6.2.6.1 Key findings

For all sections, in addition to direct habitat loss, there is the potential for significant effects on key sensitive features through factors such as habitat fragmentation, air quality changes, hydrological changes, and increased disturbance from changes in noise, vibration and lighting levels. Designated sites lying outside the corridor boundary may potentially be affected by noise and visual disturbance, and changes to air quality as a result of construction and operational phases, or if hydrologically sensitive and connected to areas affected by construction and operational effects. These indirect effects are most likely in the areas where the route alignment is most constrained by designated sites.

Section B3-1

Much of this section corresponds with Section A-1 and the potential impacts on nature conservation sites are considered to be the same. Direct habitat loss from within the SAC, SSSI and LNR should be avoidable through route alignment. However, direct loss of AW, veteran trees and LWS appears to be more difficult to avoid as there are significant extents of
these designations north of Radley College with limited route alignment opportunities given the presence of urban areas.

**Section B3-2**

Direct habitat loss from SSSI, AW and LWS may be challenging given the extent of these areas within the corridor. However, there appears to be the opportunity for appropriate route alignment to avoid the extensive areas of SSSI and AW designation between the A40 and M40. It should be possible to avoid any direct impacts on the RSPB reserve at Otmoor. The presence of LWS throughout the corridor may mean that avoiding direct habitat loss of these sites is potentially more difficult.

**Section B3-3**

The designated areas, in particular SSSI, AW and LWS, are located such that direct habitat loss could be avoidable through appropriate route alignment. However, route alignment options are considered to be constrained by the extents of residential areas in this and the adjacent sections.

**Section B3-4**

The section is relatively constrained in terms of potential route alignment options given the extent of residential areas. It may be possible to avoid direct habitat loss from within SSSI, NNR and LNR, but the extent of LWS and AW are such that direct loss of habitats within these designations may not be possible to avoid.

**Overall**

This corridor has some extensive areas of both Tier I and Tier III constraints. However, the width of the corridor is such that these may be avoided through appropriate route alignment, although this would be challenging given the distribution of residential areas within the corridor.

### 6.2.6.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3-1</td>
<td>There is the potential to avoid most habitat loss to key sensitive features through appropriate route alignment. Mitigation for other effects on key sensitive features could include creation of compensatory habitats, habitat screening by planting/fencing, and appropriate drainage, dust suppression and lighting strategies.</td>
</tr>
<tr>
<td>B3-2</td>
<td></td>
</tr>
<tr>
<td>B3-3</td>
<td></td>
</tr>
<tr>
<td>B3-4</td>
<td></td>
</tr>
</tbody>
</table>

### 6.2.7 Geology and soils

#### 6.2.7.1 Key findings

**Section B3-1**

There is the potential for significant effects relating to SSSIs, however as these are relatively small then careful route selection could likely avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.
MSGAs are present within this section; these sand and gravel resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs in one location spans two-thirds of the corridor width and so it is unlikely to be possible to route around these when taking into account other environmental discipline constraints. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and historical land uses (in particular Radley PFA Lagoons and Abingdon Airfield), however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that the associated impacts could be mitigated.

Section B3-2

There is the potential for significant effects relating to the SSSI site, however as the SSSI is relatively small then careful route selection could likely avoid them. There is no other mitigation that could be applied as the feature is only valuable in its current location and condition.

The resources in the proposed MSGA could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGA almost spans the corridor width in a couple of locations and so it is unlikely to be possible to route around this. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses (in particular the Ordnance depots, RAF site and bombing range), however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

Section B3-3

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the width of the corridor in several locations and so it is unlikely to be possible to route around this. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses (namely Calvert landfill and Westcott British Aerospace site), however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.
Section B3-4

There is the potential for significant effects relating to the NNR site, however careful route selection could avoid this. There is no other mitigation that could be applied as this feature is only valuable in its current location and condition.

MSGAs are present within this section, these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the corridor width and so routing to avoid these features will not be possible. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses in particular Bletchley landfill, however this could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is generally considered possible in terms of engineering and remediation, however in the case of Bletchley this would be a significant constraint given that the landfill serves Milton Keynes and has planning permission till 2022.

Overall

There is the potential for significant effects relating to SSSIs and the NNR site, however as these are relatively small then careful route selection could easily avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the corridor width and so routing to avoid these features will not be possible. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses (in particular Radley PFA Lagoons, Calvert landfill, Westcott Aerospace site and Airfield/RAF sites), however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

6.2.7.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3-1</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span the width of the corridor, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
</tbody>
</table>
6.2.8  Road drainage and the water environment

6.2.8.1  Key findings

Section B3-1

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas to the south and south-east of Oxford.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality

Section B3-1 has the potential for significant effects on 7 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.
Section B3-1 has the potential for significant effects on the water quality of 7 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater

Section B3-1 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and spring discharges.

Section B3-2

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas to the south-east of Bicester.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Geomorphology, WFD and Water Quality

Section B3-2 has the potential for significant effects on 14 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B3-2 has the potential for significant effects on the water quality of 14 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater

Section B3-2 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and spring discharges.

Section B3-3

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.
Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas to the south-east of Winslow.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality

Section B3-3 has the potential for significant effects on 11 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B3-3 has the potential for significant effects on the water quality of 11 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater

Section B3-3 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE and spring discharges.

Section B3-4

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas in the outskirts of Bletchley.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality
Section B3-4 has the potential for significant effects on 5 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B3-4 has the potential for significant effects on the water quality of 5 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater

Section B3-4 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing the two SPZ1s within this section.

Overall

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality

Section B3 has the potential for significant effects on 31 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section B3 has the potential for significant effects on the water quality of 31 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater
Corridor B-3 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing the two SPZ1s within this corridor.

### 6.2.8.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3-1</td>
<td><strong>Flood Risk</strong></td>
</tr>
<tr>
<td></td>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
</tr>
<tr>
<td></td>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
<td></td>
<td>• May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
</tr>
<tr>
<td></td>
<td>• Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.</td>
</tr>
<tr>
<td></td>
<td>• Groundwater mitigation may be required where groundwater flow paths are impeded.</td>
</tr>
</tbody>
</table>

**Geomorphology, WFD and Water Quality**

- Crossing of large WFD water bodies to be avoided through design (embedded mitigation).
- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.
- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.

**Groundwater**

- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- Groundwater abstractions may require monitoring and possible replacement if they are impacted by works.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.

<table>
<thead>
<tr>
<th>B3-2</th>
<th><strong>Flood Risk</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
</tr>
<tr>
<td></td>
<td>• There are areas of significantly small fluvial flood risk, to the east of Oxford, which should ideally be explored in the initial instance.</td>
</tr>
<tr>
<td></td>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
<td>Section</td>
<td>Design, mitigation and enhancement consideration for Stage 1B</td>
</tr>
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<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>• May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td><strong>Geomorphology, WFD and Water Quality</strong></td>
</tr>
<tr>
<td></td>
<td>• Crossing of large WFD water bodies to be avoided through design (embedded mitigation).</td>
</tr>
<tr>
<td></td>
<td>• Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.</td>
</tr>
<tr>
<td></td>
<td>• Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.</td>
</tr>
<tr>
<td></td>
<td><strong>Groundwater</strong></td>
</tr>
<tr>
<td></td>
<td>• Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.</td>
</tr>
<tr>
<td></td>
<td>• Groundwater abstractions may require monitoring and possible replacement if they are impacted by works.</td>
</tr>
<tr>
<td></td>
<td>• Pollution prevention control measures during construction and operation would mitigate potential quality impacts.</td>
</tr>
<tr>
<td>B3-3</td>
<td><strong>Flood Risk</strong></td>
</tr>
<tr>
<td></td>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
</tr>
<tr>
<td></td>
<td>• There are areas of significantly small fluvial flood risk, to the south of Winslow, which should ideally be explored in the initial instance.</td>
</tr>
<tr>
<td></td>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
<td></td>
<td>• May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
</tr>
<tr>
<td></td>
<td>• Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.</td>
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</tr>
<tr>
<td></td>
<td><strong>Geomorphology, WFD and Water Quality</strong></td>
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<td>• Crossing of large WFD water bodies to be avoided through design (embedded mitigation).</td>
</tr>
<tr>
<td></td>
<td>• Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.</td>
</tr>
</tbody>
</table>
### Design, mitigation and enhancement consideration for Stage 1B

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Groundwater**      | - Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.  
                        | - Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.  
                        | - If present, unlicensed groundwater abstractions may require monitoring and possible replacement if they are impacted by works.  
                        | - Pollution prevention control measures during construction and operation would mitigate potential quality impacts.              |
| **Flood Risk**       | - Crossings should be made at locations with the smallest floodplain width.  
                        | - A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.  
                        | - May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.  
                        | - Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.  
                        | - Groundwater mitigation may be required where groundwater flow paths are impeded.                                                  |
| **Geomorphology, WFD and Water Quality** | - Crossing of large WFD water bodies to be avoided through design (embedded mitigation).  
                        | - Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.  
                        | - Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.                                             |
| **Groundwater**      | - Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.  
                        | - Groundwater abstractions (including those for public supply) may require monitoring and possible replacement if they are impacted by works.  
                        | - Pollution prevention control measures during construction and operation would mitigate potential quality impacts.              |
### 6.3  Assessment Summary

#### 6.3.1  Intervention objectives assessment

**Table 6-17 Intervention objective 1 assessment – B3**

<table>
<thead>
<tr>
<th>Discipline</th>
<th>B3-1</th>
<th>B3-2</th>
<th>B3-3</th>
<th>B3-4</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>For sections B3-1 and B3-4 it is assumed that traffic could be rerouted from the more densely populated areas (e.g. Oxford, Abingdon, Milton Keynes etc.), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations), and on this basis would be beneficial overall. For sections B3-2 and B3-3 it is assumed the benefits in some locations would likely be of broadly similar extent to dis-benefits in other locations and on this basis is assessed as neutral. Overall, provided that expressway could be routed away from the more densely populated areas mentioned above, it is expected that net community benefits in terms of air quality could be possible.</td>
</tr>
</tbody>
</table>
| Noise and Vibration | | | | | Overall potential net beneficial effect having regard for: Benefits:  
- Potential positive noise benefits between Bicester and Buckingham along the A4421 and between Buckingham and Milton Keynes along the A421 resulting from possible reduction in traffic on these roads.  
- Potential positive noise benefits between Abingdon and Thame (A415, B4105 and the A329) resulting from possible reductions in traffic on these roads. Disbenefits:  
- Potential increases in noise for receptors adjacent to possible ‘on-line’ sections (A34, A421 – east of M1) due to possible increased traffic and speeds and road widening. Potential for adverse changes in noise at |
People and Communities

Potential for possible adverse effects in section B3-1 on wellbeing within communities.

Potential loss of some BMV in the southern part of section B3-2 although effects could be potentially avoided through careful route design.

Potential community constraints in the Woburn Sands area near Milton Keynes (section B3-4). Community severance maybe avoided within the remainder of the corridor through careful route design.

Overall

Corridor A has been scored light green for this intervention objective reflecting the opportunities for net beneficial effects and assuming that potential effects on people and communities would be reduced through careful route design.

Table 6-18 Intervention objective 2 assessment – B3

<table>
<thead>
<tr>
<th>Discipline</th>
<th>B3-1</th>
<th>B3-2</th>
<th>B3-3</th>
<th>B3-4</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Heritage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It appears that B3 has sufficient flexibility in the corridor to allow for mitigation of significant effects on cultural heritage assets through careful route design.</td>
</tr>
<tr>
<td>Landscape and Visual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B3 does not contain any Tier I landscape constraints. With landscape in mind, any route through section B3-4 would preferably go west of Great Brickhill, Little Brickhill and Bow Brickhill immediately adjacent to the edge of Milton Keynes to reduce the impact on the</td>
</tr>
</tbody>
</table>
**Discipline** | **B3-1** | **B3-2** | **B3-3** | **B3-4** | **Overall** | **Rationale**
--- | --- | --- | --- | --- | --- | ---
AAL designated landscape. The London Metropolitan green belt partially extends across section B3-4 although a route to the west of this section would avoid this.
Nature Conservation |  |  |  |  |  | It is considered that the width of the corridor is such that direct loss of Tier I habitats may be avoidable through appropriate route design but it would be difficult to avoid adverse effects on all designated habitats whilst avoiding other environmental constraints.
Geology and Soils |  |  |  |  |  | The corridor contains a large coverage of Mineral Safeguarding Areas (MSGA’s) which would be unavoidable.
|  |  |  |  |  |  | There are a number of geological SSSI’s along the corridor it may be possible to avoid these constraints through careful route design.
|  |  |  |  |  |  | King’s Wood and Rushmere National Nature Reserve (NNR) located in section B3-4 is of geological interest but it is considered it may be possible to avoid these constraints through careful route design.
|  |  |  |  |  |  | There are a number of authorised landfills and historic landfills within the corridor however it is considered it may be possible to avoid these constraints through careful route design.
Road Drainage and Water Environment |  |  |  |  |  | B3 has the sufficient design flexibility in the corridor to allow for mitigation of significant effects on Tier I road drainage and water constraints through careful route design and mitigation.
|  |  |  |  |  |  | Within all sections, the corridor has the potential to cross areas of FZ3b. In section B3-1, a crossing of the River Thames floodplain would be required. Crossings of FZ3b would also be required in section B3-2. In section B3-4, a crossing of the River Ouzel would be required.
Overall

Corridor B3 has been scored Amber assuming that a route can be developed in section B3-2 to the east of the M40 to avoid significant effects on Tier I nature conservation habitats to the west of the section.

6.3.2 Overall findings

Table 6-19 Summary of B3 environment assessment

<table>
<thead>
<tr>
<th>Score</th>
<th>Intervention objective 1</th>
<th>Intervention objective 2</th>
<th>Intervention objective 3</th>
<th>Strategic objective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Light green – slightly advantageous</td>
<td>Amber – moderately disadvantageous</td>
<td>Grey - neutral</td>
<td>Amber – moderately disadvantageous</td>
</tr>
</tbody>
</table>
7. Corridor C1

7.1 Baseline conditions

7.1.1 Air quality

Section C1-1

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs**: There are four AQMAs within this broad area. These are Oxford AQMA, Botley AQMA, Abingdon AQMA and Cherwell DC AQMA 3. All have been declared due to exceedances in $\text{NO}_2$.

- **Designated Sites**: This broad area includes Barrow Farm Fen SSSI, Frilford Heath, Ponds and Fens SSSI, Cothill Fen SSSI and SAC, Dry Sandford Pit SSSI, Hurst Hill SSSI, Wytham Woods SSSI, Port Meadow with Wolvercote Common and Green SSSI, Oxford Meadows SAC, Hook Meadow and The Trap Grounds SSSI, Pixey and Yarnton Meads SSSI, Cassington Meadows SSSI, Wytham Ditches and Flashes SSSI, Rushy Meadows SSSI, Shipton-on-Cherwell and Whitehill Farm Quarries SSSI, Kirtlington Quarry SSSI, Weston Fen SSSI, Wendlebury Meads and Mansmoor Closes SSSI.

- **Residential Receptors**: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Abingdon, Cothill, Wootton, Bessels Leigh, Cumnor, Botley, West Oxford, Farmoor, Wytham, Lower Wolvercote, Cassington, Yarnton, Kidlington, Shipton-on-Cherwell, Bletchingdon, Kirtlington, Weston-on-the-Green.

- **Sensitive Receptors**: Within the C1-1 boundary, there are approximately 35,000 potential air quality sensitive receptors.

- **Clean Air Zone**: The section is likely to be within the potential Oxford CAZ.

- **PCM Model**: Defra PCM links within this area have been identified on the A415 in Abingdon, and the A4260, A420, A4165, A40 and A34 around Oxford. Concentrations on the links around Abingdon are not exceeding in 2018. However, links around Oxford are elevated and some are exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data**: Cherwell District Council undertake $\text{NO}_2$ monitoring to the north of Oxford. The latest monitoring data indicates locations within the AQMA as exceeding the AQO. Oxford City Council undertake $\text{NO}_2$ monitoring with all sites within the AQMA area. The latest monitoring data indicates concentrations at four locations within Oxford centre as exceeding (or close to). Other locations are below the AQO. Vale of White Horse District Council undertake $\text{NO}_2$ monitoring to the south-east of...
Oxford. The latest monitoring data indicates most locations are below the AQO, however three locations within the Abingdon AQMA are exceeding the AQO.

- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the C1-1 area (at 1km square intervals) are below the relevant AQOs for NOx (8.8-27.2 μg/m³), NO₂ (6.8-18.7 μg/m³) and PM₁₀ (11.9-16.5 μg/m³).

There is potential for air quality benefits at sensitive receptors in Abingdon, Oxford, Yarnton, Kidlington, Kirtlington, Bletchingdon, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Potential to improve journey routing in this area to reduce congestion (and thus emissions) within Oxford, and potentially reducing air quality concentrations within the AQMA.

Section C1-2

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- AQMAs: Section C1-2 includes is one AQMA, Cherwell DC No.4, declared by Cherwell District Council in the centre of Bicester, due to exceedances in the annual NO₂ concentrations.
- Designated Sites: This area includes Ardley Trackways SSSI, Arncott Bridge Meadows SSSI.
- Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include Properties in Bicester, Wendlebury, Chesterton, Middleton Stoney, Caulcott, Wendlebury, Ambrosden, Blackthorn.
- Sensitive Receptors: Within the C1-2 boundary, there are approximately 12,000 potential air quality sensitive receptors.
- Clean Air Zone: The section is approximately 13km from the potential Oxford CAZ.
- PCM Model: Defra PCM links within this area have been identified on the A4421, A41, and A4095, all around Bicester. Concentrations are elevated but not exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: Cherwell District Council undertake NO₂ monitoring in and around Bicester. The latest monitoring data indicates locations within the AQMA are either close to, or exceeding the AQO. Monitoring locations outside of the AQMA show concentrations below the AQO.
- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the C1-2 area (at 1km square intervals) are below
the relevant AQOs for NOx (8.7-14.9 μg/m³), NO₂ (6.7-11.1 μg/m³) and PM₁₀ (12.3-16.3 μg/m³).

There is potential for air quality benefits at sensitive receptors in Bicester, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Potential to improve journey routing in this area to reduce congestion (and thus emissions) within Bicester, and potentially reducing air quality concentrations within the AQMA.

**Section C1-3**

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs:** No AQMA areas have been declared within the C1-3 boundary by either Aylesbury Vale District Council, Cherwell District Council or Milton Keynes Borough Council.

- **Designated Sites:** This area includes Stratton Audley Quarries SSSI, Ardley Cutting and Quarry SSSI, Tingewick Meadows SSSI, Foxcote Reservoir and Wood SSSI, Pilch Fields SSSI, Howe Park Wood SSSI.

- **Residential Receptors:** Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Bicester, Caversfield, Stratton Audley, Buckingham, Padbury, Newton Purcell, Finmere, Tingewick, Thornborough, Great Horwood, Little Horwood, South-west Milton Keynes.

- **Sensitive Receptors:** Within the C1-3 boundary, there are approximately 20,500 potential air quality sensitive receptors.

- **Clean Air Zone:** The section is approximately 18km from the potential Oxford CAZ.

- **PCM Model:** Defra PCM links within this area have been identified on A4095, A413, A421, A422, A4421. Concentrations are not exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data:** Aylesbury Vale District Council undertake NO₂ monitoring at one location within C1-3 area in Buckingham. The latest monitoring data indicates the majority of locations have concentrations below the AQO, with the exception of one location, which is close to exceeding (Market Square). Cherwell Valley District Council undertake NO₂ monitoring at one location within C1-3 area. The latest monitoring data indicates concentrations below the AQO.

- **Defra Background Concentrations:** The Defra background maps indicate 2018 background concentrations across the C1-3 area (at 1km square intervals) are below the relevant AQOs for NOx (7.7-16.4 μg/m³), NO₂ (6.0-12.1 μg/m³) and PM₁₀ (11.4-14.8 μg/m³).
There is potential for air quality benefits at sensitive receptors in Bicester, Caversfield and Buckingham, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Section C1-4

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- AQMAs: No AQMA areas have been declared within the C1-4 boundary by either Aylesbury Vale District Council, Central Bedfordshire Council or Milton Keynes Borough Council.

- Designated Sites: This area includes Wavendon Heath Ponds SSSI.

- Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Newton Longville, Bletchley, Lakes Estate, Little Brickhill, Bow Brickhill, Woburn Sands, Aspley Guise, Stoke Hammond, Ridgmont, south Milton Keynes.

- Sensitive Receptors: Within the C1-4 boundary, there are approximately 23,000 potential air quality sensitive receptors.

- Clean Air Zone: The section is approximately 34km from the potential Oxford CAZ.

- PCM Model: Defra PCM links within this area have been identified on A4146 and A5 south of Milton Keynes. Concentrations are elevated in 2018 (but not exceeding). PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: Milton Keynes Borough Council undertake NO\textsubscript{2} monitoring at two locations within the C1-4 area. The latest monitoring data indicates concentrations below the AQO.

- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the C1-4 area (at 1km square intervals) are below the relevant AQOs for NO\textsubscript{x} (8.8-19.0 μg/m\textsuperscript{3}), NO\textsubscript{2} (6.8-13.8 μg/m\textsuperscript{3}) and PM\textsubscript{10} (11.7-16.8 μg/m\textsuperscript{3}).

There is potential for air quality benefits sensitive receptors in Milton Keynes, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

7.1.2 Noise and vibration

Within the Corridor C1 study area there are 127,285 dwellings and 3,089 other sensitive receptors. The Corridor C1 study area contains the large settlements of Abingdon, western
It is expected that receptors in close proximity to major roads and within urban areas are subject to high noise levels dominated by road traffic. Within this corridor’s study area, a number of residential settlements exist in close proximity to the A34 (e.g. Abingdon, West Oxford, Chawley, Wytham, Wolvercote, and Kidlington), A40 (e.g. Cutteslowe and Cassington), A44 (e.g. Yarnton and Begbroke), A420 (e.g. Bessels Leigh, Cumnor, Dean Court), A41 (e.g. Bicester), A4421 (e.g. Stratton Audley and Fringford), A421 (e.g. Finmere, Tingewick, Buckingham, and Thornborough), A4146 (e.g. Stoke Hammond), A5 (e.g. Little Brickhill) and A5130 (e.g. Woburn Sands). Other major roads with the corridor study area include the M40 and M1.

Receptors located in more rural settings are expected to have their noise environment consisting of more local noise sources such as agriculture activities, road traffic on minor roads, railways and aircraft flights. There are rural expanses within the Corridor C1 study area between Abingdon and Oxford, Oxford and Bicester, Bicester and Buckingham, and Buckingham and Milton Keynes where non-traffic sources are more likely to dominate the noise environment.

There are numerous railway lines running through the Corridor C1 study area that would contribute to the surrounding noise environment: the London Marylebone to Oxford line, the Manchester to Bournemouth line, the London to Birmingham line, the London to Aylesbury line, the West London Route, and Marston Vale line. In addition, Luton and Heathrow Airport have several flight paths and stacking areas through the Corridor C1 study area. Abingdon Airfield, Oxford Airport, RAF Weston-on-the-Green & Oxford Gliding Club, RAF Bicester, Finmere Aerodrome, and two small local runways (west of Marsh Gibbon and west of Thornborough) are located within the Corridor C1 study area.

Numerous SSSIs exist within the corridor study area. Several exist to the north east of Oxford. Further along the corridor some SSSIs include: Amcotte Bridge Meadows, Ardley Cutting and Quarry, Tingewick Meadows, Wavendon Heath Ponds, and Poker’s Pond Meadow.

The Corridor C1 study area contains a total of 61 NIAs. Two are along the A420, seven along the A34, three on the A40, seven along the A44, one adjacent to the A41 east of Bicester, four along the A4421, five adjacent to the A421 (between Buckingham and Milton Keynes), one adjacent to the A421 (to the east of Milton Keynes near to the M1), and three on the A5130. The remainder of the NIAs are within Oxford, Abingdon and Milton Keynes. Two NIAs are designated due to rail noise on the London to Birmingham railway south of Milton Keynes.

### 7.1.3 People and communities

#### Section C1-1

Abingdon and Shippon cover the south-eastern corner of the section corridor, and the centre of the section corridor is constrained as west Oxford extends into Botley and Cumnor. There are further smaller scattered settlements throughout the section corridor, including Weston-on-the-Green, Hampton Poyle, Bletchingdon, Kirtlington, Tackley, Shipton-on-Cherwell, Thrupp, Begbroke, Yarnton, Cutteslowe, Upper Wolvercote, Lower Wolvercote, Wytham, Swinford, Binsey, Osney, North Hinksey, Dean Court, Farmoor, South Hinksey, Sunningwell,
Dry Sandford, Cothill, Wootton, Bessels Leigh, Appleton and the larger settlement of Kidlington north of Oxford.

Dalton Barracks is located immediately east of Shippon, and is currently used by the MOD and allocated for residential development in the emerging Vale of White Horse Local Plan.

Botley war cemetery is located within Botley and Wolvercote cemetery is located to the east of the A34 near Water Eaton. Neighbourhood plans are currently being worked on so there is no designated Local Green Space at the moment. Some areas of green space identified in Cherwell dataset constrains route options. Frilford Heath Golf Club, Hinksey Heights Golf Club, North Oxford Golf Club and Kirtlington Golf Clubs are all is located within the section. There are several areas of woodland that are likely to be used as recreational assets, in particular Wytham Woods which occupies the centre of the corridor section. Other potential recreational assets include Farmoor Reservoir and the fisheries associated with Worton Hall. Registered common land spreads across approximately half of corridor width to north-west of Oxford.

Educational, health and care/nursing facilities are largely located within existing settlement boundaries, with the following notable exceptions:

- The Action for Children Parklands Campus and St Lawrence’s Church are located immediately adjacent to the A420 at Tubney Wood
- Shrublands Care Home is located immediately adjacent to the A420 at Bessels Leigh
- St Margaret’s Church is located adjacent to the A34 at Binsey
- Oaken Holt House Nursing Home is located adjacent to the B4044 between Oxford and Farmoor.

There is a large area of best and most versatile agricultural land to the south of the corridor section.

Section C1-2

The large settlement of Bicester straddles the central part of the north-east boundary of the corridor section. The section also incorporates the villages of Caulcott, Middleton Stoney, Wendlebury, Ambrosden and Blackthorn.

There are numerous land parcels on the southern and eastern outskirts of Bicester with planning permission and/or under construction for residential and industrial use.

There is a large public park (Bignell Park) with golf course adjacent located south-west of Bicester, and also small playing fields, allotments and recreational grounds within and on the outskirts of smaller communities within the section corridor.

Educational, health and care/nursing facilities are largely located within existing settlement boundaries, with the following notable exceptions:

- St Giles’s Church is located immediately adjacent to the A41 at Wendlebury
- St Edburg’s Church of England School is located within 200m of the A41 on the southwestern outskirts of Bicester.

There is best and most versatile agricultural land in the far north-west part of corridor, which is unlikely to pose a constraint on the assumption that route options will coincide with this part of the corridor section.
Section C1-3

This section approximately follows the A4421 from Bicester and then the A421 to Milton Keynes. It wholly incorporates the town of Buckingham in the centre of the section. The section incorporates the outskirts of Bicester at the south-western boundary and outskirts of Milton Keynes at the north-eastern boundary. There are several villages throughout the section, including Bucknell, Stratton Audley, Godington, Fringford, Newton Morrell, Chetwode, Newton Purcell, Preston Bissett, Barton Hartshorn, Finmere, Water Stratford, Tingewick, Gawcott, Maids Moreton, Padbury, Thornborough, Great Horwood, Little Horwood, Nash, Whaddon and Mursley.

There is land allocated for development on the outskirts of Buckingham and Milton Keynes, as well as two small isolated sites proposed for industrial use – one to erect aircraft hangers at Finmere Aerodrome, the other, for agricultural buildings near Nash.

There are some notable areas of recreational or open space outside of settlements which may pose a constraint to route options within the corridor. This includes playing fields associated with Moretonville Junior Football Club in between Gawcott and Buckingham. Buckingham Golf Club has a large private course to the west of Buckingham. There are playing fields on the northern edges of the villages of Finmere and Tingewick.

The Lace Hill Academy is on the southern edge of Buckingham. No other sensitive community facilities have been identified outside of existing settlements.

There are two main patches of best and most versatile agricultural land along the northern boundary, one north of Fringford and the other around Buckingham and the A422 north-east of Buckingham.

Section C1-4

The outskirts of Milton Keynes and Bletchley coincide with the north-west edge of the section. There are several villages dispersed throughout the corridor including Little Great Brickhill, Bow Brickhill, Woburn Sands, Drayton Parslow, Stoke Hammond and Aspley Guise. The A5 crosses the section, bypassing Little Brickhill. The A4146 also crosses the section and is a two lane dual carriageway bypassing Stoke Hammond. The majority of the villages in the section are relatively rural and away from major highway infrastructure.

The main development allocations are along the fringe of Milton Keynes.

Key areas of open space and recreation within the corridor section include part of Woburn Safari Park, located north west of Woburn, and Stockgrove Country Park, located on the northern outskirts of Leighton Buzzard. There is a large private golf course (Woburn) near Aspley Heath. Crawley Park is located within Husborne Crawley and Caldecotte Lake is located between Bletchley and Wavendon. There are numerous small areas of playing fields within and on the outskirts of Milton Keynes and the smaller settlements. Extensive areas of woodland and heathland are present throughout the section and likely to be used for informal recreation (including King’s Wood, Buttermilk Wood, Back Wood, Wavendon Wood and Wavendon Heath). There are several small areas of registered common land within or close to Stoke Hammond, Great Brickhill and Aspley Guise.

The Lindens Residential Care Home is located on Stoke Road between Bletchley and Stoke Hammond. St James's Church and Husborne Crawley Lower School are on the edge of...
Husborne Crawley. Otherwise, educational facilities, health care facilities and care/nursing homes are largely located within or in close proximity to existing settlement boundaries.

There is very little best and most versatile agricultural land within the corridor section.

### 7.1.4 Cultural heritage

**Section C1-1**

There are 313 designated cultural heritage assets of High and Very High value within the Corridor and 1 kilometre study area for Section C1-1 comprising:

- 1 World Heritage Site
- 37 scheduled monuments
- 129 Grade I listed buildings
- 140 Grade II* listed buildings
- 4 Grade I Registered Park and Garden
- 2 Grade II* Registered Park and Gardens

There are a further 1610 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section C1-1 comprising:

- 1561 Grade II listed buildings
- 38 Conservation Areas
- 11 Grade II Registered Park and Gardens

The World Heritage Site of Blenheim Palace lies within the 1 kilometre study area and is considered to be of Very High value. The UNESCO listing for the site states that ‘the integrity of the property is well protected by its enclosing wall but important visual links do exist between the gates, the parkland buildings, buildings in the surrounding villages and landscape, and care needs to be taken to ensure these key visual links are protected’ ([https://whc.unesco.org/en/list/425](https://whc.unesco.org/en/list/425) [accessed 24/04/2018]). These views extend the setting of this asset well beyond the boundary of the designated site itself.

There are a large number of scheduled monuments within the Section C1-1 Corridor including a Prehistoric Long Barrow west of Enslow Bridge, medieval moated sites and settlement sites, 17th century water gardens and earthworks, and the 18th century Swinford bridge. The majority of these assets are small and discrete.

There are a number of High value assets on the fringes of Oxford including scheduled monuments, Grade I and Grade II* listed buildings, and the Grade II* Worcester College Registered Park and Garden. The scheduled monuments comprise Rewley Abbey, the remains of Osney Abbey, the Swing bridge (LNWR Station), the Port Meadow site ring ditches, barrows, and associated enclosures, the Seacourt medieval settlement, Godstow Abbey, the North Hinksey conduit house, and the Old Abingdon Road culverts.
The town of Abingdon also contains scheduled monuments and a large number of Grade I and Grade II* listed buildings. The scheduled monuments here comprise the Castle Mound at Fitzharris and the Ock Bridge.

There are further Grade I and Grade II* listed buildings in Rousham, Cumnor, Kidlington, Yarnton, Gosford, Kirtlington, Islip, Wytham, Cassington, Bletchingdon, North Hinksey, Tackley, Appleton-with-Eaton, Weston-on-the-Green, Hampton Gay and Poyle, Sunningwell, St. Helen Without, Shipton-on-Cherwell and Thrupp, Begbroke, South Hinksey, and Bessels Leigh.

The Rousham Grade I Registered Park and Garden contains an associated 56 listed buildings (1 Grade I, 24 Grade II*, and 31 Grade II) and a Dovecote scheduled monument. The largely rural setting is noted as contributing to the significance of these assets, particularly the views north and east from Rousham house (Grade I), the gardens and pleasure grounds. The designed landscape was intended to include the extensive views across the flood meadows north of the Cherwell and the farmland beyond, to local villages, and, in particular, the church towers and villages of Steeple Aston, Upper and Lower Heyford and Rousham together with the causewayed Heyford Bridge. Modern development partly already obscures some of these intended views ([https://historicengland.org.uk/listing/the-list/list-entry/1000107](https://historicengland.org.uk/listing/the-list/list-entry/1000107) [accessed 24/04/2018]).

The Grade II* Registered Tackley Water Garden consists of two areas, one of which relates to the 17th century house and is located on agricultural land and the other which is also the water gardens scheduled monument.

**Section C1-2**

There are 21 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section C1-2 comprising:

- 8 scheduled monuments
- 4 Grade I listed buildings
- 9 Grade II* listed buildings

There are a further 208 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section C1-2 comprising:

- 201 Grade II listed buildings
- 6 Conservation Areas
- 1 Grade II Registered Park and Garden

The Middleton Stoney Castle scheduled monument is situated on the grounds of the Grade II Registered Middleton Park, which also contains Grade I and Grade II* listed buildings. There is also a Saxon Barrow scheduled monument that lies just outside of Middleton Park at its south eastern corner. The barrow has been partially removed by the B340, but the remaining portion is expected to contain archaeological remains.
Section C1-2 is dominated by the town of Bicester, which contains Grade I and Grade II* listed buildings. Just south of Bicester are the large Alchester Roman site and parade ground scheduled monuments and to the east of Bicester is the Wretchwick Deserted Medieval Settlement scheduled monument.

There are further Grade I and Grade II* listed buildings in Middleton Stoney, Merton, Chesterton and Ambrosden. Ambrosden also contains a churchyard cross scheduled monument.

Section C1-3

There are 74 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section C1-3 comprising:

- 13 scheduled monuments
- 30 Grade I listed buildings
- 30 Grade II* listed buildings
- 1 Grade I Registered Park and Garden

There are a further 811 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section C1-3 comprising:

- 781 Grade II listed buildings
- 30 Conservation Areas

Just to the north of the town of Bicester is the RAF Bicester which contains 11 protected structures that together comprise the scheduled monument.

There are 4 scheduled monuments located on the fringes of Milton Keynes comprising the Fishpond in Water Spinney south east of St Giles’s Church Tattenhoe, the Moated site, fishponds and deserted medieval village of Tattenhoe west of Home Park Farm, the moated site and fishponds of Snelshall Benedictine Priory north of Briary Plantation, and a bowl barrow on Church hill in Whaddon. There are 2 further moated sites in the smaller villages of Stratton Audley and Little Horwood.

Two Roman barrows comprise a scheduled monument to the east of Buckingham very near to the current A421 and to the Thornborough Bridge scheduled monument. Also east of Buckingham and to the north of the Roman barrows lies a prehistoric hillfort scheduled monument which has been denuded by ploughing, but is thought to still retain valuable archaeological information (https://historicengland.org.uk/listing/the-list/list-entry/1018453 [accessed 02/05/2018]).

The town of Buckingham itself contains a large number of High value assets including a scheduled monument and Grade I and Grade II* listed buildings. The St Rumbold’s well scheduled monument lies on the southwestern edge of the town and incorporates an area of cultivation earthworks to the south of the well itself.
There are further Grade I and II* listed buildings in Thornborough, Radcliffe-cum-Chatmore, Launton, Maids Moreton, Bucknell, Whaddon, Stratton Audley, Chetwode, Water Stratford, Great Horwood, Mursley, Padbury, Tingewick, Gawcott with Lenborough, Little Horwood, Caversfield, Preston Bissett, Shenley Brook End and Foscott

A long approach of Stowe Grade I Registered Park and Garden and National Trust owned land extends across the corridor. Called Stowe Avenue (owned by the National Trust), this approach runs for 2 kilometres from the edge of Buckingham to the Corinthian Arch which overlooks the park, pleasure grounds and mansion to the north.

Section C1-4

There are 31 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section C1-4 comprising:

- 7 scheduled monuments
- 2 Grade I listed buildings
- 21 Grade II* listed buildings
- 1 Grade I Registered Park and Garden

There are a further 259 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section C1-4 comprising:

- 243 Grade II listed buildings
- 16 Conservation Areas

The Roman town of Magiovinium scheduled monument is situated on the edge of Bletchley and Fenny Stratford and is divided by the Roman Watling Street. It is roughly bounded by the current A4146 and A5. There are 2 further scheduled monuments, a medieval manor and a shrunken medieval village, within the constituent towns of Milton Keynes.

The Danesborough Camp hillfort and the Motte castle located 200m south east of Wavendon Manor scheduled monuments both survive well archaeologically and are good examples of their class.

There are Grade I and Grade II* listed buildings in West Bletchley, Newton Longville, Aspley Guise, Bletchley and Fenny Stratford, Husborne Crawley, Wavendon, Drayton Parslow, Stoke Hammond, Ridgmont, Little Brickhill, Great Brickhill, Bow Brickhill, and Aspley Heath.

The Grade I Registered Park and Garden of Woburn Abbey extends a maximum of 750 metres into the C1-4 corridor. Woburn Abbey is a large and complex site which incorporates 61 listed buildings (7 Grade I, 6 Grade II*, and 48 Grade II) on its grounds; most of which lay outside of the Section C1-4 corridor and study area. The setting of the park is largely agricultural, with some areas of woodland and the villages lying close by. It is bounded to the southwest, northwest, and north by the current A4012 road where it is enclosed by high, red-brick walls.
7.1.5 Landscape and visual

Section C1-1

The Cotswolds AONB lies approximately 1.5 km from the western boundary of the corridor which is adjacent to Blenheim Palace RPG grade I and World Heritage Site (WHS) that is less than 500m from the western boundary of the corridor.

Other relevant designations include Oxford green belt that covers the majority of the area. Pixey Mead and Port Meadow areas of common land lie immediately west of Oxford, and there are numerous conservation areas and listed buildings and areas of ancient woodland throughout the section.

Oxford Airport lies towards the west where a safeguarding area applies that restricts the height of development, type of planting and lighting requirements.

The area is characterised by low lying floodplains west of Oxford with numerous areas of green space including the common land at Pixey Mead and Port Meadow.

Sensitive visual receptors include residents in surrounding settlements and users of PRoW and open space.

Section C1-2

There are no landscape designations or significant other designations in this short section. To the south of Bicester, the area is characterised by the low lying floodplain of the River Ray.

Sensitive visual receptors include residents of Ambrosden and on the southern edge of Bicester.

Section C1-3

This section includes the southern edge of Stowe AAL north of Buckingham, and also the Great Ouse Valley (West), Great Ouse Valley (East) and Whaddon-Nash Local Landscape Areas (LLA). Stowe AAL is noted for the 'peaceful and picturesque, gently rolling agricultural landscape in and around the internationally important landscape park and gardens of Grade I Stowe Registered Park and Garden, an 18th century designed landscape and recognised as one of Britain’s finest Historic Parks and Gardens. Blocks of ancient woodland, the remnants of the medieval Whittlewood Forest, and other parklands in the area contain great cultural and natural value, as well as rich visual texture and provide a wooded backcloth to the landscape. A landscape of streams, parklands and small villages of local materials with focal points of medieval church towers, mature oak trees and with occasional long views from vantage points’.

Poundon Hill LLA lies within this section. It should, however, be noted that the updated Vale of Aylesbury Local Plan (2013 – 2033) Policies Map (November 2017), which has not yet been adopted, no longer shows Poundon LLA. This accords with the Defining the special qualities of local landscape designations in Aylesbury Vale District – Final Draft Report (LUC, March 2016) that forms part of the landscape supporting evidence, and which recommends the Poundon Hill LLA is not worthy of local landscape designation.
Stowe House is RPG grade I and National Trust (NT) property, the designated area includes Stowe Avenue that links from Stowe House to Buckingham.

RAF Bicester, Stratton Audley, Tingewick, Radcliffe, Buckingham Thornborough, Singleborough, Great Horwood, Nash and Whaddon conservation areas and numerous listed buildings also feature.

RAF Bicester is a very open landscape with views across the airfield, whilst the A4421 Buckingham Road (Roman Road) is characterised by established vegetation including mature woodland, hedgerows and hedgerow trees. The Existing A421 is a major highway and already partly dualled.

There are areas of ancient woodland south of Whaddon.

Sensitive visual receptors include residents of Launton, Stratton Audley, Fringford, Barton Hartshorn, and villages and properties along the A4421 including Newton Morrell and Newton Purcell. Also residents on the southern edge of Buckingham, and in the villages of Tingewick, Radcliffe, Buckingham Thornborough, Singleborough, Great Horwood, Nash and Whaddon.

Section C1-4

The majority of the western part of this section lies within the Brickhills AAL with the exception of a narrow area of non-designated land adjacent to the urban edge of Milton Keynes. Brickhills AAL is noted for its ‘distinct landform with wooded scarp slopes and interspersed agricultural areas and heathland’, and ‘open and panoramic views from the hilltops across the landscape of the Vale of Aylesbury to the Quainton Wing hills’.

To the east the AAL shares a boundary with the London Metropolitan green belt that extends beyond the extent of the corridor.

Other important designations include Woburn Abbey RPG grade I to the east of the corridor and Woburn, Aspley Heath, Aspley Guise and Husborne Crawley conservation areas. There is also a small area of common land south of Great Brickhill and the area is crossed by numerous PRoW including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths.

There are significant areas of woodland south and east of Brickhill and east of Woburn Abbey which includes areas of ancient woodland.

The area south of Aspley Heath includes extensive areas of heathland and woodland and includes Woburn Golf Course. Stockgrove Country Park also features within the area.

Sensitive visual receptors include residents on the southern edge of Milton Keynes, particularly the Lakes Estate area; residents in the rural villages and individual houses; and also users of PRoW and Stockgrove Country Park.

7.1.6 Nature conservation

Within corridor C1, the area west of Oxford has the highest density of the statutory designated sites. There are areas of ancient woodland and local wildlife sites throughout the corridor.
Section C1-1

The key sensitive features within the corridor are Cothill Fen SAC and Oxford Meadows SAC, 15 SSSI, 123 AW, and 1 NNR. As with section B1-1, the key sensitive features within the corridor are Cothill Fen SAC at the south of the section, and Oxford Meadows SAC which is located north east of Oxford and spans over half of the corridor width. Fifteen SSSI are located within the corridor including those forming the 2 SACs (which also includes 1 NNR), and those associated with Wytham Woods. The distribution of these SSSI comprises over three quarters of the width of the corridor to the west of Oxford. Significant areas of the 123 AW within the section are recorded in its southern half, a large number associated with Bagley Wood to the east and Tubney Wood to the south west, as well as the aforementioned Wytham Woods. To the north of the section, numerous small blocks of AW are dispersed widely across the width of the corridor.

With respect to Tier III sites, 2 LNR, 63 LWS and 12 Proposed LWS lie within the section.

The statutory designated sites for nature conservation within 5km of the corridor comprise Cothill Fen SAC and Oxford Meadows SAC, 31 SSSI and 1 NNR. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 151 AW, 3 LNR, Otmoor RSPB reserve, 93 LWS and 17 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section C1-2

The key sensitive features within the corridor are 1 SSSI and 6 AW. This section is relatively small in area and the designated sites are also small and widely distributed within it, the most significant being AW associated with Graven Hill and the SSSI adjacent to the River Ray. There are 9 LWS within the section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 3 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 8 AW, and 17 LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section C1-3

The key sensitive features within the corridor are 5 SSSI and 63 AW. The SSSIs are widely distributed around Buckingham, to its north, south west and south east. AW is scattered more widely within the section but two distinct areas are present: one between Buckingham and Bicester, and a section between Buckingham and Milton Keynes. Whilst the overall area of AW is not large, the distribution of the woodland particularly within these latter two areas constrains the route alignments options.

With respect to Tier III sites, 3 LNR, 44 LWS and 2 Proposed LWS lie within the section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 9 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 98 AW, 3 LNR, 66 LWS and 3 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.
Section C1-4

The key sensitive features within the corridor are 1 SSSI and 15 AW, all are located east of the A5 and associated with New Wavendon Heath, Black Wood and Buttermilk Wood. Although relatively small in area, their distribution and the presence of the A5, a railway line and Milton Keynes to its north makes the section quite constrained.

With respect to Tier III sites, 1 LNR and 13 LWS lie within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 4 SSSI and 1 NNR. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 23 AW, 1 LNR and 41 LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

7.1.7 Geology and soils

Section C1-1

Bedrock comprises a geological sequence of decreasing age from the Lower Jurassic Lias in the north, through Middle Jurassic limestones of the Great Oolite Group and mudstone, siltstone and of the Ancholme Group. Late Jurassic Corallian Group including limestones and sandstones, and other mudstones, siltstones and sandstones are present in the southern section. The youngest bedrock in the area is Lower Cretaceous Lower Greensand locally present in the Boars Hill area southwest of Oxford.

Superficial deposits are absent from large parts of the south and north of Section C1-1. Where present, they typically comprise alluvium or sand and gravel of the Summertown-Radley Sand and Gravel Member or Northern Drift Formation.

The following sites of geological importance are located within Section C1-1:

- **Cothill Fen**: a mixed biological and geological SSSI, which is in a favourable condition, entirely located within the south of Section C1-1. The SSSI supports nationally rare calcareous fen and moss-rich mire communities together with associated wetland habitats; palaeovegetation can be interpreted from peat samples. Cothill Fen is also designated as a SAC.

- **Dry Sandford Pit**: this mixed biological and geological SSSI is situated in the south of Section C1-1 and is in a favourable condition. A sequence of limestone rocks, formed during the Jurassic period in shallow coastal waters and containing fossil ammonites, is exposed at this site. The site is also designated as a LGS, the area of which is greater than the SSSI footprint.

- **Cumnor**: a geological SSSI in favourable condition within the south of Section C1-1, west of the A420. The site demonstrates the complex biostratigraphy and palaeogeography of the Oxfordshire Corallian (a coral rag limestone group).

- **Sugworth**: a geological SSSI in favourable condition sited adjacent to the A34 in the southwest of Section C1-1. The site is designated for its rare inland interglacial sediments containing various fossil remains.
• Hurst Hill: a biological and geological SSSI east of the A420 in the south of the section, split into two report units, one of which is in unfavourable recovering condition and the other of which is in unfavourable declining condition. The geological interest stems from the old brickpits which have yielded fossils of marine reptiles and the skeleton of an ornithopod dinosaur.

• Shipton-on-Cherwell & Whitehill Farm Quarries: a geological SSSI in the north of the section, northeast of Oxford Airport. The Shipton-on-Cherwell Quarry is in an unfavourable recovering condition whilst the Whitehill Quarry is in a favourable condition. The quarries expose sections of the White Limestone Formation and demonstrate lithostratigraphy typical of this rock unit. Fine fossil reptiles have also been yielded from the quarries.

• Kirtlington Quarry: a geological SSSI in favourable condition, west of Kirtlington in the north of Section C1-1. The site has yielded the most diverse assemblage of Middle Jurassic mammal fossils described to date worldwide. The site, including additional land to the west is also classified as a LGS (named Kirtlington Quarry and Washford Pits Wood).

• Tubney Woods Sandpit: an active quarry with exposures of lower calcareous grit in the south of the section which is classed as a LGS; the grit produces poor soils demonstrating the link between geology, pedology and biodiversity.

• Greenhill Farm Quarry (East and West): disused quarries in the north of the section classed as a LGS, which show important sections in the highly fossiliferous Jurassic rock unit – Cornbrash Formation.

Several Oxfordshire MSGAs are present within Section C1-1 as follows:

• soft sand within the southwest and north-western extent of the section (Corallian Formation)

• sharp sand and gravel across two-thirds of the width of the corridor in the centre of the section

• crushed rock in the north of the section (Great Oolite).

Two active quarries are located within Section C1-1: Upwood Quarry (mining sand of the Kingston Formation) in the southwest, and Shipton Quarry (mining the White Limestone Formation of the Great Oolite) in the northwest.

The Banbury Road Rail Depot is listed as an active depot within BritPits data in the centre of the section.

One historical (sand and gravel) quarry and 2 dormant (clay and shale and limestone) quarries are also present in the centre and north of the section.

The EA website identifies 2 authorised landfills within the southwest of Section C1-1: Upwood Quarry and Tubney Woods Landfill, both accepting inert waste. The EA website also lists a number of historical landfills within Section C1-1, that are distributed across the section but occupy a small proportion of its overall footprint. Other potentially contaminative current and
historical land uses include Abingdon Airfield/Dalton Barracks, Oxford Airport and RAF Weston-on-the-Green.

One historical NIHHS site is listed in the Groundsure COMAH data for Section C1-1 – Swinford Water Treatment Works.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA.
Section C1-2

The bedrock geology comprises mainly sandstone, limestone and argillaceous rocks of the Middle Jurassic Great Oolite Formation in the north-western half, and mudstone, siltstone and sandstone of the Upper Jurassic Ancholme Group in the south-eastern half of the section.

Alluvium and river terrace deposits are located in the south to southeast of the section but are otherwise largely absent.

The following sites of geological importance are located within Section C1-2:

- Ardley Trackways: a geological SSSI in the north of the section, in favourable condition. The site is of international importance due to the presence of a rare array of fossilised trackways formed by a herd of dinosaurs during the Middle Jurassic.

- Ardley Fields Quarry: a LGS which extends into the north of Section C1-2, bordering the Ardley Trackways SSSI.

An Oxfordshire MSGA for crushed rock spans the length of the corridor (from southwest to northeast) in the northwest of this section.

An active quarry, Dewar’s Farm, mining the White Limestone Formation, is located in the north of the section.

The EA website identifies an authorised landfill, Ardley Landfill, that extends approximately 125m into the north of the section. The EA website also lists several historical landfills that are located within the section, including one which overlaps with Ardley Landfill. Other potentially contamintative current and historical land uses include RAF Weston-on-the-Green, RAF Upper Heyford, Graven Hill and sewage works.

Two COMAHH sites are listed in the northwest of Section C1-2: a current listing for Southern Bomb Store, likely in association with RAF Upper Heyford, and an historical listing for Black Cat Fireworks.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA.

Section C1-3

The bedrock geology comprises mainly sandstone, limestone and argillaceous rocks of the Middle Jurassic Great Oolite Formation in the northwest, and mudstone, siltstone and sandstone of the Upper Jurassic Ancholme Group in the southeast and east of the section.

Glacial till is located across the majority of Section C1-3, with pockets of glacial sands and gravels and a band of alluvium around the River Great Ouse and the Padbury Brook.

The following sites of geological importance are located within Section C1-3:

- Ardley Cutting and Quarry SSSI: a biological and geological SSSI in unfavourable recovering condition, in the southwest of the section. The geological interest lies in
the exposures of Jurassic rocks, but the variations in soils also influence habitat variations at the site.

- Stratton Audley Quarries: a geological SSSI destroyed due to infilling with waste material and water, northeast of Bicester. There are no practical means of restoring access to the interest feature and so the site must be considered destroyed.

It should be noted that at the time of writing details of LGS in the area were not available, however these will be available for Stage 1B.

Buckinghamshire proposed MSGA for sand and gravel is present within Section C1-3, spanning the width of the corridor in several places. Milton Keynes sand and gravel MSGA also extends into the north-east of the section and the tip of the Oxfordshire ‘crushed rock’ MSGA extends into the south-western area of the section.

There are no active quarries in the area however historical Finmere Quarry is recorded as a number of records having mined glaciofluvial deposits of sand and gravel southwest of Finmere.

The EA website identifies several authorised landfills that are located within Section C1-3:

- Glebe Farm in the west of the section
- Finmere Quarry Landfill in the northwest
- Finmere Railway Cutting adjacent to Finmere Quarry Landfill
- Buffers Holt northwest of Buckingham
- Foxcote Pumping Station in the north

The EA website also lists several small historical landfills that are located within Section C1-3, mainly around Buckingham. Other potentially contaminative current/historical land uses include RAF Bicester, RAF Finmere, RAF Little Horwood, Thornborough Grounds Airstrip (not shown on Groundsure mapping) and several sewage works.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA. There are no COMAH sites recorded in the area.

**Section C1-4**

Bedrock geology in Section C1-4 comprises, mudstone, siltstone and sandstone of the Ancholme Group in the west and north of the section, and sandstone and mudstone of the Lower Cretaceous Lower Greensand Formation in the east to southeast.

Glacial till dominates the superficial geology in the west of Section C1-4, with glaciofluvial deposits also common. Alluvium and river terrace deposits surround the River Ouzel and Grand Union Canal. East of these watercourses, head deposits of clay, silt sand and gravel are common, as are glacial till, glaciofluvial deposits and chalky boulder clay in the north.
No sites of geological importance are located within Section C1-4, however it should be noted that no data relating to LGS were available at the time of writing this report; these will be available for Stage 1B.

Buckinghamshire proposed sand and gravel MSGA is present in the west of the section, adjoining a Milton Keynes sand and gravel MSGA to the north; these collectively span the width of the corridor. A Bedfordshire MSGA for Woburn Sands is present in the east of the section and a Bedfordshire MSGA for river valley/glacial sand and gravel extends approximately 10m into the section within the north.

Bletchley Rail Depot is located to the northwest of the section this is associated with transport of mineral resources.

The EA website identifies 1 authorised landfill that is located in Section C1-4 in the northwest: Bletchley Landfill.

The EA website also lists a number of historical landfills that are present in Section C1-4. These are distributed across the section, with the largest surrounding the authorised Bletchley Landfill. Other potentially contaminative current and historical land uses include brick works and industrial estates.

Two sites have formerly been determined as contaminated land under Part IIA of the Environmental Protection Act 1990 in Bletchley. The first is located at Buckingham House; the contamination was caused by a heating oil leak from underground pipework but was remediated. The second is listed in George Street, with the contamination caused by diesel leaking from a disused underground tank; the site has now been remediated.

7.1.8 Road drainage and the water environment

Section C1-1

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the rivers in the study area, detailed in Table 7-1. There are four rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):

- River Ock (a tributary of the River Thames) flows in a westerly direction towards Abingdon
- River Thames – flows north towards the A40 before it meanders south through Oxford City Centre towards east Abingdon
- River Cherwell (a tributary of the River Thames) – flows in a south westerly direction in parallel with the A4260 towards Oxford
- River Ray – flows past the A41 heading in a westerly direction towards Islip where it joins River Cherwell.
The Flood Zone 2 and 3 associated with the River Thames, River Cherwell and River Ray are extensive within this section.

Table 7-1 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>284.7</td>
<td>424.0</td>
<td>17.8</td>
<td>22.3</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 5% increase in the area identified as Flood Zone 3. Predominantly areas to the west of Oxford are likely to be at greater risk of fluvial flooding.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 1.8% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 3.5% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASTGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 29% of the study area is within an area of medium to high risk (see Table 7-2).

Table 7-2 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>17.3</td>
<td>• Oxford Centre</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Outskirts of Oxford (following the River Thames)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Abingdon</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>11.8</td>
<td>• West Oxford</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Abingdon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South Bicester</td>
</tr>
</tbody>
</table>

Reservoir Failure
EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 7-3.

**Table 7-3 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows north of Sutton before heading south towards Oxford at the A40.</td>
</tr>
<tr>
<td>2</td>
<td>Flooding around the Otmoor area, that flows east along the River Ray</td>
</tr>
<tr>
<td>3</td>
<td>Flows south following the River Cherwell towards Bletchingdon</td>
</tr>
<tr>
<td>4</td>
<td>Other small breach extents identified within the section</td>
</tr>
</tbody>
</table>

**Historic Flooding**

The EA’s Historic Flood Maps detail the maximum extent of previous recorded flooding events from the sea, river and groundwater. According to the EA’s dataset, 17.1% of the section has been recorded to have flooded historically. There are records of flooding outside of the existing Flood Zone 2 and 3 associated with River Thames, impacting areas in Oxford.

**Other Flood Sources**

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**

Table 7-4 shows the WFD operational catchments and WFD water body catchments which lie within Section C1-1.

**Table 7-4: WFD operational and WFD water body catchments within Section C1-1**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Cherwell</td>
<td>Cherwell (Bletchingdon to Ray)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cherwell (Ray to Thames) and Woodeaton Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cherwell (Nell Bridge to Bletchingdon)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bayswater Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### River Basin District | WFD Management Catchment | WFD Operational Catchment | WFD Water Body Catchment | WFD Water Body Status (Cycle 2, 2016) | Large WFD Water Body Crossing
--- | --- | --- | --- | --- | ---
Oxford | Oxon Ray | Oxon Ray (upstream A41 to Cherwell including Otmoor) | Bad | Yes |
 |  | Langford Brook (Bicester to Ray inc Gagle Brook) | Poor | Yes |
 |  | Gallos Brook | Moderate | Yes |
 |  | Bletchingdon Stream | Poor | Yes |
Cotswolds | Evenlode | Evenlode (Glyme to Thames) | Bad | Yes |
 |  | Dorn (Source to Glyme) | Poor | Yes |
 |  | Glyme (Dorn confluence to Evenlode) | Poor | Yes |
Windrush | Thames (Leach to Evenlode) | Poor | Yes |
 |  | Filchampstead Brook at Farmoor | Bad | Yes |
 |  | Chil and Limb Brooks (source to B4044) | Poor | Yes |
Gloucestershire and the Vale | Ock | Northfield Brook (Source to Thames at Sandford) | Poor | Yes |
 |  | Thames (Evenlode to Thame) | Moderate | Yes |
 |  | Ock and tributaries (Land Brook confluence to Thames) | Poor | Yes |
 |  | Sandford Brook (source to Ock) | Good | Yes |
 |  | Frilford and Marcham Brook | Moderate | Yes |

C1-1 also traverses 2 artificial water bodies, the Oxford Canal, Aynho to Thrupp and the Oxford Canal, Thrupp to Thames.

**Groundwater**

Section C1-1:

- Crosses a limestone Principal bedrock aquifer (underlies less than 25% of the section)
• Crosses 4 Secondary A bedrock aquifers
• Crosses 2 Secondary A superficial deposit aquifers
• Contains 5 licensed groundwater abstractions
• Contains 10 potential GWDTE
• Contains approximately 21 springs as marked on the OS 1:25,000 map

Section C1-2

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the rivers in the study area, detailed in Table 7-5. There are two rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):

• River Ray (a tributary of the River Thames) – flows in a south-westerly direction from the A41 towards the south of M40

• Unknown Watercourse (a tributary of the River Ray) – flows south through Bicester towards the M40 joining the River Ray.

The Flood Zone 2 and 3 associated with the River Ray are extensive within this section.

Table 7-5 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>48.1</td>
<td>97.9</td>
<td>15.5</td>
<td>19.0</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 3% increase in the area identified as Flood Zone 3. The published Flood Zones indicate that areas to the south-east of Bicester are likely to be at a greater risk of fluvial flooding.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 1.8% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 4.1% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water
flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s AStGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 21% of the study area is within an area of medium to high risk (see Table 7-6).

Table 7-6 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>11.4</td>
<td>• South of Bicester (following the River Ray)</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>9.8</td>
<td>• South of Bicester (following the River Ray)</td>
</tr>
</tbody>
</table>

Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow route that intersects this section has been detailed in Table 7-7.

Table 7-7 Reservoir Breach Extents

<table>
<thead>
<tr>
<th>Flow Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>Flows from North Dorton along the A41 down to Lower Arnott</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA’s dataset, 3.1% of the section has been recorded to have flooded historically. There are no records of flooding to have occurred outside of the existing flood risk areas.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.
Table 7-8 shows the WFD operational catchments and WFD water body catchments which lie within Section C1-2.

**Table 7-8: WFD operational and WFD water body catchments within Section C1-2**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Great Ouse Upper</td>
<td>Padbury Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Cherwell</td>
<td>Cherwell (Nell Bridge to Bletchingdon)</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oxon Ray</td>
<td>Summerstown Ditch and Launton and Cutters Brook</td>
<td>Bad</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Oxon Ray (upstream A41 to Cherwell) including Otmoor</td>
<td>Bad</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Langford Brook (Bicester to Ray inc Gagle Brook)</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Gallos Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Town Brook at Bicester</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Langford Brook (source to downstream A41)</td>
<td>Poor</td>
<td>Yes</td>
</tr>
</tbody>
</table>

C1-2 also traverses 1 artificial water body, the Oxford Canal, Aynho to Thrupp.

**Groundwater**

Section C1-2:

- Crosses a limestone Principal bedrock aquifer (underlies less than 25% of the section)
- Crosses 3 Secondary A bedrock aquifers
- Crosses 2 Secondary A superficial deposit aquifers
- Contains 2 licensed groundwater abstractions
- Contains 2 potential GWDTE
- Contains approximately 7 springs as marked on the OS 1:25,000 map
Section C1-3

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the rivers in the study area, detailed in Table 7-9. There are three rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):

- River Ray (a tributary of the River Thames) – flows in a south-westerly direction from the A41 towards the south of M40
- Padbury Brook (a tributary of the River Great Ouse) – flows in south-easterly direction from the A421, near M40 J10. It then meanders and heads north towards Buckingham before joining the River Great Ouse
- River Great Ouse – flows north-east from Brackley, meanders through Buckingham it then flows north-east towards then it connects on Stony Stratford.

The Flood Zone 2 and 3 associated with the River Great Ouse is substantially smaller in comparison to the floodplain area associated with the River Ray.

Table 7-9 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>69.5</td>
<td>446.0</td>
<td>4.9</td>
<td>6.0</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 1% increase in the area identified as Flood Zone 3. The published Flood Zones indicate that small areas in Bicester and Buckingham are likely to be within an area of greater fluvial flood risk over the lifetime of the development.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 3.2% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 5.3% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.
Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASrGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 13% of the study area is within an area of medium to high risk (see Table 7-10).
Table 7-10 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>1.4</td>
<td>• South-east of Bicester (following the River Ray)</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>11.4</td>
<td>• South-east of Bicester</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South-west of Buckingham</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• West of Bletchley</td>
</tr>
</tbody>
</table>

Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 7-11.

Table 7-11 Reservoir Breach Extents

<table>
<thead>
<tr>
<th>Flow Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA’s dataset, 2.3% of the section has been recorded to have flooded historically. There are records of flooding to have occurred outside of the existing Flood Zone 2 and 3 (i.e. south-east of Buckingham) identifying additional areas at risk of flooding.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

Geomorphology, WFD and Water Quality

Table 7-12 shows the WFD operational catchments and WFD water body catchments which lie within Section C1-3.
Table 7-12: WFD operational and WFD water body catchments within Section C1-3

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Great Ouse Upper</td>
<td>Horwood Tributary</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook (DS Granborough)</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Padbury Brook (The Twins)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Padbury Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Beachampton Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leckhampstead Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Stowe Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouse (Buckingham to Cosgrove)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weald Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouse (Brackley to Buckingham)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Ouzel and Milton Keynes</td>
<td></td>
<td>Ouzel US Caldecote Mill</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Newton Longville Brook</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Loughton Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Oxon Ray</td>
<td>Gubbinshole and Broadmoor ditch to Ray (Oxon)</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Summerstown Ditch and Launton and Cutters Brook</td>
<td>Bad</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Oxon Ray (upstream A41 to Cherwell including Otmoor)</td>
<td>Bad</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Langford Brook (Bicester to Ray inc Gagle Brook)</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Gallos Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ray and tributaries NorthEast of Grendon Underwood</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Town Brook at Bicester</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Langford Brook (source to downstream A41)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Groundwater**

Section C1-3:
CROSSES A LIMESTONE PRINCIPAL BEDROCK AQUIFER (UNDERLIES LESS THAN 25% OF THE SECTION)

CROSSES 2 SECONDARY A BEDROCK AQUIFERS

CROSSES 3 SECONDARY A SUPERFICIAL DEPOSIT AQUIFERS

CONTAINS 6 LICENSED GROUNDWATER ABSTRACTIONS

CONTAINS 4 POTENTIAL GWDTE

CONTAINS APPROXIMATELY 41 SPRINGS AS MARKED ON THE OS 1:25,000 MAP

**Section C1-4**

**Flood Risk**

**Fluvial**

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the rivers in the study area, detailed in Table 7-13. There is one river within this section that has significant areas of Flood Zone 3b (functional floodplain):

- River Ouzel (a tributary of the River Great Ouse) – flows from south-west Leighton Buzzard through Milton Keynes where it joins the River Great Ouse.

The Flood Zone 2 and 3 associated with the River Ouzel is relatively small within this section.

**Table 7-13 Quantitative Analysis of Rivers and Fluvial Flood Risk**

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.8</td>
<td>157.9</td>
<td>3.2</td>
<td>3.8</td>
</tr>
</tbody>
</table>

The detailed hydraulic model for Central Bedfordshire Council has been used to assess the potential future extent of Flood Zone 3 as a result of climate change (upper end, 65% climate change allowance has been assessed). In the absence of hydraulic modelling for all other areas the extent of Flood Zone 2 has been adopted to assess future Flood Zone 3 extent. The assessment identifies that there will be approximately 1% increase in the area identified as Flood Zone 3. The published Flood Zones indicate that small areas in Bletchley are likely to be within an area at greater risk of fluvial flooding.

**Surface Water**

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 2.3% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 4.2% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water risk.
flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASTGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 22% of the study area is within an area of medium to high risk (see Table 7-14).

Table 7-14 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>5.8</td>
<td>• North-west of Leighton Buzzard (i.e. Stoke Hammond)</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>16.3</td>
<td>• South-east of Bletchley</td>
</tr>
</tbody>
</table>

Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 7-15.

Table 7-15 Reservoir Breach Extents

<table>
<thead>
<tr>
<th>Flow Path</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows north through Milton Keynes Center where it continues to follow the River Great Ouse</td>
</tr>
<tr>
<td>2</td>
<td>Flows north east from Woburn towards the M1 where it continues to flow parallel with the M1 following the River Ouzel</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA’s dataset, 2.6% of the section has been recorded to have flooded historically. There are records of flooding outside of the existing Flood Zone 2 and 3 associated with River Ouzel.

Other Flood Sources
The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**

Table 7-16 shows the WFD operational catchments and WFD water body catchments which lie within Section C1-4.

**Table 7-16: WFD operational and WFD water body catchments within Section C1-4**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Ivel</td>
<td>Flit tributary</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Running Waters-Steppingley</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Great Ouse Upper</td>
<td>Claydon Brook</td>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ouzel and Milton Keynes</td>
<td>Broughton Brook</td>
<td>Poor</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ouzel US Caldecote Mill</td>
<td>Moderate</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Newton Longville Brook</td>
<td>Poor</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loughton Brook</td>
<td>Moderate</td>
<td></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Thames</td>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td>Hardwick Brook (Source to Thame)</td>
<td>Moderate</td>
<td>No</td>
</tr>
</tbody>
</table>

C1-4 also traverses 1 artificial water body, the Grand Union Canal, Milton Keynes trough pound.

**Groundwater**

Section C1-4

- Crosses a sandstone Principal bedrock aquifer (underlies 25 to 50% of the section)
- Crosses 3 Secondary A superficial deposit aquifers
- Contains 1 SPZ1 associated with licenced potable abstractions
- Contains 1 SPZ2 associated with licenced potable abstractions
- Contains 1 SPZ3 associated with licenced potable abstractions
- Contains 6 licensed groundwater abstractions
- Contains 2 potential GWDTE
Contains approximately 5 springs as marked on the OS 1:25,000 map
7.2    Environmental assessment

7.2.1    Air quality

7.2.1.1    Key findings

Section C1-1

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section C1-1 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes routes to the west of Abingdon and Oxford, and the A34 north of Oxford.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes (A34 south of Oxford and B4017 north of Abingdon) could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance, although some road links are elevated (west of Oxford). This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.8-22.2 μg/m$^3$), NO$_2$ (5.3-15.7 μg/m$^3$) and PM$_{10}$ (11.5-16.1 μg/m$^3$).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Oxford and Abingdon), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.
Section C1-2

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section C1-2 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link).

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes through, and around Bicester, could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).
- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.7-11.4 μg/m$^3$), NO$_2$ (5.2-8.6 μg/m$^3$) and PM$_{10}$ (11.8-15.9 μg/m$^3$).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Bicester), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section C1-3

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section C1-3 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at...
sensitive receptors within 200m (of the road link). For this section, this includes routes to the north-east of Buckingham.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes through Bicester could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).
- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.0-13.2 μg/m³), NO₂ (4.7-9.9 μg/m³) and PM₁₀ (11.0-14.3 μg/m³).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Bicester and Caversfield), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section C1-4

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section C1-4 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes the A4146 and A5.

Those links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes to the south of Milton Keynes could see a reduction in traffic flow (and therefore emissions).
It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.9-14.5 μg/m³), NO₂ (5.4-10.8 μg/m³) and PM₁₀ (11.3-16.4 μg/m³).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Milton Keynes), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Overall

The available information highlights the AQMAs within Corridor C1 (Oxford and Bicester), and the ongoing exceedances of the relevant AQOs. The corridor includes parts of large urban areas including Abingdon, Oxford, Bicester, Buckingham and Milton Keynes, as well as a number of designated sites.

Corridor C1 has approximately 90,000 air quality sensitive receptors that could be impacted (both adversely and beneficially) by route options through this corridor. The monitoring exceedances within the AQMAs highlights the opportunity to reduce congestion in these areas and potentially improve air quality within the AQMAs.

### 7.2.1.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1-1</td>
<td>Avoidance of AQMAs (and journey re-routing through them).</td>
</tr>
<tr>
<td></td>
<td>Best practice dust and site management mitigation measures</td>
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<tr>
<td></td>
<td>during construction.</td>
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<tr>
<td>C1-2</td>
<td>Avoidance of AQMAs (and journey re-routing through them).</td>
</tr>
<tr>
<td></td>
<td>Best practice dust and site management mitigation measures</td>
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<tr>
<td></td>
<td>during construction.</td>
</tr>
<tr>
<td>C1-3</td>
<td>Best practice dust and site management mitigation measures</td>
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<td></td>
<td>during construction.</td>
</tr>
</tbody>
</table>
7.2.2 Noise and vibration

7.2.2.1 Key findings

The effect of traffic noise on sensitive receptors is very sensitive to exact alignment, which is not known at this early stage of scheme development. The qualitative key findings for this study area are based on indicative predictions of how sensitive receptors could be impacted based on whether the ultimate route alignment is ‘on-line’ (following an existing main road) or ‘off-line’ (creating a new main road).

If the route alignment was to be ‘on-line’ for the relevant sections of the A34, A420, A4421, A421 and A4146 within the study area, then there is potential for sensitive receptors nearby to these roads (e.g. Abingdon, West Oxford, Chawley, Wytham, Wolvercote, Kidlington, Bessels Leigh, Cumnor, Dean Court, Stratton Audley, Fringford, Finmere, Tingewick, Buckingham, Thornborough and Stoke Hammond), including a number of NIAs, to experience adverse noise effects as traffic possibly moves closer, and/or traffic flows and speeds increase. Significant adverse effects are possible.

Should the route alignment move ‘off-line’ from the A34, A420, A4421, A421 and A4146, then sensitive receptors near these roads would have the potential to experience beneficial effects. The beneficial effects would be dependent on whether vehicles would be diverted away from the A34, A420, A4421, A421 and A4146, thus reducing the amount of traffic on those roads, with the ‘off-line’ alignment. Settlements set back from the A34 (i.e. Sunningwell, Wytham, Wolvercote, and Weston-on-the Green), the A420 (i.e. Appleton and Wootton), A4421 (i.e. Fringford and Stratton Audley), A421 (i.e. Tingewick, Gawcott, Thornborough, Nash, Great Horwood, and Whaddon), and the A4146 (i.e. Little Brickhill and Great Brickhill) could be adversely affected should an ‘off-line’ route alignment be introduced near to such settlements.

The sensitive receptors located in the large rural areas where the route either would, or has the potential to be, ‘off-line’ may experience adverse effects due to the introduction of a new noise source. These include Shippon, Cothill, Wootton, Dry Sandford, Merton, Ambrosden, Blackthorn, Arnott (including the army barracks), Newton Longville, Little Horwood, Mursley, Water Eaton, Stoke Hammond, Great Brickhill, Woburn Sands, Aspley Guise, Cross End, Aspley Heath, and Bow Brickhill. This also includes numerous individual receptors throughout the rural areas. The ultimate route alignment is key in determining the potential effect for such receptors.

For the larger settlements of Abingdon, western fringe of Oxford, Bicester, Buckingham, Bletchley and the southeast of Milton Keynes, the sensitive receptors on the boundaries of these settlements could be adversely affected through the introduction of a new route. The effects would depend on the proximity of the route alignment to the settlement boundaries. The same sensitive receptors could potentially be beneficially affected if the route alignment bypasses the larger settlements. Similar effects could occur for the NIAs in the settlements.

The indicative traffic data shows potential noise benefits within Abingdon (B4017), around Bicester (A4095, B4100, and B4030), through Croughton (B4031), to the east of Leighton...
Buzzard (A4012), within Oxford (B4495), and within Milton Keynes (including A4146, A421 and B4034). Receptors located near to these roads, including a number of NIAs, could therefore experience noise reductions from the corridor option.

The indicative traffic data shows potential adverse noise effects for the A338 (between A415 and A420), B4017 (between A20 and B4044), A413 north of Buckingham, A4146 (Leighton Buzzard to Bletchley), as well as on a number of minor roads on the road network. Receptors located nearby to these roads could experience noise increases from this corridor option.

The construction of a new or improved highway requires the use of noise and vibration emitting plant. Sensitive receptors that will be situated close to the ultimate route alignment would have the potential to be exposed to adverse noise and vibration effects from such works. This would particularly apply to those receptors in proximity to potential ‘off-line’ carriageway alignments within rural areas that could be associated with Corridor C1 (i.e. Abingdon and Oxford, Oxford and Bicester, Bicester and Buckingham, and Buckingham and Milton Keynes), where existing ambient noise and vibration levels are relatively low.

Sensitive receptors located adjacent to existing ‘on-line’ road sections where road widening would be likely as a result of the scheme (e.g. sections of the A34, A420, A4421, A421 and A4146), would already be exposed to high ambient noise levels. Nevertheless, potential adverse effects may still be possible for nearby receptors.

Given the transient nature of the majority of the construction activities, any adverse noise and vibration effects experienced by sensitive receptors would be limited in duration. This reduces the potential for significant effects to arise. Nevertheless, any effects would be minimised through the use of specific mitigation measures and controlled via the relevant Local Authority’s Environmental Health departments.

### 7.2.2.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1-1</td>
<td>The typical mitigation measures that would be considered are as follows:</td>
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<tr>
<td></td>
<td>- Thin Surfacing (Low Noise Road Surfacing) – In accordance with HD 213/11, low noise surfing provides a benefit, relative to traditional Hot Rolled Asphalt of 3.5 dB(A) at speeds of 75kph and above. Such a measure can be considered a holistic mitigation measure, as it reduces noise at source for the entire scheme.</td>
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<tr>
<td></td>
<td>- Noise Bunds and Noise Barriers – Earth bunds or noise barriers of sufficient length and height can provide attenuation above 10 dB(A). It is anticipated that such measures would be employed through the scheme, with noise barriers more likely at ‘on-line’ sections and within built-up areas, and bunds employed within the more rural areas.</td>
</tr>
<tr>
<td>C1-2</td>
<td></td>
</tr>
<tr>
<td>C1-3</td>
<td></td>
</tr>
<tr>
<td>C1-4</td>
<td>It is anticipated that all work would be undertaken to the guidance detailed in BS 5228: 2009+A1:2014 – Parts 1 and 2. These standards contain various measures to mitigate noise and vibration from construction works and centre around the principle of a ‘best practicable means’ approach.</td>
</tr>
</tbody>
</table>
7.2.3 People and communities

7.2.3.1 Key findings

For all sections there is potential for a new route to cause significant effects on sensitive receptors. Potential impacts include the loss of land and property for some residents, landowners and businesses and loss of amenity to local recreational assets (including PRoW) and communities from the introduction of a new expressway infrastructure into areas that are currently relatively rural. Such impacts may give rise to effects on physical and mental health, access, land use and viability of businesses.

Section C1-1

Due to the number of settlements dispersed across the width of the corridor section and substantial ribbon development along roads to the west of Oxford and north-west of Abingdon, it is likely that it is likely the development of a route in this area would likely result in some community severance. Loss of some best and most versatile agricultural land would also be likely for any route developed in this section.

Section C1-2

There is a likelihood that some isolated residential properties may need to be demolished – with adverse wellbeing effects on individuals - but no significant effects on existing communities are considered likely with good route alignment.

Section C1-3

There is potential to avoid most constraints within this section if a southerly route alignment is developed.

Section C1-4

This section is very constrained in the Woburn Sands area. Development of a route here would likely result in significant adverse effects caused by community severance and loss of amenity for local communities.

Overall

The spread of settlements on the north west outskirts of Oxford and again in the Woburn Sands area means that there is likely to be significant community severance from route options within this corridor, although there is scope to avoid constraints through the centre sections of the corridor.

7.2.3.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1-1</td>
<td>Seek to avoid community severance. The number of settlements within relatively close proximity provide opportunity to enhance cycle network further through scheme design. National Cycle Network routes 5 and 51 are present, along with others in Abingdon and Oxford that could be linked into. Good route alignment is required to minimise impacts on agricultural viability, for example by maintaining tenable field sizes.</td>
</tr>
<tr>
<td>Section</td>
<td>Design, mitigation and enhancement consideration for Stage 1B</td>
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<td>-----------------------------------------------------------</td>
</tr>
<tr>
<td>C1-2</td>
<td>Design to minimise disruption to local communities as far as practicable.</td>
</tr>
<tr>
<td>C1-3</td>
<td>Avoid playing fields and main communities through route alignment. Potential to mitigate effects through good highway alignment, landscaping and noise abatement.</td>
</tr>
<tr>
<td>C1-4</td>
<td>Seek to avoid community severance. Should this not be achievable, then seek to build in cycle and pedestrian networks between communities severed by the new route, to create improved active travel opportunities between local community destinations. This could contribute to health benefits in the longer term.</td>
</tr>
</tbody>
</table>

### 7.2.4 Cultural heritage

#### 7.2.4.1 Key findings

**Section C1-1**

The World Heritage Site of Blenheim Palace is located within 300 metres of the corridor boundary. The UNESCO listing for the site states that ‘the integrity of the property is well protected by its enclosing wall but important visual links do exist between the gates, the parkland buildings, buildings in the surrounding villages and landscape, and care needs to be taken to ensure these key visual links are protected’ (https://whc.unesco.org/en/list/425 [accessed 24/04/2018]). There is the potential for adverse effects to the setting of this asset through noise and visual intrusion during construction and operation and through the disruption of important views.

The Castle Mound at Fitzharris and the Ock Bridge scheduled monuments are within the town of Abingdon, and the North Hinksey conduit house, the Swing Bridge, Rewley Abbey, and the remains of Osney Abbey scheduled monuments are within the built up outskirts of Oxford. All are therefore unlikely to be situated within close proximity to the Proposed Development. The setting of the Ock Bridge has views to the west over the Ock valley, however, the current A34 is not currently visible from this location and any development in this location would likely be online or offline further to the west. Therefore, there is likely to be no significant effect on these assets or on their settings. The Swinford Bridge is an isolated, discreet asset, in use as a crossing over the river Thames, and is also unlikely to be affected by the Proposed Development.

The majority of scheduled monuments in this area are relatively small and discreet, except the Port Meadow site which extends for almost 2.5 kilometres (1.5 miles) north to south. Although the location of a number of these assets would suggest that it is unlikely that they would be near enough to the Proposed Development for significant adverse effects to occur, in some areas the location of these assets would be difficult to avoid. In particular, the extensive Port Meadow site is just east of both the Godstow Abbey and Seacourt medieval settlement scheduled monuments. The Seacourt medieval settlement scheduled monument is also currently dissected by the current A34. This means that the potential for both online and offline development is highly restricted in this area. It should also be noted that the presence of numerous settlement sites and a dense multi-period site dating back to the prehistoric period may be indicative of further associated unknown archaeological remains of high value outside of the scheduled area.
The setting of scheduled monuments may also be affected by noise and visual intrusion during construction and operation including:

- the Dovecote which is associated with the Grade I listed Rousham House and the Grade I Registered Park and Garden which comprises its grounds
- the views to the south from the hillfort at Bladon Heath

Many of the listed buildings within the C1-1 corridor are situated in small groups within towns and villages that provide some screening. There are also a large number of Grade II listed assets that are either independent or in small groups situated more rurally. The relatively high number of small conservation areas within this section is indicative of the density and spread of the historic built environment more generally. Specifically, the Oxford Canal Conservation Area runs for approximately 14.5 kilometres (9 miles) from north to south within the corridor and a significant effect on this asset would be difficult to mitigate. If the Proposed Development is offline, there is the potential for a significant adverse impact on the setting of all of the listed buildings and Conservation Areas within the Section C1-1 corridor through noise and visual intrusion during construction and operation.

Any online development of the current A420 has the potential to impact upon 18 listed buildings (1 Grade II* and 17 Grade II) and 1 Conservation Area which are located within 250 metres of the existing road.

A cluster of 13 listed buildings (12 Grade II, 1 Grade II*) are located within 350 metres of the current A34 in an area where online development is possible. In particular, the Grade II Manor Preparatory School and Manor Cottage, as well as the Grade II* listed barn associated with the Manor Preparatory School, are within 100 metres of the current A34 and, although they are currently well screened, there is the potential for significant effects to their setting from noise and visual intrusion during construction and operation of any online development. There are a further 25 listed buildings (1 Grade I, 4 Grade II*, and 20 Grade II) and 5 Conservation Areas within 300 metres of the current A34, most of which are located to the south of the A40 junction; there is the potential for significant effects to the setting of these assets through noise and visual intrusion during construction and operation of any online development.

The 190 listed buildings, 2 scheduled monuments, 1 Grade II Registered Park and Garden, and 2 Conservation Areas located within Abingdon are at least partially screened from new development, particularly if the route were to remain online with the current A34. However, there is still the potential for significant adverse effects on the setting of these assets through noise and visual intrusion during construction and operation.

The Grade I Registered Park and Garden at Rousham, which contains a total of 32 High value assets, is situated on the edge of this corridor and is unlikely to be directly affected by the Proposed Development. However, there is the potential for adverse effects on the setting of the assets through noise and visual intrusion during construction and operation broadly. Specifically, important views out from the property are predominantly those to the north and east of the house, which should not be affected by the Proposed Development, with views to the south terminating with a rim of low, partly wooded hills approximately 2 kilometres away (https://historicengland.org.uk/listing/the-list/list-entry/1000107 [accessed 24/04/2018]). However, the rural setting more generally is also considered to be of significance and sensitive design in this area would be needed.
The Grade II* Registered Park and Garden at Worcester College is within the built up area along the edges of Oxford. It is well screened by trees and by railway infrastructure to the west. This asset is therefore unlikely to be situated within close proximity to the Proposed Development and there is likely to be no significant effects on the setting of this asset.

Section C1-2

The Alchester Roman site scheduled monument is currently bisected by railway infrastructure and the associated parade ground, access road, and marching camp scheduled monument that lies immediately to the southeast. This is a large scheduled monument which is located very near to the current A41 and may therefore be adversely affected by both online or offline development in this area. Furthermore, the nature of this site indicates the potential for associated archaeological remains of High value to be found outside of the scheduled areas.

Similarly, the Wretchwick Deserted Medieval Settlement scheduled monument survives as earthworks just south of Langford Village and the current A4421 as two separated areas bisected by a current working farm. However, a much smaller area is included in the scheduling here than in the Alchester Roman site, and the location of the monument is such that only online development of the A4421 would be likely to have the potential for significant adverse effects on this asset. It should be noted that, due to the nature of settlement sites, there is the potential for associated archaeological remains of High value to be found outside of the scheduled areas.

As they are relatively discreet assets in locations that are unlikely to be within the Section C1-2 route alignment, the Proposed Development is unlikely to have a significant adverse effect on the Ambrosden churchyard cross scheduled monuments, or on the moated site at Stratton Audley, which is well screened by the current village. The Middleton Stoney motte and bailey castle was partially excavated in the 1970s and is located within the grounds of a Grade II Registered Park and Garden, both of which are factors that reduce the potential for adverse effects by the Proposed Development. Also, the Saxon Barrow south of Middleton Stoney survives well as a clearly defined earthwork, partially excavated in 1974 as part of the Oxford Road development. The asset is discrete and could be avoided; however, due to its proximity to the current A4095 any online development has the potential to adversely affect the setting of this asset as well as associated archaeological materials.

The majority of listed buildings within this section are located within the centre of Bicester (comprising 114 listed buildings) and would not be significantly affected by on or offline development. The rest of the listed buildings are located either in small village groups or as isolated rural structures. There is a large amount of pre-existing transportation infrastructure within the Section C1-2 corridor and many of the listed buildings have screening in place to mitigate the current levels of noise and visual intrusion and would not be significantly affected by further online development. However, online development would have the potential for a significant adverse effect on the setting of 14 Grade II listed buildings located within 250 metres of the current A41 and on the 1 Grade II listed buildings within 50 metres of the current M40.

The Grade II Registered Middleton Park forms the setting for 11 listed buildings (1 Grade I, 3 Grade II*, and 7 Grade II). There is the potential for visual and noise intrusion on the setting of the buildings and the designated formal grounds during operation and construction of the Proposed Development.

Section C1-3
RAF Bicester scheduled monument comprises eleven distinct scheduling areas; including structures such as bomb stores, air raid shelters, a hanger complex, and pillboxes. It is likely that the any route within the section C1-3 corridor would have to be situated well to the north or south in order to bypass Bicester and would therefore be a suitable distance away from these scheduled areas. It is therefore unlikely that there would be a significant impact on this scheduled monument.

Many of the other scheduled monuments are also in built environments or other locations that would be unsuitable for a route alignment and would therefore not be significantly impacted by the Proposed Development. Those within more rural environments are discrete assets that could generally be avoided through design.

Any online development of the current A421 has the potential for a significant effect on those assets which are located within close proximity to the current highway through the removal of archaeological remains during construction or through noise and visual intrusion on the setting of the asset during construction and operation. These assets comprise:

- Two Roman barrows 200m east-northeast of Thornborough Bridge and approximately 60 metres north of the current A421
- the Thornborough Bridge scheduled monument (and Grade I listed building) located less than 30 metres north of the current A421 with direct views of the highway
- St. Rumbold’s Well scheduled monument is located approximately 300m from the current A421 but incorporates within the scheduling an area of cultivation earthworks to the south of the well itself. These earthworks extend beyond the scheduled area and could be adversely affected by online development of the A421 thereby affecting the setting of the scheduled monument itself

The majority of listed buildings within the corridor are located within small villages, often Conservation Areas, with only a small number of structures situated in more isolated rural locations. Varying levels of screening exist from neighbouring properties and vegetation; however, there is the potential for significant adverse effects through noise and visual intrusion during construction and operation on the setting of these assets.

Online development is unlikely to significantly impact upon the majority of the listed buildings apart from:

- the Grade I listed Church of St Mary and the Grade II* listed Barn in Launton, which are both located on the northern edge of the village and west of Bicester, 250 metres from the current A4421
- 20 Grade II listed buildings and 1 Conservation Area associated with the RAF Bicester and bordering the A4421 just north of Bicester
- 11 further Grade II listed buildings within 100 metres of the current A4421
- 2 Grade II listed buildings within 100 metres of the current A421

A south-eastern avenue of Stowe Grade I Registered Park and Garden extends into the corridor and into Buckingham. Although tree lined, the avenue is surrounded by open agricultural land. The distance from the current A421 route and its location on the opposite
side of Buckingham means that this asset restricts route development along the north of Buckingham, but is unlikely to be significantly affected by online development or offline development to the south of the current A421.

Section C1-4

The Roman town of Magiovinium scheduled monument flanks the Roman Road of Watling street and is roughly bordered by the river Ouzel, the current A4146 and the current A5. The nature of this site suggests the potential for further unknown archaeological remains of High value associated with this asset that lie outside of the scheduling boundary. Proposed development online or offline within the vicinity of the A4146, and to the current roundabout would have a potential significant effect on this asset through the removal of archaeological deposits during construction.

The other scheduled monuments within the Section C1-4 corridor are located in positions that are unlikely to be situated within close proximity to the Proposed Development. There is therefore unlikely to be a significant effect on these assets; however, the Danesborough Camp hillfort is specifically located on a prominent hill and the setting of this asset may be significantly affected through noise and visual intrusion during construction and operation.

Sixty-four listed buildings within Section C1-4 are within the built up areas of Bletchley and Milton Keynes and are unlikely to be situated within close proximity of the Proposed Development. It is therefore unlikely that there would be a significant effect on the setting of these assets. The rest of the listed buildings within the corridor are located within small town and village Conservation Areas with a small number of assets situated independently in more rural settings. These assets have varying levels of screening from vegetation and neighbouring properties; however, there is the potential for a significant adverse effect on the setting of these assets through noise and visual intrusion during construction and operation. The spread of the assets is such that mitigation through design should be possible; however, it may be more difficult within the northern section of the corridor where 4 Conservation Areas are situated linearly from east to west.

The Grade I Registered Park and Garden of Woburn Abbey extends a maximum of 750 metres into the C1-4 corridor. The park is bounded on the north by Turnpike Road, and is well screened in this area by dense vegetation. However, without further assessment of the potential noise and visibility of the Proposed Development it is not possible to completely rule out the potential for a significant adverse effect on the Registered Park and Garden and the associated designated asset through noise and visual intrusion during construction and operation.

Overall

Overall, due to the density of cultural heritage assets within Section C1-1 and the proximity of the Very High value Blenheim Palace, it may not be possible to mitigate the significant adverse effects on cultural heritage assets within Corridor C1.

7.2.4.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
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<tbody>
<tr>
<td>C1-1</td>
<td>The World Heritage Site of Blenheim Palace is within the study area for Section C1-1 and, due to the Very High value of this asset, even a minor adverse impact to the</td>
</tr>
</tbody>
</table>
### Design, mitigation and enhancement consideration for Stage 1B

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
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<tbody>
<tr>
<td>setting of this asset, which includes long views, would be considered significant.</td>
<td>In conjunction to this, there are a number of High and Medium value assets that have the potential to be significantly affected by both online or offline development; such as the Oxford Canal Conservation Area and the Port Meadow and Seacourt Medieval settlement scheduled monuments. Mitigation of these significant adverse effects may not be possible. If archaeological remains cannot be avoided, a programme of archaeological investigation, recording, analysis, interpretation and dissemination would be required to mitigate any removal of archaeological deposits, and within scheduled monument boundaries this would require Scheduled Monument Consent from the Secretary of State.</td>
</tr>
<tr>
<td>C1-2</td>
<td>The route potential for this section is limited by the town of Bicester and the overall spread of heritage assets. Of particular note for Section C1-2 is that the density of assets in relation to the pre-existing highway infrastructure and the city of Bicester means that route design may be difficult through the center of this corridor; however, mitigation through design may still be possible.</td>
</tr>
<tr>
<td>C1-3</td>
<td>The lighter density of cultural heritage assets within this section would likely allow for the mitigation of any potential significant adverse effects. Of particular note for Section C1-3 is that the south-eastern avenue of the Stowe Grade I Registered Park and Garden would limit route development to the north of Buckingham.</td>
</tr>
<tr>
<td>C1-4</td>
<td>Overall, the dispersed nature of the assets within Corridor C1-4 has the potential for appropriate design mitigation. Of particular note for Corridor C1-4 is the Roman town of Magiovinium and Roman fort along the current A4146. Any online development would be likely to have a significant adverse effect on this asset through the removal of archaeological remains. There is also a density of cultural heritage assets within the north of the corridor comprising the Grade I Registered Park and Garden of Woburn Abbey and 4 Conservation Areas that are situated linearly from east to west restricting the potential for suitable route options in this area.</td>
</tr>
</tbody>
</table>

### 7.2.5 Landscape and visual

#### 7.2.5.1 Key findings

**Section C1-1**

A route developed in the western part of the corridor could affect views from and the setting of the Cotswolds AONB and Blenheim Palace RPG grade I and World Heritage Site. This impact could be compounded by potential restrictions on planting and mounding associated with Oxford Airport safeguarding area.

The eastern part of the corridor crosses areas of the floodplain west of Oxford and routes developed here would be likely to require extensive lengths of embankment or viaduct which would be highly visible in the landscape. There could potentially be secondary landscape
impacts if borrow pits are needed to create embankments. There could also potentially be
direct and indirect landscape and visual effects on areas of common land at Pixie Mead and
Port Meadow; public parks and the setting of listed buildings and conservation areas.

Development or improvements of the existing route along the A34 could result in large
adverse landscape and visual effects due to the close proximity of sensitive receptors and
landscapes.

Section C1-2

There are potential large adverse impacts where the eastern part of this small section
crosses the low lying floodplain south of Bicester and any route developed here is likely to
require extensive lengths of embankment or viaduct that could be at odds with the open
landscape and highly visible. Additionally, there could potentially be secondary landscape
impacts if borrow pits are needed to create embankments.

To the west of Bicester, the corridor is constrained by Middleton Park RPG grade II and a
public park at Bignell Park. A route developed here could potentially affect the setting of and
views from Middleton Park and on users of the public park.

Section C1-3

Any route developed across the low lying floodplain east of Bicester is likely to require an
embankment or viaduct that would be at odds with the open landscape and highly visible.

Impacts on RAF Bicester from a route developed in this section could be difficult to mitigate
due to the open character of the airfield. Restrictions may also apply to elements associated
with the expressway such as the height of gantries; extent and height of lighting, and planting
types to avoid conflict with aircraft.

A route that follows and widens the existing A4421 potentially result in the loss of mature
established vegetation and adverse landscape and visual impacts on the settlements and
residents along the route. Offline improvements would impact on open countryside.

Route options north of the A421 would have a direct impact on regional and local landscape
designations (Stowe AAL and the Great Ouse Valley (West), Great Ouse Valley (East) and
Whaddon-Nash LLAs). There would also be a direct impact on Stowe RPG grade I as Stowe
Avenue would be severed. Stowe is a National Trust property. Routes south of the A421
would have potential impacts on views from and the setting of the designated landscapes
and Stowe RPG grade I.

Section C1-4

The corridor crosses the Brickhills AAL which would be affected by routes developed in this
section. Route alignments here would pass through the London Metropolitan green belt
and may have an impact on its sense of openess. There is also the potential for direct and
indirect impacts on Woburn Abbey RPG grade I including impacts on views and on its setting.
There are extensive areas of heathland and woodland south of Aspley Heath which includes
Woburn Golf Course that could be difficult to mitigate.
Whilst the woodland cover provides potential for screening, there are numerous PRoWs in this area including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths.

The corridor passes to the south of the Lakes Estate on the southern edge of Milton Keynes. Whilst this area is already affected by the A4146, there is potential for increase visual impacts from the expressway due to the requirements for signs and gantries and from new junction arrangements.

Between the A5 and M1 there are a number of constraints including numerous settlements, some with conservation area status, extensive areas of heathland and woodland south of Aspley Heath and a number of golf courses that could be affected if a new route is developed in this section. Routes developed in this section would require grade separated junctions with the A5 and M1 and also a crossing for the railway line, which could result in landscape and visual impacts on residents and users of PRoW and open space.

**Overall**

Route options to the west of Corridor C1 would potentially result in large adverse effects on views from and the setting of the Cotswolds AONB and Blenheim Palace RPG grade I and World Heritage Site.

Routes that follow the existing A34 alignment would be constrained by potential direct and indirect landscape and visual effects on areas of common land at Pixie Mead and Port Meadow; public parks and the setting of listed buildings and conservation areas.

The next most sensitive part of Corridor C1 lies to the north of the A421 which includes Stowe AAL, Stowe RPG grade I and the Great Ouse Valley (West), Great Ouse Valley (East) and Whaddon-Nash LLAs. Routes south of the A421 would have potential impacts on views from and the setting of the designated landscapes and Stowe RPG grade I.

To the west of Bicester, the corridor is constrained by Middleton Park RPG grade II and a public park at Bignell Park. A route developed here could potentially affect the setting of and views from Middleton Park and on users of the public park. Impacts on RAF Bicester would be difficult to mitigate due to the open character of the airfield.

Elsewhere there are potential large adverse impacts where the corridor crosses the low lying floodplain south and east of Bicester where it is likely that extensive lengths of embankment or viaduct would be at odds with the open landscape and highly visible.

Any routes developed at the northern extent of the corridor would likely directly impact on the Brickhills AAL. In landscape terms, route options would preferably be located immediately adjacent to the edge of Milton Keynes to minimise the impact on the designated landscape. An eastern route would impact on the openness of the London Metropolitan green belt and potentially on the setting of Woburn Abbey, with the potential loss of extensive areas of heathland and woodland.

Overall, Corridor C1 is very constrained by landscape considerations, due to the potential impacts on views from and the setting of nationally important landscapes of the Cotswolds AONB, Blenheim Palace and Stowe as well as series of local landscape designations to the north of the corridor.
### 7.2.5.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1-1</td>
<td>Routes that are developed off the existing A34 alignment are likely to be very difficult to mitigate. Route selection should have consideration for avoiding views from and the setting of the Cotswolds AONB and Blenheim Palace RPG grade I and World Heritage Site should be discounted. Careful consideration to be given to the location of gantries, lighting and signs to avoid additional visual impacts, particularly close to sensitive visual receptors. Further consideration should be given to the limitations on mounding and planting in the vicinity of Oxford Airport which potentially mean that route options to the west of the corridor cannot be mitigated. Investigate opportunities to improve mitigation for existing receptors through measures such as planting new wet woodland blocks and tree belts at appropriate locations. Such measures could include consideration of opportunities to improve public access and ecological connectivity.</td>
</tr>
<tr>
<td>C1-2</td>
<td>Keep vertical alignment as low as possible in the landscape to minimise visual impact. Careful consideration to be given to the location of gantries, lighting and signs to avoid additional visual impacts, particularly close to sensitive visual receptors.</td>
</tr>
<tr>
<td>C1-3</td>
<td>Seek to avoid routes that have a potential impact on AAL and LLAs north of the A421, and Stowe RPG grade I, including impacts on views from and the setting of these constraints. Consider routes east of Stratton Audley to reduce impact on views from and setting of RAF Bicester conservation area. Align route away from A4421 to avoid significant impacts on residents and setting of listed buildings. Investigate alignments south of Buckingham to bypass urban area. Investigate link south of Whaddon to avoid ancient woodlands. Keep vertical alignment as low as possible in the landscape to minimise visual impact. Careful consideration to be given to the location of gantries, lighting and signs to avoid additional visual impacts, particularly close to sensitive visual receptors.</td>
</tr>
<tr>
<td>C1-4</td>
<td>Keep route options as close as possible to the existing A4146 corridor to minimise severance of and direct impacts on the Brickhills AAL and other constraints and sensitive visual receptors that are not currently affected by infrastructure. Consideration should be given to creating a buffer/visual screen to reduce visual impacts on residents south of Milton Keynes.</td>
</tr>
</tbody>
</table>
7.2.6 Nature conservation

7.2.6.1 Key findings

For all sections, in addition to direct habitat loss, there is the potential for significant effects on key sensitive features through factors such as habitat fragmentation, air quality changes, hydrological changes, and increased disturbance from changes in noise, vibration and lighting levels. Designated sites lying outside the corridor boundary may potentially be affected by noise and visual disturbance, and changes to air quality as a result of construction and operational phases, or if hydrologically sensitive and connected to areas affected by construction and operational effects. These indirect effects are most likely in the areas where the route alignment is most constrained by designated sites.

Section C1-1

This section corresponds with section B1-1 and the potential impacts on nature conservation designations are the same. Section C1-1 includes an almost continuous belt of designated land comprising Oxford Meadows SAC and 6 SSSI bisected by the existing A34 north west of Oxford. It is considered unlikely that any route alignment through this area would avoid direct habitat loss from these Tier I constraints.

In addition to direct habitat loss, and common to all of the designated sites identified in the study area, the indirect effects identified are considered likely to be more of a risk for route alignment options in the areas south of the A40 compared to north where the area of land designated for nature conservation is less extensive.

Section C1-2

The section is considerably smaller than the rest of the corridor and there are limited designated areas for nature conservation. As a result, it is considered possible for the route alignment to avoid direct habitat loss of SSSI, LNR, AW and LWS.

Section C1-3

The limited extent of SSSI and LNR within this section mean that direct habitat loss should be avoidable through route alignment. However, there are more extensive areas of AW and LWS and this, in association with the distribution of residential areas, may make avoiding these sites through appropriate route alignment more difficult.

Section C1-4

Much of this section is within Section B1-4 and the potential impacts on nature conservation are considered to be the same. Section C1-4 appears relatively constrained in terms of potential route alignment options given the extent of residential areas. It may be possible to avoid direct habitat loss from within SSSI, NNR and LNR, but the extent of LWS and AW are such that direct loss of habitats within these designations may not be possible to avoid.

Overall

The extensive area of Tier I constraints at the southern end of the corridor is considered to be unavoidable with limited or no mitigation measure likely to be possible. The remaining sections have less extensive designated area, although, in combination with the distribution
of residential areas present, it may be difficult for a route alignment to avoid all Tier I constraints.

### 7.2.6.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1-1</td>
<td>Whilst mitigation may be possible to address significant adverse effects to European sites, this is the most sensitive section with the Stage 1A corridor appraisal and, on a precautionary basis, it has been assessed as potentially unmitigable.</td>
</tr>
<tr>
<td>C1-2</td>
<td>There is the potential to avoid habitat loss to key sensitive features through appropriate route alignment. Mitigation for other effects on key sensitive features could include creation of compensatory habitats, habitat screening by planting/fencing, and appropriate drainage, dust suppression and lighting strategies.</td>
</tr>
<tr>
<td>C1-3</td>
<td></td>
</tr>
<tr>
<td>C1-4</td>
<td></td>
</tr>
</tbody>
</table>

### 7.2.7 Geology and soils

#### 7.2.7.1 Key findings

**Section C1-1**

There is the potential for significant effects relating to SSSIs, however careful route selection could avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs in one location span two thirds of the corridor width and so it is unlikely to be possible to route around this when taking into account other environmental discipline constraints. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere. A number of operational quarries are recorded within C1-1, without adequate mitigation there is the potential for activities to be disrupted at these and extraction may be compromised, however route selection could avoid this. It may also be possible to expedite extraction of minerals in advance of the works, however this would need further consultation and assessment.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses, however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, however it is expected that these impacts could be mitigated.

**Section C1-2**

There is the potential for significant effects relating to the SSSI, however careful route selection could avoid these. There is no other mitigation that could be applied as the feature is only valuable in its current location and condition.
MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs are only present in the north western extent of the corridor and route selection could avoid these. It may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere. An operational quarry is recorded within C1-2, without adequate mitigation there is the potential for activities to be disrupted here and extraction may be compromised, however route selection could avoid this. It may also be possible to expedite extraction of minerals in advance of the works, although this would need further consultation and assessment.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses, however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

Section C1-3

There is the potential for significant effects relating to the SSSIs, however careful route selection could avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the width of the corridor and so routing to avoid these features is not possible. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses (largely airfields in this area), however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

Section C1-4

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the corridor width and so routing to avoid these features is not possible. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses in particular Bletchley landfill, however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is generally considered possible in terms of engineering and remediation, however in the case of Bletchley this would be a significant constraint given that the landfill serves Milton Keynes and has planning permission till 2022.
Overall

There is the potential for significant effects relating to the SSSIs, however careful route selection could avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the corridor width and so routing to avoid these features is not possible. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere. Operational quarries are recorded in the Sections, without adequate mitigation there is the potential for activities to be disrupted at these and extraction may be compromised, however route selection could avoid this. It may also be possible to expedite extraction of minerals in advance of the works, although this would need further consultation and assessment.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses in particular Bletchley landfill, however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is generally considered possible in terms of engineering and remediation, however in the case of Bletchley this would be a significant constraint given that the landfill serves Milton Keynes and has planning permission till 2022.

7.2.7.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1-1</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span two-thirds of the corridor width in one location, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>C1-2</td>
<td>Given the area and location of the features the majority could be avoided by route selection. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>C1-3</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGA which spans the width of the corridor, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>C1-4</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span the corridor width, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills however Bletchley landfill may represent more of a constraint from a regulatory perspective.</td>
</tr>
</tbody>
</table>
7.2.8 Road drainage and the water environment

7.2.8.1 Key findings

Section C1-1

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas to the west of Oxford.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality

Section C1-1 has the potential for significant effects on 19 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section C1-1 has the potential for significant effects on the water quality of 19 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater

Section C1-1 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and spring discharges.

Section C1-2

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas to the south-east of Bicester.
The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

**Geomorphology, WFD and Water Quality**

Section C1-2 has the potential for significant effects on 6 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section C1-2 has the potential for significant effects on the water quality of 6 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Section C1-2 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and spring discharges.

**Section C1-3**

**Flood Risk**

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk in small areas in Bicester and Buckingham.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

**Geomorphology, WFD and Water Quality**

Section C1-3 has the potential for significant effects on 14 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.
Section C1-3 has the potential for significant effects on the water quality of 14 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater

Section C1-3 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and spring discharges.

Section C1-4

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk in small areas in Bletchley.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality

Section C1-4 has the potential for significant effects on 4 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section C1-4 has the potential for significant effects on the water quality of 4 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater

Section C1-4 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing the SPZ1 within this section.

Overall
Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality

Section C1 has the potential for significant effects on 35 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section C1 has the potential for significant effects on the water quality of 35 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater

Corridor C-1 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing the SPZ1 within this corridor.

7.2.8.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1-1</td>
<td><strong>Flood Risk</strong></td>
</tr>
<tr>
<td></td>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
</tr>
<tr>
<td></td>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
<td></td>
<td>• May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
</tr>
<tr>
<td></td>
<td>• Areas of high surface water flood risk should be avoided. Where not</td>
</tr>
</tbody>
</table>
### Section Design, mitigation and enhancement consideration for Stage 1B

#### Feasible, additional storage may be required to manage any displacements of surface water flows.
- Groundwater mitigation may be required where groundwater flow paths are impeded.

##### Geomorphology, WFD and Water Quality
- Crossing of large WFD water bodies to be avoided through design (embedded mitigation).
- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.
- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.

##### Groundwater
- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- Groundwater abstractions may require monitoring and possible replacement if they are impacted by works.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.

#### C1-2 Flood Risk
- Crossings should be made at locations with the smallest floodplain width.
- A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.
- May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.
- Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.
- Groundwater mitigation may be required where groundwater flow paths are impeded.

##### Geomorphology, WFD and Water Quality
- Crossing of large WFD water bodies to be avoided through design (embedded mitigation).
- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.
- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.

##### Groundwater
- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- Groundwater abstractions may require monitoring and possible replacement...
### Section Design, mitigation and enhancement consideration for Stage 1B

<table>
<thead>
<tr>
<th>C1-3</th>
<th>Flood Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Crossings should be made at locations with the smallest floodplain width.</td>
</tr>
<tr>
<td></td>
<td>- A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
<td></td>
<td>- May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
</tr>
<tr>
<td></td>
<td>- Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.</td>
</tr>
<tr>
<td></td>
<td>- Groundwater mitigation may be required where groundwater flow paths are impeded.</td>
</tr>
</tbody>
</table>

### Geomorphology, WFD and Water Quality

|      | Crossing of large WFD water bodies to be avoided through design (embedded mitigation). |
|      | Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes. |
|      | Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs. |

### Groundwater

|      | Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality. |
|      | Groundwater abstractions may require monitoring and possible replacement if they are impacted by works. |
|      | Pollution prevention control measures during construction and operation would mitigate potential quality impacts. |

### C1-4 Flood Risk

|      | Crossings should be made at locations with the smallest floodplain width. |
|      | A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b. |
|      | May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change. |
|      | Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows. |
|      | Groundwater mitigation may be required where groundwater flow paths are impeded. |
## Geomorphology, WFD and Water Quality

- Crossing of large WFD water bodies to be avoided through design (embedded mitigation).
- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.
- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.

## Groundwater

- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- Groundwater abstractions (including those for public supply) may require monitoring and possible replacement if they are impacted by works.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.

### 7.3 Assessment Summary

#### 7.3.1 Intervention objectives assessment

**Table 7-17 Intervention objective 1 assessment – C1**

<table>
<thead>
<tr>
<th>Discipline</th>
<th>C1-1</th>
<th>C1-2</th>
<th>C1-3</th>
<th>C1-4</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise and Vibration</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

For all subsections it is assumed that traffic could be rerouted from the more densely populated areas (e.g. Oxford, Abingdon, Bicester, Caversfield, Milton Keynes etc.), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations) and on this basis would be beneficial overall.

Overall potential net neutral effect having regard for:

**Benefits:**
- Potential for reductions in noise levels at receptors in Bicester, Bletchley, Milton Keynes due to potential traffic flow being diverted away from these areas.

**Disbenefits:**
- Potential increases in noise for receptors
adjacent to possible ‘on-line’ sections (A34, A421 between Buckingham and Bletchley, A421 – east of M1) due to possible increased traffic and speeds and road widening.

Potential for adverse changes in noise at sensitive receptors in rural areas where new offline sections could form part of a new route option.

- Potential for adverse noise and vibration impacts at sensitive receptors associated with construction and online widening.

Sections C1-1 and C1-4 both have a number of relatively rural settlements which are dispersed across much of the width of the corridor section, including some ribbon development along minor roads likely to be crossed by potential route options. Therefore, these sections have been assessed as amber as there is a likelihood for adverse effects on wellbeing for residents of some of these communities. Potential community constraints in the Woburn Sands area near Milton Keynes (section C1-4).

Corridor C1 has been scored neutral overall having regard for potential beneficial effects on air quality and noise set against potential adverse effects on people and communities which it is assumed would be reduced through careful route design.

**Table 7-18 Intervention objective 2 assessment – C1**

<table>
<thead>
<tr>
<th>Discipline</th>
<th>C1-1</th>
<th>C1-2</th>
<th>C1-3</th>
<th>C1-4</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Heritage</td>
<td>Red</td>
<td>Green</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Section C1-1 is particularly constrained. A route through the eastern part of the corridor (A34 online widening) would likely result in the loss of a scheduled monument located on either side of the existing A34 (Seacourt medieval settlement). A route any further east could impact on two other scheduled monuments (Godstow Abbey and ring</td>
</tr>
<tr>
<td>Discipline</td>
<td>C1-1</td>
<td>C1-2</td>
<td>C1-3</td>
<td>C1-4</td>
<td>Overall</td>
<td>Rationale</td>
</tr>
<tr>
<td>-----------------------------</td>
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<td>---------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td></td>
<td>Yellow</td>
<td></td>
<td></td>
<td>ditches, barrows and associated enclosures at Port Meadow). A route slightly to the west could impact on a grade I listed building at Wytham.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A route through the western part C1-1 could result in unmitigable significant effects on the setting of Blenheim Palace World Heritage Site (WHS) and Registered Park and Garden Grade I. There are also a number of scattered scheduled monuments, grade I and II* listed buildings and grade II* RPG’s.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In all of the other sections it is considered, there is sufficient flexibility in the corridor to allow for mitigation of significant effects on cultural heritage assets through careful route design.</td>
</tr>
<tr>
<td>Landscape and Visual</td>
<td>Yellow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C1 does not contain any Tier I landscape constraints. Routes developed on the western side of section C1-1 would likely impact on views from and the setting of the Cotswolds AONB and Blenheim Palace RPG grade I and World Heritage Site. Section C1-2 crosses areas of floodplain south of Bicester and is likely to require extensive lengths of embankment or viaduct. Consequently, there are potential secondary landscape impacts if borrow pits are needed to create embankments. Even with careful consideration of the horizontal and vertical alignment, a large adverse effect on the landscape would remain. Any route through section C1-3 north of the A421 could have a direct impact on the Stowe AAL and LLAs. With landscape in mind, any route through section C1-4 would preferably to go west of Great Brickhill, Little Brickhill and Bow Brickhill immediately adjacent to the edge of Milton Keynes to reduce the impact on the AAL designated landscape. The London Metropolitan green belt partially extends across section C1-4 although a</td>
</tr>
</tbody>
</table>
### Nature Conservation

Section C1-1 includes an almost contiguous belt of land containing Oxford Meadows Special Area of Conservation (SAC); Wytham Woods SSSI; Cassington Meadows SSSI; Pixey and Yarnton Meads SSSI; Wolvercote Meadows SSSI; Port Meadow with Wolvercote Common and Green SSSI and Hook Meadow and The Trap Grounds SSSI.

Any A34 online highways work adjacent to a SAC would have the potential for significant adverse effects, especially if works were outside the highways boundary. Increasing traffic flow along the existing alignment may also lead to adverse effects due to changes in air quality and/or hydrology.

Any route through the western part of the corridor would likely have unmitigable significant effects on ancient woodland.

Section C1-2 – It is considered that there is sufficient flexibility in the corridor to potentially avoid significant adverse effects on nature conservation constraints.

Section C1-3 – it is considered that habitat loss within the SSSI should be avoidable through careful route design. However, it may not be possible for any route to completely avoid habitat loss in one or more LWS or Ancient Woodland given their location within the section, particularly in the vicinity of Sheephouse Wood SSSI and Finemere Wood SSSI.

Section C1-4 – it is considered that habitat loss from within SSSIs, the NNR and LNR should be avoidable through route design. However, habitat loss may be unavoidable from one or more LWS and/or Ancient Woodland given the extent of designated areas in the north east of the section.

### Geology and Soils

The corridor contains a large coverage of Mineral Safeguarding Areas (MSGA’s) which...
Discipline | C1-1 | C1-2 | C1-3 | C1-4 | Overall | Rationale
--- | --- | --- | --- | --- | --- | ---
Road Drainage and Water Environment | | | | | | would be unavoidable.

There are a number of geological SSSI’s along the corridor but it is considered that it may be possible to avoid these constraints through careful route design.

There are a number of authorised landfills and quarries within the corridor however it is considered these could possibly be avoided through careful route design.

There are a number of historic landfills and potentially contaminative historical and current land uses within the corridor. However, it is considered these could possibly be avoided through careful route design.

Section C1-1 would cross FZ3b areas at various intervals along the section, as the Thames, River Cherwell and tributaries are widespread. If this corridor is taken forward, an extremely wide clear span crossing would likely be required (could be up to 2km in length in order to avoid FZ3b.

Records of historical flooding from the River Thames also demonstrate that areas have been flooded outside of flood zones 2 and 3.

All of the other sections have the potential to cross areas of FZ3b.

Overall

Corridor C1 has been scored red because this corridor does offer sufficient flexibility to avoid all Tier I constraints.

### 7.3.2 Overall findings

**Table 7-19 Summary of C1 environment assessment**

<table>
<thead>
<tr>
<th>Score</th>
<th>Intervention objective 1</th>
<th>Intervention objective 2</th>
<th>Intervention objective 3</th>
<th>Strategic objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grey – neutral</td>
<td>Red – highly disadvantageous</td>
<td>Grey - neutral</td>
<td>Red – highly disadvantageous</td>
<td></td>
</tr>
</tbody>
</table>
8. Corridor C2

8.1 Baseline conditions

8.1.1 Air quality

Section C2-1

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs:** The C2-1 area includes Abingdon AQMA (central Abingdon), and the southern part of the Oxford AQMA. Both have been declared due to exceedances in NO\(_2\).

- **Designated Sites:** This area includes Dry Sandford Pit SSSI, Barrow Farm Fen SSSI, Sugworth SSSI and Cothill Fen SSSI and SAC.

- **Residential Receptors:** Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Oxford, Abingdon, Radley and Sunningwell.

- **Sensitive Receptors:** Within the C2-1 boundary, there are approximately 17,000 potential air quality sensitive receptors.

- **Clean Air Zone:** The section is approximately 2km from the potential Oxford CAZ.

- **PCM Model:** Defra PCM links within this area have been identified on A415 and A4183 in Abingdon. Concentrations are elevated but not exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data:** The Vale of White Horse District Council has 18 NO\(_2\) monitoring locations within C2-1, in and around the centre of Abingdon. The latest monitoring data indicates elevated NO\(_2\) concentrations, with one exceedance on the A415, and concentrations close to exceeding within the existing AQMA area.

- **Defra Background Concentrations:** The Defra background maps indicate 2018 background concentrations across the C2-1 area (at 1km square intervals) are below the relevant AQOs for NO\(_x\) (10.1-19.9 μg/m\(^3\)), NO\(_2\) (7.7-14.3 μg/m\(^3\)) and PM\(_{10}\) (12.2-15.6 μg/m\(^3\)).

There is potential for air quality benefits at sensitive receptors in Oxford and Abingdon, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Potential to improve journey routing in this area to reduce congestion (and thus emissions) within Oxford, and potentially reducing air quality concentrations within the AQMA.
Section C2-2

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs:** The C2-2 area includes the south-eastern part of the Oxford AQMA, and Cherwell DC No.4 AQMA in the centre of Bicester, which have been declared due to exceedances in the annual NO\textsubscript{2} concentrations.

- **Designated Sites:** This area includes Brasenose Wood and Shotover Hill SSSI, Littleworth Brick Pit SSSI, Lyehill Quarry, Holton Wood SSSI, Waterperry Wood SSSI, Stanton Great Wood SSSI, Holly Wood SSSI, Shabbington Woods Complex SSSI, Otmoor SSSI, Murcott Meadows SSSI, Whitecross Green and Oriel Woods SSSI, Muswell Hill SSSI, Arncott Bridge Meadows SSSI, Rushbeds Wood and Railway Cutting SSSI.

- **Residential Receptors:** Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Toot Baldon, Horspath, Wheatley, Stanton St John, Horton-cum-Studley, Piddington, Ludgershall, Bearstall, Arncott, Ambrosden, Blackthorn, Bicester.

- **Sensitive Receptors:** Within the C2-2 boundary, there are approximately 20,000 potential air quality sensitive receptors.

- **Clean Air Zone:** The section is approximately 5km from the potential Oxford CAZ.

- **PCM Model:** Defra PCM links within this area have been identified on A4095, A41 and A4142 in Bicester and Oxford. Concentrations are elevated (but not exceeding) in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data:** South Oxfordshire District Council undertake NO\textsubscript{2} monitoring at one location within C2-2 area. The latest monitoring data indicates concentrations below the AQO. Cherwell District Council undertake NO\textsubscript{2} monitoring in and around Bicester. The latest monitoring data indicates locations within the AQMA are either close to, or exceeding the AQO. Monitoring locations outside of the AQMA show concentrations below the AQO.

- **Defra Background Concentrations:** The Defra background maps indicate 2018 background concentrations across the C2-2 area (at 1km square intervals) are below the relevant AQOs for NO\textsubscript{x} (8.4-31.1 \( \mu \text{g/m}^3 \)), NO\textsubscript{2} (6.4-20.8 \( \mu \text{g/m}^3 \)) and PM\textsubscript{10} (11.5-19.0 \( \mu \text{g/m}^3 \)). The NO\textsubscript{x} background concentration is slightly above the AQO of 30 \( \mu \text{g/m}^3 \) (in the centre of Oxford), however, this applies to designated sites, and there no sites within this 1km grid square.

There is potential for air quality benefits at sensitive receptors in Oxford, Wheatley and Bicester, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).
Potential to improve journey routing in this area to reduce congestion (and thus emissions) within Oxford and Bicester, and potentially reducing air quality concentrations within the AQMAs.

Section C2-3

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs**: No AQMA areas have been declared within the C2-3 boundary by either Aylesbury Vale District Council, Cherwell District Council or Milton Keynes Borough Council.

- **Designated Sites**: This area includes Stratton Audley Quarries SSSI, Ardley Cutting and Quarry SSSI, Tingewick Meadows SSSI, Foxcote Reservoir and Wood SSSI, Pilch Fields SSSI, Howe Park Wood SSSI, Long Herdon SSSI.

- **Residential Receptors**: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Bicester, Caversfield, Stratton Audley, Buckingham, Padbury, Newton Purcell, Finmere, Tingewick, Thornborough, Great Horwood, Little Horwood, Marsh Gibbon, Twyford, South-west Milton Keynes.

- **Sensitive Receptors**: Within the C2-3 boundary, there are approximately 21,000 potential air quality sensitive receptors.

- **Clean Air Zone**: The section is approximately 18km from the potential Oxford CAZ.

- **PCM Model**: Defra PCM links within this area have been identified on A4095, A413, A421, A422, A4421. Concentrations are not exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data**: Aylesbury Vale District Council undertake NO\textsubscript{2} monitoring at one location within C2-3 area in Buckingham. The latest monitoring data indicates the majority of locations have concentrations below the AQO, with the exception of one location, which is close to exceeding (Market Square). Cherwell Valley District Council undertake NO\textsubscript{2} monitoring at one location within C2-3 area. The latest monitoring data indicates concentrations below the AQO.

- **Defra Background Concentrations**: The Defra background maps indicate 2018 background concentrations across the C2-3 area (at 1km square intervals) are below the relevant AQOs for NO\textsubscript{x} (7.7-16.4 μg/m\textsuperscript{3}), NO\textsubscript{2} (6.0-12.1 μg/m\textsuperscript{3}) and PM\textsubscript{10} (11.4-14.8 μg/m\textsuperscript{3}).

There is potential for air quality benefits at sensitive receptors in Bicester, Caversfield and Buckingham, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).
Section C2-4

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs**: No AQMA areas have been declared within the C2-4 boundary by either Aylesbury Vale District Council, Central Bedfordshire Council or Milton Keynes Borough Council.

- **Designated Sites**: This area includes Wavendon Heath Ponds SSSI.

- **Residential Receptors**: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Newton Longville, Bletchley, Lakes Estate, Little Brickhill, Bow Brickhill, Woburn Sands, Aspley Guise, Stoke Hammond, Ridgmont, south Milton Keynes.

- **Sensitive Receptors**: Within the C2-4 boundary, there are approximately 23,000 potential air quality sensitive receptors.

- **Clean Air Zone**: The section is approximately 40km from the potential Oxford CAZ.

- **PCM Model**: Defra PCM links within this area have been identified on A4146 and A5 south of Milton Keynes. Concentrations are elevated in 2018 (not exceeding). PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data**: Milton Keynes Borough Council undertake NO\textsubscript{2} monitoring at two locations within the C2-4 area. The latest monitoring data indicates concentrations below the AQO.

- **Defra Background Concentrations**: The Defra background maps indicate 2018 background concentrations across the C2-4 area (at 1km square intervals) are below the relevant AQOs for NO\textsubscript{x} (8.8-19.0 μg/m\textsuperscript{3}), NO\textsubscript{2} (6.8-13.8 μg/m\textsuperscript{3}) and PM\textsubscript{10} (11.7-16.8 μg/m\textsuperscript{3}).

There is potential for air quality benefits sensitive receptors in Milton Keynes, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

### 8.1.2 Noise and vibration

Within the Corridor C2 study area there are 115,700 dwellings and 2,090 other sensitive receptors. The Corridor C2 study area contains the large settlements of Abingdon, the south east fringe of Oxford, Bicester, Buckingham, Bletchley and the southeast of Milton Keynes, as well as numerous smaller towns and villages.

It is expected that receptors in close proximity to major roads and within urban areas are subject to high noise levels dominated by road traffic. Within this corridor’s study area, a number of residential settlements exist in close proximity to the A34 (e.g. Abingdon and...
Shippon), A40 (e.g. Wheatley and Sandhills), A41 (e.g. Bicester), A4421 (e.g. Stratton Audley and Fringford), A421 (e.g. Finmere, Tingewick, Buckingham, and Thornborough), A4146 (e.g. Stoke Hammond), A5 (e.g. Little Brickhill) and A5130 (e.g. Woburn Sands). In addition, the M40 and M1 runs through this corridor study area.

Receptors located in more rural settings are expected to have their noise environment consisting of more local sources such as agriculture activities, road traffic on minor roads, railways and aircraft flights. There are rural expanses within the Corridor C2 study area between Abingdon and Oxford, Oxford and Bicester, Bicester and Buckingham, and Buckingham and Milton Keynes, where non-traffic sources are more likely to dominate the noise environment.

There are numerous railway lines running through the Corridor C2 study area that would contribute to the surrounding noise environment: the Cherwell Valley line, London Marylebone to Oxford line, the Manchester to Bournemouth line, the London to Birmingham line, the West London Route, and Marston Vale line. In addition, Luton and Heathrow Airport have several flight paths and stacking areas through the Corridor C2 study area. The corridor study area also includes the Abingdon Airfield, RAF Bicester, Finmere Aerodrome, and three rural runways (Slay Barn airstrip, south of Wheatley, one west of Marsh Gibbon and one west of Thornborough).

Numerous SSSIs exist within the corridor study area. These include: Barrow Farm, Culham Brake, Tingewick Meadows, Wavendon Heath Ponds, and Poker's Pond Meadow.

The Corridor C2 study area contains a total of 47 NIAs. Three NIAs exist adjacent to the A34, four on the A4074, one in Littlemore, six along the A40, two on the A41, four exist adjacent to the A4421, five adjacent to the A421 (between Buckingham and Milton Keynes), one adjacent to the A421 (to the east of Milton Keynes near to the M1), and three on the A5130. The remainder of the NIAs are within Oxford, Abingdon and Milton Keynes. Two NIAs are designated due to rail noise on the London to Birmingham railway line south of Milton Keynes.

8.1.3 People and communities

Section C2-1

Abingdon is located in the south-west of the section, while the southern outskirts of Oxford (Blackbird Leys area) coincide with the northern edge of the section. Villages within the corridor section are Shippon, Gozzard’s Ford, Sunningwell, Cothill, Radley, Nuneham Courtenay and the Woodland/Pebble Hill/Bigwood mobile home estates north of Radley. The western edge of Abingdon is bounded by the A34 which is a busy dual carriageway.

There are areas of land allocated for development near Radley and the southern fringe of Oxford, while Dalton Barracks is used by the MOD and allocated for residential development in the emerging Vale of White Horse Local Plan.

In terms of recreation and open space, the Tilsley Park leisure complex abuts the eastern side of the A34 in Abingdon, while there are some areas of Local Green Space within some settlements, notably Chippinghurst. Radley College golf course (private). Bagley Wood provides an area for informal recreation.
In terms of education, health and other sensitive community receptors, the Manor Preparatory School, School of St Helen and St Katharine, Larkmead School, Church of St Mary Magdalene and Stowford House nursing home are within 250m of the A34. Radley College, with its extensive grounds, is within the centre of the corridor (there is also a primary school within the village of Radley).

There are patches of best and most versatile agricultural land in the southern parts of section (some of which has already been lost to development as Abingdon has expanded).

Section C2-2

This large corridor section includes Greater Leys, Blackbird Leys and Sandhills on the outskirts of Oxford in the south-western part. It also incorporates much of Bicester and Graven Hill. Villages within the corridor section include Toot Baldon, Garsington, Wheatley, Horspath, Stanton St John, Horton-cum-Studley, Boarstall, Murcott, Arncott, Piddington, Ludgershall, Blackthorn and Ambrosden. The A40 forms a bypass for Wheatley, while the M40 and A41 also cross the corridor section.

The main development allocations are on the outskirts of Oxford (south-west part of the section), and Bicester (north-west part of section). There is also a small residential allocation on the edge of Ambrosden.

The north-east part of the section boundary overlaps some linear areas of registered common land (Oakley/Brill area), while a further patch of common land is within a large country park (Shotover Country Park) located between Oxford and Horspath. Several large areas of woodland throughout the northern half of the corridor section are likely to be used for informal recreational purposes. There are also large golf courses located south of Horton-cum-Studley (Studley Wood Golf Club) and Boarstall (Magnolia Park Golf Club), and further small formal recreational facilities located within and on the outskirts of settlements.

There are large areas of best and most versatile agricultural land extending across the much of the southern half of the section.

Section C2-3

This section approximately follows the A4421 from Bicester and then the A421 to Milton Keynes. It wholly incorporates the town of Buckingham in the centre of the section. The section incorporates the outskirts of Bicester at the south-western boundary and outskirts of Milton Keynes at the north-eastern boundary. There are several villages throughout the section, including Bucknell, Stratton Audley, Marsh Gibbon, Grendon Underwood, Edgcott, Godington, Twyford, Fringford, Newton Morell, Chetwode, Newton Purcell, Preston Bissett, Barton Hartshorn, Finmere, Water Stratford, Tingewick, Gawcott, Maids Moreton, Padbury, Thornborough, Great Horwood, Little Horwood, Nash, Whaddon and Mursley.

There is land allocated for development on the outskirts of Buckingham and Milton Keynes, as well as two small isolated sites proposed for industrial use – one to erect aircraft hangers at Finmere Aerodrome, the other, for agricultural buildings near Nash.

There are some notable areas of recreational or open space outside of settlements which may pose a constraint to route options within the corridor. This includes playing fields associated with Moretonville Junior Football Club in between Gawcott and Buckingham. Buckingham Golf Club has a large private course to the west of Buckingham. There are
playing fields on the northern edges of the villages of Finmere and Tingewick and on the edges of Marsh Gibbon and Twyford.

The Lace Hill Academy is on the southern edge of Buckingham. No other sensitive community facilities have been identified outside of existing settlements.

There are two main patches of best and most versatile agricultural land along the northern boundary, one north of Fringford and the other around Buckingham and the A422 north-east of Buckingham.

Section C2-4

The outskirts of Milton Keynes and Bletchley coincide with the north-west edge of the section. There are several villages dispersed throughout the corridor including Little Great Brickhill, Bow Brickhill, Woburn Sands, Drayton Parslow, Stoke Hammond and Aspley Guise. The A5 crosses the section, bypassing Little Brickhill. The A4146 also crosses the section and is a two lane dual carriageway bypassing Stoke Hammond. The majority of the villages in the section are relatively rural and away from major highway infrastructure.

The main development allocations are along the fringe of Milton Keynes.

Key areas of open space and recreation within the corridor section include part of Woburn Safari Park, located north west of Woburn, and Stockgrove Country Park, located on the northern outskirts of Leighton Buzzard. There is a large private golf course (Woburn) near Aspley Heath. Crawley Park is located within Husborne Crawley and Caldecotte Lake is located between Bletchley and Wavendon. There are numerous small areas of playing fields within and on the outskirts of Milton Keynes and the smaller settlements. Extensive areas of woodland and heathland are present throughout the section and likely to be used for informal recreation (including King's Wood, Buttermilk Wood, Back Wood, Wavendon Wood and Wavendon Heath). There are several small areas of registered common land within or close to Stoke Hammond, Great Brickhill and Aspley Guise.

The Lindens Residential Care Home is located on Stoke Road between Bletchley and Stoke Hammond. St James's Church and Husborne Crawley Lower School are on the edge of Husborne Crawley. Otherwise, educational facilities, health care facilities and care/nursing homes are largely located within or in close proximity to existing settlement boundaries.

There is very little best and most versatile agricultural land within the corridor section.

8.1.4 Cultural heritage

Section C2-1

There are 42 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section C2-1 comprising:

- 8 scheduled monuments
- 9 Grade I listed buildings
- 24 Grade II* listed building
• 1 Grade I Registered Park and Garden

There are a further 400 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section C2-1 comprising:

• 390 Grade II listed buildings
• 9 Conservation Areas
• 1 Grade II Registered Park and Garden

Abingdon itself contains a large number of High value cultural heritage assets comprising scheduled monuments and Grade I and II* listed buildings. The majority of these assets are located relatively central within the built up area of the town; however, the 3 settlement site scheduled monuments located on the fringes of the town to the north east and across the A34 to the west are situated in a more open environment.

Grade I and Grade II* listed buildings are also located within the villages of Radley, Marsh Baldon, Sunningwell, St. Helen Without, Sandford-on-Thames, Kennington, and Littlemore.

The Grade I Registered Park and Garden of Nuneham Courtenay extends approximately 450 metres into the Section C2-1 corridor from the south; however, it is situated in a rural landscape on low, undulating hills with a steep slope towards its western boundary created by the River Thames. This situation creates important long views west towards Abingdon and north towards Oxford.

Section C2-2

There are 69 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section C2-2 comprising:

• 13 scheduled monuments
• 13 Grade I listed buildings
• 39 Grade II* listed buildings
• 2 Grade I Registered Park and Gardens
• 2 Grade II* Registered Parks and Gardens

There are a further 649 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section C2-2 comprising:

• 636 Grade II listed buildings
• 13 Conservation Areas

There are a number of smaller, discrete scheduled monuments dotted across this corridor comprising 3 Deserted Medieval Villages, 3 moated sites, and 2 village crosses.
Section C2-2 incorporates the town of Bicester, which contains Grade I and Grade II* listed buildings. Just south of Bicester are the large Alchester Roman site and parade ground scheduled monuments and to the east of Bicester is the Wretchwick Deserted Medieval Settlement scheduled monument.

Further Grade I and Grade II* listed buildings are located in Stanton St. John, Beckley and Stowood, Boarstall, Holton, Ludgershall, Wheatley, Horton-cum-Studley, Garsington, Toot Baldon, Horspath, Piddington, Ambrosden, and Cuddesdon and Denton.

Shotover Park Grade I Registered Park and Garden is situated centrally to the corridor and incorporates 43 listed buildings (1 Grade I, 5 Grade II*, and 37 Grade II). It is situated on the east side of Shotover Hill on gently undulating land, set within an agricultural landscape.

The Wotton House Grade I Registered Park and Garden extends only slightly into the Section C2-2 corridor. It incorporates 24 listed buildings (4 Grade I, 1 Grade II*, and 19 Grade II) and a large part of the park is well screened by vegetation; however, the park is purposely aligned with views of the forested areas of Tittershall and Grove Woods to the north and east.

Section C2-3

There are 80 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section C2-3 comprising:

- 14 scheduled monuments
- 31 Grade I listed buildings
- 33 Grade II* listed buildings
- 2 Grade I Registered Park and Garden

There are a further 847 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section C2-3 comprising:

- 817 Grade II listed buildings
- 30 Conservation Areas

Just to the north of the town of Bicester is the RAF Bicester which contains 11 protected structures that together comprise the scheduled monument.

There are 4 scheduled monuments located on the fringes of Milton Keynes comprising the Fishpond in Water Spinney south east of St Giles’s Church Tattenhoe, the Moated site, fishponds and deserted medieval village of Tattenhoe west of Home Park Farm, the moated site and fishponds of Snelshall Benedictine Priory north of Briary Plantation, and a bowl barrow on Church hill in Whaddon. There are 3 further moated sites in the smaller villages of Stratton Audley and Little Horwood and in a more rural location near Grendon Underwood.

Two Roman barrows comprise a scheduled monument to the east of Buckingham very near to the current A421 and to the Thornborough Bridge scheduled monument. Also east of Buckingham and to the north of the Roman barrows lies a prehistoric hillfort scheduled...
monument which has been denuded by ploughing, but is thought to still retain valuable archaeological information ([https://historicengland.org.uk/listing/the-list/list-entry/1018453][accessed 02/05/2018]).

The town of Buckingham itself contains a large number of High value assets including a scheduled monument and Grade I and Grade II* listed buildings. The St Rumbold’s well scheduled monument lies on the southwestern edge of the town and incorporates an area of cultivation earthworks to the south of the well itself.

There are further Grade I and II* listed buildings in Thornborough, Radclive-cum-Chackmore, Launton, Maids Moreton, Bucknell, Whaddon, Stratton Audley, Twyford, Chetwode, Water Stratford, Great Horwood, Marsh Gibbon, Grendon Underwood, Mursley, Padbury, Tingewick, Gawcott with Lenborough, Little Horwood, Caversfield, Preston Bissett, Shenley Brook End, and Foscott

A long approach of Stowe Grade I Registered Park and Garden and National Trust owned land extends across the corridor. Called Stowe Avenue (owned by National Trust), this approach runs for 2 kilometres from the edge of Buckingham to the Corinthian Arch which overlooks the park, pleasure grounds and mansion to the north.

Section C2-4

There are 42 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section C2-4 comprising:

- 7 scheduled monuments
- 2 Grade I listed buildings
- 32 Grade II* listed buildings
- 1 Grade I Registered Park and Garden

There are a further 313 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section C2-4 comprising:

- 297 Grade II listed buildings
- 16 Conservation Areas

The Roman town of Magiovinium scheduled monument is situated on the edge of Bletchley and Fenny Stratford and is divided by the Roman Watling Street. It is roughly bounded by the current A4146 and A5. There are 2 further scheduled monuments, a medieval manor and a shrunken medieval village, within the constituent towns of Milton Keynes.

The Danesborough Camp hillfort and the Motte castle located 200m south east of Wavendon Manor scheduled monuments both survive well archaeologically and are good examples of their class.

There are Grade I and Grade II* listed buildings in West Bletchley, Newton Longville, Aspley Guise, Bletchley and Fenny Stratford, Husborne Crawley, Wavendon, Drayton Parslow, Stoke Hammond, Ridgmont, Little Brickhill, Great Brickhill, Bow Brickhill, and Aspley Heath.
The Grade I Registered Park and Garden of Woburn Abbey extends a maximum of 750 metres into the C2-4 corridor. Woburn Abbey is a large and complex site which incorporates 61 listed buildings (7 Grade I, 6 Grade II*, and 48 Grade II) on its grounds; most of which lay outside of the Section C2-4 corridor and study area. The setting of the park is largely agricultural, with some areas of woodland and the villages lying close by. It is bounded to the southwest, northwest, and north by the current A4012 road where it is enclosed by high, red-brick walls.

8.1.5 Landscape and visual

There are no designated landscapes in this section of the corridor, although there are a number of other designations that are relevant to landscape. These include Oxford green belt which, although green belts are not a landscape designation, they are relevant to LVIA due to the need to consider effects on its openness.

Also of relevance are Nuneham Courtenay and Marsh Baldon conservation areas and many listed buildings including Radley College.

The area is characterised by the low lying river Thames floodplain and there are significant areas of ancient woodland within it.

A golf course and playing fields are associated with and adjacent to Radley College.

Sensitive visual receptors include residents on the northern edge of Abingdon, Radley and other rural settlements along with isolated farmsteads and properties; users of PRoW including Thames Path national trail.

Section C2-2

This section includes part of Brill-Winchendon Hills AAL which is noted for its ‘undulating hills and ridges, with magnificent panoramic views across the strongly scenic and rural landscape. Together with the Quainton-Wing Hills they form a series of low, generally open limestone hills with hilltop settlements, between the foot of the Chilterns escarpment and the dip slope of the Cotswolds’.

Other relevant designations include Oxford green belt, Shotover House RPG grade 1, Shotover Country Park, Garsington, Wheatley, Forest Hill, and Stanton St. John conservation areas and many listed buildings. Wotton House RPG grade I is located at the eastern extent of the section, albeit that the majority of the site lies outside of the corridor.

Part of the area also includes the low lying River Ray floodplain and there are numerous blocks of ancient woodland.

Sensitive visual receptors include residents in villages and scattered properties including residents of Ambrosden and Blackthorn, and users of PRoW and Shotover Country Park.

Section C2-3

This section includes the southern edge of Stowe AAL north of Buckingham, and also the Great Ouse Valley (West), Great Ouse Valley (East) and Whaddon-Nash Local Landscape Areas (LLA). Stowe AAL is noted for the ‘peaceful and picturesque, gently rolling agricultural landscape in and around the internationally important landscape park and gardens of Grade I
Stowe Registered Park and Garden, an 18th century designed landscape and recognised as one of Britain’s finest Historic Parks and Gardens. Blocks of ancient woodland, the remnants of the medieval Whittlewood Forest, and other parklands in the area contain great cultural and natural value, as well as rich visual texture and provide a wooded backcloth to the landscape. A landscape of streams, parklands and small villages of local materials with focal points of medieval church towers, mature oak trees and with occasional long views from vantage points.

Poundon Hill LLA lies within this section. It should, however, be noted that the updated Vale of Aylesbury Local Plan (2013 – 2033) Policies Map (November 2017), which has not yet been adopted, no longer shows Poundon LLA. This accords with the Defining the special qualities of local landscape designations in Aylesbury Vale District – Final Draft Report (LUC, March 2016) that forms part of the landscape supporting evidence, and which recommends the Poundon Hill LLA is not worthy of local landscape designation.

Stowe House is RPG grade I and (NT) property, the designated area includes Stowe Avenue that links from Stowe House to Buckingham.

RAF Bicester, Stratton Audley, Tingewick, Radcliffe, Buckingham Thornborough, Singleborough, Great Horwood, Nash and Whaddon conservation areas and numerous listed buildings also feature.

RAF Bicester is a very open landscape with views across the airfield, whilst the A4421 Buckingham Road (Roman Road) is characterised by established vegetation including mature woodland, hedgerows and hedgerow trees. The Existing A421 is a major highway and already partly dualled.

There are areas of ancient woodland south of Whaddon.

Sensitive visual receptors include residents of Launton, Stratton Audley, Fringford, Barton Hartshorn, and villages and properties along the A4421 including Newton Morrell and Newton Purcell. Also residents on the southern edge of Buckingham, and in the villages of Tingewick, Radcliffe, Buckingham Thornborough, Singleborough, Great Horwood, Nash and Whaddon.

Section C2-4

The majority of the western part of this section lies within the Brickhills AAL with the exception of a narrow area of non-designated land adjacent to the urban edge of Milton Keynes. Brickhills AAL is noted for its ‘distinct landform with wooded scarp slopes and interspersed agricultural areas and heathland’, and ‘open and panoramic views from the hilltops across the landscape of the Vale of Aylesbury to the Quainton Wing hills’.

To the east the AAL shares a boundary with the London Metropolitan green belt that extends beyond the extent of the corridor.

Other important designations include Woburn Abbey RPG grade I to the east of the corridor and Woburn, Aspley Heath, Aspley Guise and Husborne Crawley conservation areas. There is also a small area of common land south of Great Brickhill and the area is crossed by numerous PRoW including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths.
There are significant areas of woodland south and east of Brickhill and east of Woburn Abbey which includes areas of ancient woodland.

The area south of Aspley Heath includes extensive areas of heathland and woodland and includes Woburn Golf Course. Stockgrove Country Park also features within the area.

Sensitive visual receptors include residents on the southern edge of Milton Keynes, particularly the Lakes Estate area; residents in the rural villages and individual houses; and also users of PRoW and Stockgrove Country Park.

8.1.6 Nature conservation

Corridor C2 has large concentrations of designated sites, principally ancient woodland, south west of the M40 and east of Bletchley. There are fewer designated sites within the corridor between Bicester and Bletchley.

Section C2-1

The key sensitive features within the corridor are Cothill Fen SAC, 3 SSSI, 23 AW, and a cluster of veteran trees associated with Radley College grounds. As in section B2-1, only a very small section of Cothill Fen SAC and its constituent SSSI intersect the corridor, immediately west of Abingdon Airfield. Two small SSSIs are situated on the west and southern edge of the corridor, one within Abingdon Airfield and the second to the airfield’s south west corner. The main constraint within the section is AW associated with Bagley Wood on the northern edge of the corridor near Kennington.

With respect to Tier III sites, 1 LNR, 13 LWS and 1 Proposed LWS are located within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise Cothill Fen SAC and Oxford Meadows SAC, 10 SSSI and 1 NNR. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 40 AW, 1 LNR, 27 LWS and 8 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section C2-2

The key sensitive features within the corridor are 11 SSSI and 44 AW. A large area wooded area within the centre of the section is designated as both SSSI and AW, associated with Holly Wood; Stanton Great Wood; Holton Wood; Waterperry Wood; Hell Coppice and woodland to its north. Whitecross Green Wood and Rushbeds Wood lie further to the north and north east respectively.

Further SSSI on the western boundary of the section include those associated with Shotover Country Park and Otmoor. Areas of AW are located either side of the M40. When considered together, these designations make the area between the M40 and the A40 very heavily constrained.

With respect to Tier III sites, Otmoor RSPB reserve; 34 LWS and 4 Proposed LWS lie within this section.
The statutory designated sites for nature conservation within 5km of the corridor comprise 16 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 62 AW, 3 LNRs, Otmoor RSPB reserve, 53 LWS and 6 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.
Section C2-3

The key sensitive features within the corridor are 6 SSSI and 65 AW. The SSSIs are widely distributed around Buckingham, to its north, south west and south east. AW is scattered more widely within the section but two distinct areas are present: one between Buckingham and Bicester, and a section between Buckingham and Milton Keynes. Whilst the overall area of AW is not large, the distribution of the woodland within latter two areas in particular constrains the route alignment options.

With respect to Tier III sites, 3 LNR, 57 LWS and 2 Proposed LWS lie within the section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 12 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 112 AW, 3 LNR, 79 LWS and 3 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section C2-4

The key sensitive features within the corridor are 1 SSSI and 15 AW, all situated east of the A5 and associated with New Wavendon Heath, Black Wood and Buttermilk Wood. Although relatively small in area, their distribution and the presence of the A5, a railway line and Milton Keynes to its north makes the section quite constrained.

With respect to Tier III sites, 1 LNR and 13 LWS lie within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 4 SSSI and 1 NNR. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 23 AW, 1 LNR and 41 LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

8.1.7 Geology and soils

Section C2-1

The bedrock geology of Section C2-1 broadly comprises a geological succession of sandstones, mudstones and some limestone of decreasing age, gently dipping to the south-east, from the oldest Upper Jurassic Ancholme Group and Corallian limestones to the Lower Cretaceous Lower Greensand.

Sand and gravel of various formations and alluvium around the River Thames are the most common superficial deposits in Section C2-1, with head deposits more common east of the River Thames.

The sites of geological importance present within Section C2-1 are summarised below:

- Cothill Fen: this is a mixed biological and geological SSSI, which is in a favourable condition, the tip of which slightly extends into the southwest of Section C2-1. The SSSI supports nationally rare calcareous fen and moss-rich mire communities together with associated wetland habitats; palaeovegetation can be interpreted from peat samples. Cothill Fen is also designated as a SAC.
Dry Sandford Pit: this mixed biological and geological SSSI is situated in the southwest of section C2-1 and is in a favourable condition. A sequence of limestone rocks, formed during the Jurassic period in shallow coastal waters and containing fossil ammonites, is exposed at this site. The site is also designated as a LGS, the area of which is greater than the SSSI footprint.

Sugworth: a geological SSSI in favourable condition sited adjacent to the A34 in the centre of Section C2-1. The site is designated for its rare inland interglacial sediments containing various fossil remains.

Two Oxfordshire MSGAs are located within Section C2-1: one for soft sand in the west (Corallian) and one for sharp sand and gravel in the east (superficial sand and gravel); the latter spans approximately two thirds of the corridor width.

The EA website identifies Radley PFA Lagoons as an authorised landfill which extends into Section C2-1, southeast of Radley.

The EA website also lists a number of relatively small historical landfills (the largest has a total area of approximately 5.74 ha), that are mainly in southwestern and central parts of Section C2-1. A detailed review of potentially contaminative land uses is not possible at this stage, but notable current and historical land uses include Abingdon Airfield/Dalton Barracks (a semi-active historical RAF site) and Oxford sewage treatment works.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA.

There are no active, dormant or historic mineral extraction sites recorded in the area based on BritPits data gained from the BGS.

Section C2-2

The bedrock geology of Section C2-2 again comprises a succession of sandstones, mudstones and some limestone of decreasing age, gently dipping to the south-east, from the Great Oolite Formation in the north, with Upper Jurassic Anchoilme Group present across much of the northern section, and Corallian limestones to the south and east. There are inliers of Great Oolite limestone in the north, and some outliers of Portland Group and Lower Cretaceous Wealden around Shotover and Muswell Hill.

Superficial deposits are absent from the majority of Section C2-2, but alluvium is located around watercourses such as the River Ray and River Thame with pockets of river terrace deposits, and head deposits common in the southwest.

The sites of geological importance located within Section C2-2 are:

- Littleworth Brick Pit: a geological SSSI in unfavourable recovering condition, situated to the south of the A40 in the south of the section. The site is famous for its ammonite faunas and offers an unrivalled section for the study of Kimmeridge Clay strata.
- Lyehill Quarry: a geological SSSI in favourable condition, north of the A40 in the south of the section. The quarries expose the most extensive sections in the Wheatley Limestone.
• Muswell Hill SSSI: a geological SSSI in favourable condition, in the north of the section. The site has considerable potential for research in Jurassic/Cretaceous dating and palaeogeography.

• Shotover LGS: a relatively large LGS in the southwest of the section, at which Jurassic deposits can be found and the relationship between springs and permeability’s of strata is manifest.

• Wheatley Recreation Ground LGS: a disused quarry south of the A40 designated as a LGS, where a rare exposure of Wheatley limestone is found.

The proposed Buckinghamshire sand and gravel MSGA is located within central and north-eastern parts of Section C2-2, spanning less than half the corridor width. No operational, dormant or active quarries are recorded in the area.

The EA website identifies 4 relatively small (<5 ha) historical landfills that are located in Section B2-2, near Wheatley and Bicester. Other potentially contaminative current and historical land uses include several sewage works, RAF Oakley (which extends approximately 15m into the section across the eastern boundary), the Mini Plant Oxford, Otmoor Range, Arncott and Graven Hill Ordnance Depots, Piddington Depot and St George’s Barracks.

One site determined as potentially contaminated land under Part IIA of the Environmental Protection Act 1990 is located in Stanton St John in the western centre of the section. The site is described as a former quarry but no further details have been found at the time of writing.

The Groundsure COMAH data show three historical NIHHS sites (two of which mostly overlap), located to the west of the section. Two are for Cowley (gas) Holder Station but no details are available for the other site.

**Section C2-3**

The bedrock geology comprises mainly sandstone, limestone and argillaceous rocks of the Middle Jurassic Great Oolite Formation in the north-west, and mudstone, siltstone and sandstone of the Upper Jurassic Ancholme Group in the south-east and east of the section.

Glacial till is located across the majority of Section C2-3, with pockets of glacial sands and gravels and a band of alluvium around the River Great Ouse and the Padbury Brook; they are absent in the vicinity of and to the east of Bicester.

The following SSSIs with geological interest are located within section C2-3:

• Ardley Cutting and Quarry: a biological and geological SSSI in unfavourable recovering condition, northwest of Bicester. The geological interest lies in the exposures of Jurassic rocks, but the variations in soils also influence habitat variations at the site.

• Stratton Audley Quarries: a geological SSSI destroyed due to infilling with waste material and water. There are no practical means of restoring access to the interest feature and so the site must be considered destroyed.
Buckinghamshire proposed MSGA for sand and gravel is present within Section C2-3, spanning the width of the corridor in several places. Milton Keynes sand and gravel MSGA also extends into the north-east of the section and the tip of the Oxfordshire ‘crushed rock’ MSGA extends into the south-western area of the section.

The historical Finmere Quarry is located in the north of this section, and is recorded as a number of records having mined glaciofluvial deposits of sand and gravel.

The EA website identifies several authorised landfills that are located within Section C2-3:

- Glebe Farm in the west of the section
- Finmere Quarry Landfill in the northwest
- Finmere Railway Cutting adjacent to Finmere Quarry Landfill
- Buffers Holt northwest of Buckingham
- Foxcote Pumping Station in the north

The EA website also lists several small historical landfills that are located within Section C2-3, mainly around Buckingham. Calvert historical landfill is also located approximately 130m east of the corridor boundary. Other potentially contaminative current/historical land uses include RAF Bicester, RAF Finmere, RAF Little Horwood and Thornborough Grounds Airstrip (not shown on Groundsure mapping).

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA. There are no COMAH sites recorded in the area.

**Section C2-4**

Bedrock geology in Section C2-4 comprises, mudstone, siltstone and sandstone of the Ancholme Group in the west and north of the section, and sandstone and mudstone of the Lower Cretaceous Lower Greensand Formation in the east to southeast.

Glacial till dominates the superficial geology in the west of Section C2-4, with glaciofluvial deposits also common. Alluvium and river terrace deposits surround the River Ouzel and Grand Union Canal. East of these watercourses, head deposits of clay, silt sand and gravel are common, as are glacial till, glaciofluvial deposits and chalky boulder clay in the north.

No sites of geological importance are located within Section C2-4.

Buckinghamshire proposed sand and gravel MSGA is present in the west of the section, adjoining a Milton Keynes sand and gravel MSGA to the north; these collectively span the width of the corridor. A Bedfordshire MSGA for Woburn Sands is present in the east of the section and a Bedfordshire MSGA for river valley/glacial sand and gravel extends approximately 10m into the section within the north.

Bletchley Rail Depot is located to the northwest of the section and this is associated with transport of mineral resources.
The EA website identifies 1 authorised landfill that is located in Section C2-4 in the northwest: Bletchley Landfill.

The EA website also lists a number of historical landfills that are present in Section C2-4. These are distributed across the section, with the largest surrounding the authorised Bletchley Landfill. Other potentially contaminative current and historical land uses include brick works and industrial estates.

Two sites have formerly been determined as contaminated land under Part IIA of the Environmental Protection Act 1990 in Bletchley. The first is located at Buckingham House; the contamination was caused by a heating oil leak from underground pipework but was remediated. The second is listed in George Street, with the contamination caused by diesel leaking from a disused underground tank; the site has now been remediated.

8.1.8 Road drainage and the water environment

Section C2-1

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 8-1. There are rivers within this section that have significant areas of Flood Zone 3b (functional floodplain), including:

- River Thames - Flows south of Oxford and meanders around south-east of Abingdon where it then meanders back in easterly direction towards the A4074
- River Oak (a tributary of the River Thames) – flows north-easterly direction towards Abingdon central where it joins the River Thames.

Flood Zone 2 and 3 associated with the River Thames is extensive within this section.

Table 8-1 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.0</td>
<td>94.0</td>
<td>8.0</td>
<td>10.9</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 3% increase in the area identified as Flood Zone 3. The published Flood Zones indicate that areas in east of Abingdon are likely to be at greater risk from fluvial flooding over the lifetime of the development.
Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 1.8% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 3.5% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASIGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 31% of the study area is within an area of medium to high risk (see Table 8-2).

Table 8-2 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>15.4</td>
<td>• South and east of Abingdon (following the River Thames and River Thame)</td>
</tr>
</tbody>
</table>
| Medium (50 – 75%) | 15.9 | • South of Oxford  
• Abingdon |

Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow route that intersects this section has been detailed in Table 8-3.

Table 8-3 Reservoir Breach Extents

<table>
<thead>
<tr>
<th>Source</th>
<th>Flow Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmoor Reservoir</td>
<td>Flows south of Oxford and meanders around south-east of Abingdon</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of previous recorded flooding events from the sea, river and groundwater. According to the EA data set 8.3% of the study area has been recorded to have flooded historically. There are records of flooding outside of
the existing Flood Zone 2 and 3 associated with the River Thames, identifying additional areas South of Oxford to be at risk.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

Geomorphology, WFD and Water Quality

Table 8-4 shows the WFD operational catchments and WFD water body catchments which lie within Section C2-1.

**Table 8-4: WFD operational and WFD water body catchments within Section C2-1**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames</td>
<td>Gloucestershire and the Vale</td>
<td>Ock</td>
<td>Northfield Brook (Source to Thames at Sandford)</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Thames (Evenlode to Thame)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ock and tributaries (Land Brook confluence to Thames)</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sandford Brook (source to Ock)</td>
<td>Good</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frilford and Marcham Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td></td>
<td>Baldon Brook (South of Oxford)</td>
<td>Moderate</td>
<td>No</td>
</tr>
</tbody>
</table>

Groundwater

Section C2-1

- Crosses 2 Secondary A bedrock aquifers
- Crosses 2 Secondary A superficial deposit aquifers
- Contains 2 licensed groundwater abstractions
- Contains 5 potential GWDTE
- Contains approximately 1 spring as marked on the OS 1:25,000 map
Section C2-2

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 8-5. There are rivers within this section that have significant areas of Flood Zone 3b (functional floodplain), including:

- River Thame (a tributary of the River Thames) – flows south-west of the Wheatley Interchange and joins the River Thames at Dorchester-On-Thames
- River Ray (a tributary of the River Thames) – flows in a south-westerly direction from the A41 towards the south of M40

Flood Zone 2 and 3 associated with the River Thame and River Ray (including the Otmoor) is extensive within this section.

Table 8-5 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>142.9</td>
<td>274.6</td>
<td>13.4</td>
<td>16.2</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 3% increase in the area identified as Flood Zone 3. The published Flood Zones indicate that areas in south-east Bicester are likely to be within a greater risk from fluvial flooding over the lifetime of the development.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 3.1% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 5.8% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASgtGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where
greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 20% of the study area is within an area of medium to high risk (see Table 8-6).

### Table 8-6 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
</table>
| High (> 75%) | 9.3 | • South-east of Oxford  
   • South of Bicester (following the River Ray) |
| Medium (50 – 75%) | 10.7 | • South of Bicester (following the River Ray) |

**Reservoir Failure**

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 8-7.

### Table 8-7 Reservoir Breach Extents

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows west from Wilstone Reservoir past north-Aylesbury heading south-west towards Thame. It then flows past the M40 and heads in a south-westerly direction towards Warborough.</td>
</tr>
<tr>
<td>2</td>
<td>Flows from North Dorton along the A41 down to Lower Arncott</td>
</tr>
</tbody>
</table>

**Historic Flooding**

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA data set 3.0% of the study area has been recorded to have flooded historically. There are no records of flooding to have occurred outside of the existing Flood Zone 2 and 3.

**Other Flood Sources**

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**
Table 8-8 shows the WFD operational catchments and WFD water body catchments which lie within Section C2-2.

**Table 8-8: WFD operational and WFD water body catchments within Section C2-2**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Cherwell</td>
<td>Cherwell (Ray to Thames) and Woodeaton Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bayswater Brook</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td>Oxon Ray</td>
<td></td>
<td>Summerstown Ditch and Launton and Cutters Brook</td>
<td>Bad</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oxon Ray (upstream A41 to Cherwell) including Otmoor</td>
<td>Poor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Langford Brook (Bicester to Ray inc Gagle Brook)</td>
<td>Poor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tetchwick Brook, Source to Ray and tribs</td>
<td>Moderate</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Town Brook at Bicester</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ludgershall Brook and Muswellhill Brook</td>
<td>Poor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Langford Brook (source to downstream A41)</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Gloucestershire and the Vale</td>
<td>Ock</td>
<td>Northfield Brook (Source to Thames) at Sandford</td>
<td>Poor</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thames (Evenlode to Thame)</td>
<td>Moderate</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td>Thame (Scotsgrove Brook to Thames)</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Baldon Brook (South of Oxford)</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worminghall Brook and tributaries</td>
<td>Poor</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dorton, Chearsley and Waddesdon Brooks</td>
<td>Poor</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Holton Brook and tributaries</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
Groundwater

Section C2-2

- Crosses a limestone Principal bedrock aquifer (underlies less than 10% of the section)
- Crosses 4 Secondary A bedrock aquifers
- Crosses 2 Secondary A superficial deposit aquifers
- Contains 1 licensed groundwater abstraction
- Contains 12 potential GWDTE
- Contains approximately 42 springs as marked on the OS 1:25,000 map

Section C2-3

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the rivers in the study area, detailed in Table 8-9. There are three rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):

- River Ray (a tributary of the River Thames) – flows in a south-westerly direction from the A41 towards the south of M40
- Padbury Brook (a tributary of the River Great Ouse) – flows in south-easterly direction from the A421, near M40 J10. It then meanders and heads north towards Buckingham before joining the River Great Ouse
- River Great Ouse – flows north-east from Brackley, meanders through Buckingham it then flows north-east towards then it connects on Stony Stratford.

The Flood Zone 2 and 3 associated with the River Great Ouse is substantially smaller in comparison to the floodplain area associated with the River Ray.

Table 8-9 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>95.8</td>
<td>466.5</td>
<td>5.9</td>
<td>7.2</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be
approximately 1% increase in the area identified as Flood Zone 3. The published Flood Zones indicate that small areas in Bicester and Buckingham are likely to be within an area of greater fluvial flood risk over the lifetime of the development.

**Surface Water**

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 3.7% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 6.2% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

**Groundwater**

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASTGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 12% of the study area is within an area of medium to high risk (see Table 8-10).

**Table 8-10 Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>1.5</td>
<td>• South-east of Bicester (following the River Ray)</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>11.0</td>
<td>• South-east of Bicester</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South-west of Buckingham</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• West of Bletchley</td>
</tr>
</tbody>
</table>

**Reservoir Failure**

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 8-11.

**Table 8-11 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows from North Dorton along the A41 down to Lower Arncott</td>
</tr>
<tr>
<td>2</td>
<td>Flows from pond in Claydon Park heading in westerly direction towards Stoke Lyne</td>
</tr>
</tbody>
</table>
Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA’s dataset, 2.3% of the section has been recorded to have flooded historically. There are records of flooding to have occurred outside of the existing Flood Zone 2 and 3 (i.e. south-east of Buckingham) identifying additional areas at risk of flooding.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

Geomorphology, WFD and Water Quality

Table 8-12 shows the WFD operational catchments and WFD water body catchments which lie within Section C2-3.

Table 8-12: WFD operational and WFD water body catchments within Section C2-3

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Great Ouse Upper</td>
<td>Horwood Tributary</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook (DS Granborough)</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Padbury Brook (The Twins)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Padbury Brook</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Beachampton Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leckhampstead Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Stowe Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouse (Buckingham to Cosgrove)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weald Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouse (Brackley to Buckingham)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouzel and Milton</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouzel US Caldecote Mill</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Newton Longville Brook</td>
<td>Poor</td>
<td>No</td>
</tr>
</tbody>
</table>
### Oxford to Cambridge Expressway
#### Appendix E: Supplementary Environmental Information

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Oxon Ray</td>
<td>Gubbinshole and Broadmoor ditch to Ray (Oxon)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Summerstown Ditch and Launton and Cutters Brook</td>
<td>Bad</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Oxon Ray (upstream A41 to Cherwell) including Otmoor</td>
<td>Bad</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Langford Brook (Bicester to Ray inc Gagle Brook)</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ray and tributaries NorthEast of Grendon Underwood</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tetchwick Brook, Source to Ray and tribs</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Town Brook at Bicester</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ludgershall Brook and Muswellhill Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Langford Brook (source to downstream A41)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Groundwater**

**Section C2-3**

- Crosses a limestone Principal bedrock aquifer (underlies less than 25% of the section)
- Crosses 2 Secondary A bedrock aquifers
- Crosses 3 Secondary A superficial deposit aquifers
- Contains 6 licensed groundwater abstractions
- Contains 4 potential GWDTE
- Contains approximately 41 springs as marked on the OS 1:25,000 map

**Section C2-4**

**Flood Risk**
Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the rivers in the study area, detailed in Table 8-13. There is one river within this section that has significant areas of Flood Zone 3b (functional floodplain):

- River Ouzel (a tributary of the River Great Ouse) – flows from south-west Leighton Buzzard through Milton Keynes where it joins the River Great Ouse.

The Flood Zone 2 and 3 associated with the River Ouzel is relatively small within this section.

**Table 8-13 Quantitative Analysis of Rivers and Fluvial Flood Risk**

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.8</td>
<td>157.9</td>
<td>3.2</td>
<td>3.8</td>
</tr>
</tbody>
</table>

The detailed hydraulic model for Central Bedfordshire Council has been used to assess the potential future extent of Flood Zone 3 as a result of climate change (upper end, 65% climate change allowance has been assessed). In the absence of hydraulic modelling for all other areas the extent of Flood Zone 2 has been adopted to assess future Flood Zone 3 extent. The assessment identifies that there will be approximately 1% increase in the area identified as Flood Zone 3. The published Flood Zones indicate that small areas in the outskirts of Bletchley are likely to be within an area at greater risk of fluvial flooding.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 2.3% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 4.2% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASIGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 22% of the study area is within an area of medium to high risk (see Table 8-14).

**Table 8-14 Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
</table>
Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 8-15.

Table 8-15 Reservoir Breach Extents

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Reservoir Breach Extents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows north through Milton Keynes Center where it continues to follow the River Great Ouse</td>
</tr>
<tr>
<td>2</td>
<td>Flows north east from Woburn towards the M1 where it continues to flow parallel with the M1 following the River Ouzel</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA’s dataset, 2.6% of the section has been recorded to have flooded historically. There are records of flooding outside of the existing Flood Zone 2 and 3 associated with the River Ouzel, identifying additional areas on the outskirts of Bletchley towards Leighton Buzzard to be at risk.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

Geomorphology, WFD and Water Quality

Table 8-16 shows the WFD operational catchments and WFD water body catchments which lie within Section C2-4.

Table 8-16: WFD operational and WFD water body catchments within Section C2-4

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper</td>
<td>Ivel</td>
<td>Flit tributary</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>River Basin District</td>
<td>WFD Management Catchment</td>
<td>WFD Operational Catchment</td>
<td>WFD Water Body Catchment</td>
<td>WFD Water Body Status (Cycle 2, 2016)</td>
<td>Large WFD Water Body Crossing</td>
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<tr>
<td>---------------------</td>
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<td>--------------------------</td>
<td>--------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>and Bedford</td>
<td>Running Waters-Steppingley</td>
<td>Moderate</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Great Ouse Upper</td>
<td>Claydon Brook</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ouszeland Milton Keynes</td>
<td>Broughton Brook</td>
<td>Poor</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ouzel US Caldecote Mill</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Newton Longville Brook</td>
<td>Poor</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loughton Brook</td>
<td>Moderate</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thames</td>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td>Hardwick Brook (Source to Thame)</td>
<td>Moderate</td>
<td>No</td>
</tr>
</tbody>
</table>

Section C2-4 also traverses 1 artificial water body, the Grand Union Canal, Milton Keynes trough pound.

**Groundwater**

Section C2-4

- Crosses a sandstone Principal bedrock aquifer (underlies 25 to 50% of the section)
- Crosses 3 Secondary A superficial deposit aquifers
- Contains 1 SPZ1 associated with licenced potable abstractions
- Contains 1 SPZ2 associated with licenced potable abstractions
- Contains 1 SPZ3 associated with licenced potable abstractions
- Contains 6 licensed groundwater abstractions
- Contains 2 potential GWDTE
- Contains approximately 5 springs as marked on the OS 1:25,000 map
8.2 Environmental assessment

8.2.1 Air quality

8.2.1.1 Key findings

Section C2-1

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section C2-1 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link).

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes through Abingdon could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (7.9-15.8 μg/m³), NO₂ (6.1-11.7 μg/m³) and PM₁₀ (11.8-15.2 μg/m³).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Oxford and Abingdon), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section C2-2

Basic Screening Exercise
Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section C2-2 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes routes to the north-east of Oxford (A4027).

Those links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that road links into and around Bicester could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).
- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.3-26.6 μg/m$^3$), NO$_2$ (5.0-18.3 μg/m$^3$) and PM$_{10}$ (11.1-18.7 μg/m$^3$).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Oxford, Wheatley and Bicester), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section C2-3

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section C2-3 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes Buckingham and north of Bicester.
Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes through Bicester could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.0-13.2 μg/m^3), NO2 (4.7-9.9 μg/m^3) and PM10 (11.0-14.3 μg/m^3).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Bicester, Caversfield and Buckingham), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section C2-4

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section C2-4 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes the A4146 and A5.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes to the south of Milton Keynes could see a reduction in traffic flow (and therefore emissions).
It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.9-14.5 μg/m$^3$), NO$_2$ (5.4-10.8 μg/m$^3$) and PM$_{10}$ (11.3-16.4 μg/m$^3$).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Milton Keynes), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Overall

The available information highlights the AQMAs within Corridor C2 (Abingdon, Bicester and Oxford), and the ongoing exceedances of the relevant AQOs. The corridor includes parts of large urban areas including Abingdon, Oxford, Bicester, Buckingham and Milton Keynes, as well as a number of designated sites.

Corridor C2 has approximately 83,000 air quality sensitive receptors that could be impacted (both adversely and beneficially) by route options through this corridor. The monitoring exceedances within the AQMAs highlights the opportunity to reduce congestion in these areas and potentially improve air quality within the AQMAs.

### 8.2.1.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2-1</td>
<td>Avoidance of AQMAs (and journey re-routing through them).</td>
</tr>
<tr>
<td></td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
<tr>
<td>C2-2</td>
<td>Avoidance of AQMAs (and journey re-routing through them).</td>
</tr>
<tr>
<td></td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
<tr>
<td>C2-3</td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
</tbody>
</table>
8.2.2 Noise and vibration

8.2.2.1 Key findings

The effect of traffic noise on sensitive receptors is very sensitive to exact alignment, which is not known at this early stage of scheme development. The qualitative key findings for this study area are based on indicative predictions of how sensitive receptors could be impacted based on whether the ultimate route alignment is ‘on-line’ (following an existing main road) or ‘off-line’ (creating a new main road).

If the route alignment was to be ‘on-line’ for the relevant sections of the A34, A4421, A421 and A4146 within the study area, then there is potential for sensitive receptors nearby to these roads (e.g. Abingdon, Shippon, Stratton Audley, Fringford, Finmere, Tingewick, Buckingham, Thornborough and Stoke Hammond), including a number of NIAs, to experience adverse noise effects as traffic possibly moves closer, and/or traffic flows and speeds increase. Significant adverse effects are possible.

Should the route alignment move ‘off-line’ from the A34, A4421, A421 and A4146, then sensitive receptors near these roads would have the potential to experience beneficial effects. The beneficial effects would be dependent on whether vehicles would be diverted away from the A34, A4421, A421 and A4146, thus reducing the amount of traffic on those roads, with the ‘off-line’ alignment. Settlements set back from the A34 (i.e. Sunningwell and Bayworth), A4421 (i.e. Fringford and Stratton Audley), A421 (i.e. Tingewick, Gawcott, Thornborough, Nash, Great Horwood, and Whaddon), and the A4146 (i.e. Little Brickhill and Great Brickhill) could be adversely affected should an ‘off-line’ route alignment be introduced near to such settlements.

The sensitive receptors located in the large rural areas where the route either would, or has the potential to be, ‘off-line’ may experience adverse effects due to the introduction of a new noise source. These include Little London, Radley, Sandford-on-Thames, Blackbird Leys, Garsington, Horspath, Littleworth, the west side of Wheatley, Forest Hill, Stanton St John, Horton-cum-Studley, Ancott (including nearby army barracks), Ambrosden, Blackthorn, Marsh Gibbon, Launton, Twyford, Newton Longville, Little Horwood, Mursley, Water Eaton, Stoke Hammond, Great Brickhill, Woburn Sands, Aspley Guise, Cross End, Aspley Heath, and Bow Brickhill. This also includes numerous individual receptors throughout the rural areas. The ultimate route alignment is key in determining the potential effect for such receptors.

For the larger settlements of Abingdon, eastern fringe of Oxford, Bicester, Buckingham, Bletchley and the southeast of Milton Keynes, the sensitive receptors on the boundaries of these settlements could be adversely affected through the introduction of a new route. The effects would depend on the proximity of the route alignment to the settlement boundaries. The same sensitive receptors could potentially be beneficially affected if the route alignment bypasses the larger settlements. Similar effects could occur for the NIAs in the settlements.

The indicative traffic data shows potential noise benefits between Abingdon and Thame (A415, B4105 and the A329) resulting from possible reductions in traffic on these roads.
Furthermore, the A4012 to the east of Leighton Buzzard, roads within Oxford (including A4142 and B4495), within Milton Keynes (including A4146, A421 and B4034), within Bicester (A4095, B4100, and A41), and an approximate 5 km section of the A41 to the northwest of Aylesbury show potential noise benefits. Receptors located nearby to these roads, including a number of NIAs, could therefore potentially experience noise reductions from the corridor option.

The indicative traffic data shows potential adverse noise effects on the A413 north of Buckingham, A422 (Thornton to Old Stratford), A4146 (Leighton Buzzard to Bletchley), as well as on a number of minor roads on the road network. Receptors located nearby to these roads could experience noise increases from this corridor option.

The construction of a new or improved highway requires the use of noise and vibration emitting plant. Sensitive receptors that will be situated close to the ultimate route alignment would have the potential to be exposed to adverse noise and vibration effects from such works. This would particularly apply to those receptors in proximity to potential ‘off-line’ carriageway alignments within rural areas that could be associated with Corridor C2 (i.e. Abingdon and Oxford, Oxford and Bicester, Bicester and Buckingham, and Buckingham and Milton Keynes), where existing ambient noise and vibration levels are relatively low.

Sensitive receptors located adjacent to existing ‘on-line’ road sections where road widening would be likely as a result of the scheme (e.g. sections of the A34, A4421, A421 and A4146), would already be exposed to high ambient noise levels; nevertheless, potential adverse effects may still be possible for nearby receptors.

Given the transient nature of the majority of the construction activities, any adverse noise and vibration effects experienced by sensitive receptors would be limited in duration. This reduces the potential for significant effects to arise. Nevertheless, any effects would be minimised through the use of specific mitigation measures and controlled via the relevant Local Authority’s Environmental Health departments.

### 8.2.2.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2-1</td>
<td>The typical mitigation measures that would be considered are as follows:</td>
</tr>
<tr>
<td></td>
<td>• Thin Surfacing (Low Noise Road Surfacing) – In accordance with HD 213/11, low noise surfacing provides a benefit, relative to traditional Hot Rolled Asphalt of 3.5 dB(A) at speeds of 75kph and above. Such a measure can be considered a holistic mitigation measure, as it reduces noise at source for the entire scheme.</td>
</tr>
<tr>
<td>C2-2</td>
<td>• Noise Bunds and Noise Barriers – Earth bunds or noise barriers of sufficient length and height can provide attenuation above 10 dB(A). It is anticipated that such measures would be employed through the scheme, with noise barriers more likely at ‘on-line’ sections and within built-up areas, and bunds employed within the more rural areas.</td>
</tr>
<tr>
<td>C2-3</td>
<td>It is anticipated that all work would be undertaken to the guidance detailed in BS 5228: 2009+A1:2014 – Parts 1 and 2. These standards contain various measures to mitigate noise and vibration from construction works and centre around the principle of a ‘best practicable means’ approach.</td>
</tr>
</tbody>
</table>
8.2.3 People and communities

8.2.3.1 Key findings

For all sections there is potential for a new route to cause significant effects on sensitive receptors. Potential impacts include the loss of land and property for some residents, landowners and businesses and loss of amenity to local recreational assets (including PRoW) and communities from the introduction of a new expressway infrastructure into areas that are currently relatively rural. Such impacts may give rise to effects on physical and mental health, access, land use and viability of businesses.

Section C2-1

There is potential loss of amenity and adverse effects on wellbeing for residents in communities close to where a new highway infrastructure maybe introduced, notably the Woodland, Pebble Hill and Bigwood park home estates and properties along Sugworth Lane (north of Radley).

A route developed in this section would potentially require land-take from Radley College’s grounds and golf course.

Some loss of best and most versatile agricultural land is considered likely in this section.

Section C2-2

There is very limited scope to avoid constraints between Oxford and Wheatley. It is likely that there would be significant adverse effects including some community severance and loss of property associated with routes developed in this area.

Some loss of best and most versatile agricultural land is considered likely in this section.

Section C2-3

There is potential to avoid most constraints within this section if a southerly route alignment is developed.

Section C2-4

This section is very constrained in the Woburn Sands area. Development of a route here would likely result in significant adverse effects caused by community severance and loss of amenity for local communities.

Overall

The constrained nature of the Wheatley and Woburn Sands areas mean that there is likely to be significant community severance from route options within this corridor.

8.2.3.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2-1</td>
<td>Select a route alignment that minimises impacts on nearby communities, whilst maintaining viability of recreational assets. Good route alignment is required to</td>
</tr>
</tbody>
</table>
### Design, mitigation and enhancement consideration for Stage 1B

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2-2</td>
<td>Selecting a route that passes east of Wheatley may mitigate significant severance. Potential to mitigate effects through good highway alignment, landscaping and noise abatement. Good route alignment is required to minimise impacts on agricultural viability, for example by maintaining tenable field sizes.</td>
</tr>
<tr>
<td>C2-3</td>
<td>Avoid playing fields and main communities through route alignment. Potential to mitigate effects through good highway alignment, landscaping and noise abatement.</td>
</tr>
<tr>
<td>C2-4</td>
<td>Seek to avoid community severance. Should this not be achievable, then seek to build in cycle and pedestrian networks between communities severed by the new route, to create improved active travel opportunities between local community destinations. This could contribute to health benefits in the longer term.</td>
</tr>
</tbody>
</table>

#### 8.2.4 Cultural heritage

##### 8.2.4.1 Key findings

**Section C2-1**

The settlement site scheduled monuments in this area are generally located on the edges of the corridor and in locations that are not likely to be within the route of the Proposed Development. There is likely to be no significant effect on these assets or their settings; however, it should be noted that the concentration of settlement sites in this area could indicate a high potential for associated unknown archaeological remains of potentially High value.

The Castle Mound at Fitzharris, the remains of Barton, the Remains of Abingdon Abbey, and the Ock and Abingdon Bridges scheduled monuments are within the town of Abingdon and are all therefore unlikely to be situated within close proximity to the Proposed Development. The setting of the Ock Bridge has views to the west over the Ock valley, however, the current A34 is not currently visible from this location and any development here would likely be online or offline further to the west. Therefore, there is likely to be no significant effects on these assets or on their settings.

Within Abingdon, the 278 listed buildings, 1 Grade II Registered Park and Garden, and 3 Conservation Areas are at least partially screened from new development, particularly if any route were to remain online with the current A34. However, there is still the potential for significant adverse effects on the setting of these assets through noise and visual intrusion during construction and operation. The remaining listed buildings within the corridor are located within villages or small clusters of buildings and vegetation that would typically provide good screening from the Proposed Development. However, these groupings are limited in size and tend to be surrounded by arable fields, and some Grade II assets are situated in more isolated locations. Route placement and proximity to these assets would highly influence the degree of adverse effects on each designated asset. Overall, there is the potential for a significant adverse effect on the setting of the designated listed buildings within the corridor through noise and visual intrusion during construction and operation.
A cluster of 13 listed buildings (12 Grade II, 1 Grade II*) are located within 350 metres of the current A34 in an area where online development is possible. In particular, the Grade II Manor Preparatory School and Manor Cottage, as well as the Grade II* listed barn associated with the Manor Preparatory School, are within 100 metres of the current A34 and, although they are currently well screened, there is the potential for significant effects to their setting from noise and visual intrusion during construction and operation of any online development.

The Grade I Registered Park and Garden of Nuneham Courtenay extends approximately 450 metres into the Section C2-1 corridor from the south; however, it is situated on low, undulating hills with a steep slope towards its western boundary created by the River Thames. This situation creates important long views west towards Abingdon and north towards Oxford. There is the potential for adverse effects to the setting of this asset through noise and visual intrusion during construction and operation and through the disruption of long views to the west and north.

Section C2-2

The moated sites, the Deserted Medieval Villages and the town cross scheduled monuments are discrete and well defined assets, some of which are sheltered by the surrounding built environment, and could be avoided through careful design. It should be noted that the presence of Deserted Medieval Village assets may be indicative of further associated unknown archaeological remains of High value outside of the scheduled area.

The Alchester Roman site scheduled monument is currently bisected by railway infrastructure and the associated parade ground, access road, and marching camp scheduled monument lies immediately to the southeast. This is a large scheduled monument which is located very near to the current A41 and may therefore be adversely affected by both online or offline development in this area. Furthermore, the nature of this site indicates the potential for associated archaeological remains of High value to be found outside of the scheduled areas.

Similarly, the Wretchwick Deserted Medieval Settlement scheduled monument survives as earthworks just south of Langford Village and the current A4421 as two separated areas bisected by a current working farm. However, a much smaller area is included in the scheduling here than in the Alchester Roman site, and the location of the monument is such that only online development of the A4421 would be likely to have the potential for significant adverse effects on this asset. It should be noted that, due to the nature of settlement sites, there is the potential for associated archaeological remains of High value to be found outside of the scheduled areas.

A large number of listed buildings within this section are located within the centre of Bicester (comprising 114 listed buildings) and would not be significantly affected by on or offline development. The rest of the listed buildings tend to be grouped in small clusters of designated assets and have varying levels of screening from the surrounding built environment and vegetation. There are, however, a moderate number of listed buildings that are situated independently within a more rural environment. Overall, the spread of these assets across the Section C2-2 corridor suggests that adverse impacts to the setting of these assets should be avoidable through careful design; however, all of the listed buildings have the potential for adverse effects to their setting from noise and visual intrusion during construction and operation. Furthermore, there is a high density of assets along the current A40 that includes the Grade I Registered Shotover Park and the Wheatley Conservation Area.
(which includes 50 listed buildings). The potential for route options in this area is therefore limited to the eastern and western edges of the corridor; both of which may still have significant effects on other designated assets.

The Shotover Grade I Registered Park and Garden is screened by vegetation on all sides, and is bounded by the current A40 to the north. However, given the width of the park across the corridor, its central location, and the further limitations on route options imposed by the neighbouring town of Wheatley (including the Wheatley Conservation Area), it would be difficult to design the route to avoid affecting key elements of the historic landscape and to minimise any increases in visual and noise intrusion on the setting of this asset. Furthermore, while Shotover Park itself provides screening for those designated buildings contained within the grounds (comprising the Grade I listed country house, 2 Grade II* listed temples and a Grade II* listed obelisk), the potential for significant effects from noise and visual intrusion during construction and operation cannot be ruled out.

The Grade I Registered Park and Garden of Wotton House extends from within the Section C2-2 corridor and into Section C2-3. A large part of the park is well screened by vegetation. However, the park is purposely aligned with views of the forested areas of Tittershall and Grove Woods to the north and it is situated to command important views to the west, both of which have a potential to be affected by the Proposed Development. Views to the west from the Park are unscreened and the Proposed Development has the potential for significant effects on the setting of the asset from noise and visual intrusion during construction and operation.

Section C2-3

RAF Bicester scheduled monument comprises eleven distinct scheduling areas; including structures such as bomb stores, air raid shelters, a hanger complex, and pillboxes. It is likely that the any route within the section C2-3 corridor would have to be situated well to the north or south in order to bypass Bicester and would therefore be a suitable distance away from these scheduled areas. It is therefore unlikely that there would be a significant impact on this scheduled monument.

Many of the other scheduled monuments are also in built environments or other locations that would be unsuitable for a route alignment and would therefore not be significantly impacted by the Proposed Development. Those within more rural environments are discrete assets that could generally be avoided through design.

Any online development of the current A421 has the potential for a significant effect on those assets which are located within close proximity to the current highway through the removal of archaeological remains during construction or through noise and visual intrusion on the setting of the asset during construction and operation. These assets comprise:

- Two Roman barrows 200m east-northeast of Thornborough Bridge and approximately 60 metres north of the current A421
- the Thornborough Bridge scheduled monument (and Grade I listed building) located less than 30 metres north of the current A421 with direct views of the highway
- St. Rumbold’s Well scheduled monument is located approximately 300m from the current A421 but incorporates within the scheduling an area of cultivation earthworks to the south of the well itself. These earthworks extend beyond the scheduled area
and could be adversely affected by online development of the A421 thereby affecting the setting of the scheduled monument itself.

The majority of listed buildings within the corridor are located within small villages, often Conservation Areas, with only a small number of structures situated in more isolated rural locations. Varying levels of screening exist from neighbouring properties and vegetation; however, there is the potential for significant adverse effects through noise and visual intrusion during construction and operation on the setting of these assets.

Online development is unlikely to significantly impact upon the majority of the listed buildings apart from:

- the Grade I listed Church of St Mary and the Grade II* listed Barn in Launton, which are both located on the northern edge of the village and west of Bicester, 250 metres from the current A4421
- 20 Grade II listed buildings and 1 Conservation Area associated with the RAF Bicester and bordering the A4421 just north of Bicester
- 11 further Grade II listed buildings within 100 metres of the current A4421
- 2 Grade II listed buildings within 100 metres of the current A421

A south-eastern avenue of Stowe Grade I Registered Park and Garden extends into the corridor and into Buckingham. Although tree lined, the avenue is surrounded by open agricultural land. The distance from the current A421 route and its location on the opposite side of Buckingham means that this asset restricts route development along the north of Buckingham, but is unlikely to be significantly affected by online development or offline development to the south of the current A421.

The Grade I Registered Park and Garden of Wotton House extends from within the Section C2-2 corridor and into the Section C2-3 study area. A large part of the park is well screened by vegetation. However, the park is purposely aligned with views of the forested areas of Tittershall and Grove Woods to the north, which lies within the Section C2-3 corridor, and it is situated to command important views to the west, both of which have a potential for significant effects on the setting of the asset from noise and visual intrusion during construction and operation.

**Section C2-4**

The Roman town of Magiovinium scheduled monument flanks the Roman Road of Watling street and is roughly bordered by the river Ouzel, the current A4146 and the current A5. The nature of this site suggests the potential for further unknown archaeological remains of High value associated with this asset that lie outside of the scheduling boundary. Proposed development online or offline within the vicinity of the A4146, and to the current roundabout would have a potential significant effect on this asset through the removal of archaeological deposits during construction.

The other scheduled monuments within the Section C2-4 corridor are located in positions that are unlikely to be situated within close proximity to the Proposed Development. There is therefore unlikely to be a significant effect on these assets; however, the Danesborough
Camp hillfort is specifically located on a prominent hill and the setting of this asset may be significantly affected through noise and visual intrusion during construction and operation.

Sixty-four listed buildings within Section C2-4 are within the built up areas of Bletchley and Milton Keynes and are unlikely to be situated within close proximity to the Proposed Development. It is therefore unlikely that there would be a significant effect on the setting of these assets. The rest of the listed buildings within the corridor are located within small town and village Conservation Areas with a small number of assets situated independently in more rural settings. These assets have varying levels of screening from vegetation and neighbouring properties; however, there is the potential for a significant adverse effect on the setting of these assets through noise and visual intrusion during construction and operation. The spread of the assets is such that mitigation through design should be possible; however, it may be more difficult within the northern section of the corridor where 4 Conservation Areas are situated linearly from east to west.

The Grade I Registered Park and Garden of Woburn Abbey extends a maximum of 750 metres into the C2-4 corridor. The park is bounded on the north by Turnpike Road, and is well screened in this area by dense vegetation. However, without further assessment of the potential noise and visibility of the Proposed Development it is not possible to completely rule out the potential for a significant adverse effect on the Registered Park and Garden and the associated designated asset through noise and visual intrusion during construction and operation.

Overall

Overall, the spread and nature of the assets within Corridor C2 suggests the potential for a significant adverse effect for which mitigation may be possible.

8.2.4.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2-1</td>
<td>The overall spread and density of the cultural heritage assets in Section C2-1 should allow for a route design that could mitigate the potential significant adverse effects. Of particular note for Section C2-1 is the Grade II* listed barn within the grounds of the Manor Preparatory School, which is immediately next to the current A34. Any online development would need to be sensitively designed in order to mitigate any noise and visual intrusion. Furthermore, careful design would be needed in order to mitigate any impact on the setting of the Grade I Registered Nuneham Park and the important long views to the north.</td>
</tr>
</tbody>
</table>
| C2-2    | The spread and density of assets over most of the Section B2-2 corridor should allow for a suitable route design that could mitigate the potential significant adverse effects. Of particular note for Section C2-2 is the area surrounding Shotover Park Grade I Registered Park and Garden, which is located very centrally in the corridor and within a narrow section that is further limited by the neighbouring town and Conservation Area of Wheatley. Very sensitive design would be required to mitigate the adverse effects on the setting of this asset, particularly in consideration of the intrusion already posed by the current A40. Also of note for Section C2-2 is the Grade I Registered Park and Garden of Wotton House, which has noted views
### Section C2-3

The lighter density of cultural heritage assets within this section would likely allow for the mitigation of any potential significant adverse effects.

Of particular note for Section C2-3 is that the south-eastern avenue of the Stowe Grade I Registered Park and Garden would limit route development to the north of Buckingham. Also of note for Sections C2-3 is the Grade I Registered Park and Garden of Wotton House, which has noted views north within the section C2-3 corridor. Sensitive design would be required in order to not impact the setting of this High value asset.

### Section C2-4

Overall, the dispersed nature of the assets within Corridor C2-4 has the potential for appropriate design mitigation.

Of particular note for Corridor C2-4 is the Roman town of Magiovinium and Roman fort along the current A4146. Any online development would be likely to have a significant adverse effect on this asset through the removal of archaeological remains. There is also a high density of cultural heritage assets within the north of the corridor comprising the Grade I Registered Park and Garden of Woburn Abbey and 4 Conservation Areas that are situated linearly from east to west restricting the potential for suitable route options in this area.

### 8.2.5 Landscape and visual

#### 8.2.5.1 Key findings

**Section C2-1**

The corridor runs to the north of Abingdon and south and south east of Oxford. Routes developed in this section could result in adverse visual impacts affecting the residents of these areas along with those in scattered rural properties, and users of PRoW including the Thames Path national trail.

To the west, new or improved routes would be set in the context of the existing built up area and A34 corridor. However, where the corridor crosses the railway and River Thames and River Thame floodplains it is likely to require extensive lengths of embankment or viaduct that could be at odds with the low lying landscape and highly visible. Additionally, there could potentially be secondary landscape impacts if borrow pits are needed to create embankments.

There are also potential impacts on Radley golf course and Radley College sports fields and/or the nearby ancient woodland, a balance needs to be struck to find the least damaging route.

**Section C2-2**

The eastern part of this section is particularly sensitive. Routes developed in this section could directly impact on the Brill-Winchendon AAL and common land at Brill Common. There is also potential for indirect impacts on the panoramic views from and the setting of the AAL...
arising from any route that is located in this area. There is also potential for impacts on the network of ancient woodlands of Bernwood Forest to the west of the M40.

The section of the corridor immediately east of Oxford through to the M40 features Shotover House RPG grade I. Wotton House RPG grade I lies to the east of the corridor. Routes developed in this section would potentially result in direct impacts on these constraints and indirect impacts are possible on the setting of and views from the historic parks.

Areas of greenspace such as Shotover Country Park and a number of golf courses could be difficult to mitigate.

The corridor includes high ground at Arncott Hill. This is an area associated with industrial and commercial development and, as such, sensitive visual receptors are limited. Having regard for the topography and scattered ancient woodlands it would be difficult to find a route through this area.

The area north of Arncott is characterised by the low lying landscape of the River Ray floodplain and routes developed in this area would likely require an extensive length of embankment or viaduct that would be highly visible. Additionally, there could potentially be secondary landscape impacts if borrow pits are needed to create embankments.

Section C2-3

Any route developed across the low lying floodplain east of Bicester is likely to require an embankment or viaduct that would be at odds with the open landscape and highly visible.

Impacts on RAF Bicester from a route developed in this section could be difficult to mitigate due to the open character of the airfield. Restrictions may also apply to elements associated with the expressway such as the height of gantries; extent and height of lighting, and planting types to avoid conflict with aircraft.

A route that follows and widens the existing A4421 potentially result in the loss of mature established vegetation and adverse landscape and visual impacts on the settlements and residents along the route. Offline improvements would impact on open countryside.

Route options north of the A421 would have a direct impact on regional and local landscape designations (Stowe AAL and the Great Ouse Valley (West), Great Ouse Valley (East) and Whaddon-Nash LLAs). There would also be a direct impact on Stowe RPG grade I as Stowe Avenue would be severed. Stowe is a National Trust property. Routes south of the A421 would have potential impacts on views from and the setting of the designated landscapes and Stowe RPG grade I.

Section C2-4

The corridor crosses the Brickhills AAL which would be affected by routes developed in this section. Route alignments here would pass through the London Metropolitan green belt and may have an impact on its sense of openness. There is also the potential for direct and indirect impacts on Woburn Abbey RPG grade I including impacts on views and on its setting. There are extensive areas of heathland and woodland south of Aspley Heath which includes Woburn Golf Course that could be difficult to mitigate. Whilst the woodland cover provides potential for screening there are numerous PRoWs in this area including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths.
The corridor passes to the south of the Lakes Estate on the southern edge of Milton Keynes. Whilst this area is already affected by the A4146, there is potential for increase visual impacts from the expressway due to the requirements for signs and gantries and from new junction arrangements.

Between the A5 and M1 there are a number of constraints including numerous settlements some with conservation area status, extensive areas of heathland and woodland south of Aspley Heath and a number of golf courses that could be difficult to mitigate if additional land is required for compensation. Routes developed in this section would require grade separated junctions with the A5 and M1 and also a crossing for the railway line, which could result in landscape and visual impacts on residents and users of PRoW and open space.

**Overall**

The most sensitive part of Corridor C2 lies to the north of the A421 which includes Stowe AAL, Stowe RPG grade I and the Great Ouse Valley (West), Great Ouse Valley (East) and Whaddon-Nash LLAs. Routes south of the A421 would have potential impacts on views from and the setting of the designated landscapes and Stowe RPG grade I.

To the east of the corridor there are potential direct impacts on, Brill-Winchendon Hills AAL and registered common land at Brill Common. These include indirect effects on the setting of these distinctively undulating areas that are noted for their panoramic views. There is potential for impacts on the networks of ancient woodlands around Radley, Bernwood Forest and Brickhills. Other sensitive constraints in this part of the corridor include Shotover House RPG grade I and Wotton House RPG grade I, where there is potential for significant adverse effects including impacts on views and setting. There are potential adverse effects where the corridor crosses the floodplains of the River Thames, River Thame and River Ray, and Otmoor. A route through these areas would be at odds with the low lying landscape and highly visible.

Throughout the corridor there are other areas of sensitive landscape. Amongst these are areas of greenspace such as Shotover Country Park and a number of golf courses and sports fields at Radley College which could be difficult to mitigate. Impacts on RAF Bicester would be difficult to mitigate due to the open character of the airfield.

Any routes developed at the northern extent of the corridor would likely directly impact on the Brickhills AAL. In landscape terms, route options would preferably be located immediately adjacent to the edge of Milton Keynes to minimise the impact on the designated landscape. An eastern route would impact on the openness of the London Metropolitan green belt and potentially on the setting of Woburn Abbey, with the potential loss of extensive areas of heathland and woodland.

Overall, Corridor C2 is very constrained by landscape considerations, due to the potential impacts on views from and the setting of nationally important landscapes at Stowe as well as series of local landscape designations to the north of the corridor.

### 8.2.5.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2-1</td>
<td>Follow existing A34 as closely as possible and as far as practicable, having regard</td>
</tr>
</tbody>
</table>
Section Design, mitigation and enhancement consideration for Stage 1B

for other environmental constraints, seek to avoid routes that directly impact on Radley College, associated playing fields and the golf course.
Keep vertical alignment as low as possible in the landscape to minimise visual impact, particularly where crossing the railway. Careful consideration to be given to the location of gantries, lighting and signs to avoid additional visual impacts, particularly close to sensitive visual receptors.

C2-2 Route selection should avoid Shotover RPG grade I, Shotover Country Park, blocks of ancient woodland and Brill-Winchendon Hills AAL.
The least damaging option would be to align as closely as possible to the existing M40.

C2-3 Seek to avoid routes that have a potential impact on AAL and LLAs north of the A421, and Stowe RPG grade I, including impacts on views from and the setting of these constraints.
Consider routes east of Stratton Audley to reduce impact on views from and setting of RAF Bicester conservation area.
Align route away from A4421 to avoid significant impacts on residents and setting of listed buildings.
Investigate alignments south of Buckingham to bypass urban area.
Investigate link south of Whaddon to avoid ancient woodlands.
Keep vertical alignment as low as possible in the landscape to minimise visual impact. Careful consideration to be given to the location of gantries, lighting and signs to avoid additional visual impacts, particularly close to sensitive visual receptors.

C2-4 Keep route options as close as possible to the existing A4146 corridor to minimise severance of and direct impacts on the Brickhills AAL and other constraints and sensitive visual receptors that are not currently affected by infrastructure.
Consideration should be given to creating a buffer/visual screen to reduce visual impacts on residents south of Milton Keynes.

8.2.6 Nature conservation

8.2.6.1 Key findings

For all sections, in addition to direct habitat loss, there is the potential for significant effects on key sensitive features through factors such as habitat fragmentation, air quality changes, hydrological changes, and increased disturbance from changes in noise, vibration and lighting levels. Designated sites lying outside the corridor boundary may potentially be affected by noise and visual disturbance, and changes to air quality as a result of construction and operational phases, or if hydrologically sensitive and connected to areas affected by construction and operational effects. These indirect effects are most likely in the areas where the route alignment is most constrained by designated sites.

Section C2-1

This section corresponds with Section B2-1 and the potential impacts on nature conservation designations are considered to be the same. Direct habitat loss from within the Cothill Fen
SAC, SSSI and LNR should be avoidable through route alignment. However, direct loss of AW, veteran trees, and LWS appears to be more difficult to avoid as there are significant extents of these designations north of Radley College with limited route alignment opportunities given the presence of urban areas.

Section C2-2

The boundary of this section broadly corresponds with Section B2-2, therefore the potential impacts are considered to be the same. Direct habitat loss from SSSI, AW and LWS appears to be unavoidable given the extent of these areas within the corridor. It should be possible to avoid any direct impact on Otmoor RSPB reserve through appropriate route alignment. However, this section has large areas designated with both Tier I and III constraints making any route alignment choices potentially difficult.

Section C2-3

The boundary of this section broadly corresponds with Section C1-3 and the potential impacts on nature conservation designations are considered to be the same. The limited extent of SSSI and LNR within this section, mean that direct habitat loss should be avoidable through route alignment. However, there are more extensive areas of AW and LWS and this, in association with the distribution of residential areas, may make avoiding these sites through appropriate route alignment more difficult.

Section C2-4

This section corresponds with Section C1-4 and the potential impacts on nature conservation designations are considered to be the same. Section C2-4 appears relatively constrained in terms of potential route alignment options given the extent of residential areas. It may be possible to avoid direct habitat loss from within SSSI, NNR and LNR, but the extent of LWS and AW are such that direct loss of habitats within these designations may not be possible to avoid.

Overall

The extensive areas of Tier I constraints between the A40 and M40 mean that the avoidance of direct loss of habitat through route alignment is likely to be difficult in this area and further south. At the northern and eastern end of the corridor, although slightly less constrained from a nature conservation perspective, the more extensive residential areas mean than route alignment to avoid Tier I and III constraints appears to be difficult.

8.2.6.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2-1</td>
<td>There is the potential to avoid most habitat loss to key sensitive features through appropriate route alignment. Mitigation for other effects on key sensitive features could include creation of compensatory habitats, habitat screening by planting/fencing, and appropriate drainage, dust suppression and lighting strategies.</td>
</tr>
<tr>
<td>C2-2</td>
<td>There appears to be limited opportunity to avoid habitat loss to key sensitive features through appropriate route alignment. Mitigation for this and other effects on key sensitive features could include creation of</td>
</tr>
</tbody>
</table>
### Oxford to Cambridge Expressway

**Appendix E: Supplementary Environmental Information**

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>compensatory habitats, habitat screening by planting/fencing, and appropriate drainage, dust suppression and lighting strategies.</td>
</tr>
<tr>
<td>C2-3</td>
<td>There is the potential to avoid most habitat loss to key sensitive features through appropriate route alignment. Mitigation for other effects on key sensitive features could include creation of compensatory habitats, habitat screening by planting/fencing, and appropriate drainage, dust suppression and lighting strategies.</td>
</tr>
<tr>
<td>C2-4</td>
<td></td>
</tr>
</tbody>
</table>
8.2.7 Geology and soils

8.2.7.1 Key findings

Section C2-1

There is the potential for significant effects relating to SSSIs, however as these are relatively small then careful route selection could likely avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these sand and gravel resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs in one location span two thirds of the corridor width and so it is unlikely to be possible to route around these when taking into account other environmental discipline constraints. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses (in particular Radley PFA Lagoons and Abingdon Airfield), however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

Section C2-2

There is the potential for significant effects relating to SSSIs, however as these are relatively small, careful route selection could likely avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and current conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. However, as the MSGAs span less than half the corridor width and are only present in limited locations it is likely to be possible to route around them to avoid any effect. If an effect were to be unavoidable it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with potentially contaminative historical and current land uses, however these could be avoided by route selection. If the route were to cross a historic land use there may be engineering challenges and costs to consider, although it is expected that these impacts could be mitigated.

Section C2-3

There is the potential for significant effects relating to the SSSIs, however careful route selection could avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the width of the corridor and so routing to avoid these features is not possible. However, it may be possible to
extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses (largely airfields in this area), however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

Section C2-4

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the corridor width and so routing to avoid these is not possible. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses in particular Bletchley landfill, however this could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is generally considered possible in terms of engineering and remediation, although in the case of Bletchley this would be a significant constraint given that the landfill serves Milton Keynes and has planning permission till 2022.

Overall

There is the potential for significant effects relating to the SSSIs, however careful route selection could avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the width of the corridor and so routing to avoid these features is not possible. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses (in particular airfields and Bletchley landfill) however this could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account, particular at Bletchley as the landfill serves Milton Keynes. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.
8.2.7.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2-1</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span the width of the corridor, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources.</td>
</tr>
<tr>
<td>C2-2</td>
<td>Given the area and location of the features the majority could be avoided by route selection, including the MSGA. If a MSGA could not be avoided mitigation would be possible in the form of prior excavation and re-use and relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>C2-3</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGA which spans the width of the corridor, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>C2-4</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span the corridor width, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills however Bletchley landfill may represent more of a constraint from a regulatory perspective.</td>
</tr>
</tbody>
</table>

8.2.8 Road drainage and the water environment

8.2.8.1 Key findings

Section C2-1

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas in east of Abingdon.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.
**Geomorphology, WFD and Water Quality**

Section C2-1 has the potential for significant effects on 4 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section C2-1 has the potential for significant effects on the water quality of 4 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Section C2-1 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and a spring discharge.

**Section C2-2**

**Flood Risk**

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk in small areas at south-east Bicester.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

**Geomorphology, WFD and Water Quality**

Section C2-2 has the potential for significant effects on 8 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section C2-2 has the potential for significant effects on the water quality of 8 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Section C2-2 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and
from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and spring discharges.

Section C2-3

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk in small areas at Bicester and Buckingham.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality

Section C2-3 has the potential for significant effects on 18 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section C2-3 has the potential for significant effects on the water quality of 18 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater

Section C2-3 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and spring discharges.

Section C2-4

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk in small areas at Bletchley.
The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

**Geomorphology, WFD and Water Quality**

Section C2-4 has the potential for significant effects on 4 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section C2-4 has the potential for significant effects on the water quality of 4 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Section C2-4 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing the SPZ1 within this section.

**Overall**

**Flood Risk**

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

**Geomorphology, WFD and Water Quality**
Section C2 has the potential for significant effects on 29 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section C2 has the potential for significant effects on the water quality of 29 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Corridor C-2 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing the SPZ1 within this corridor.

### 8.2.8.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2-1</td>
<td><strong>Flood Risk</strong></td>
</tr>
<tr>
<td></td>
<td>- Crossings should be made at locations with the smallest floodplain width.</td>
</tr>
<tr>
<td></td>
<td>- A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
<td></td>
<td>- May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
</tr>
<tr>
<td></td>
<td>- Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.</td>
</tr>
<tr>
<td></td>
<td>- Groundwater mitigation may be required where groundwater flow paths are impeded.</td>
</tr>
<tr>
<td></td>
<td><strong>Geomorphology, WFD and Water Quality</strong></td>
</tr>
<tr>
<td></td>
<td>- Crossing of large WFD water bodies to be avoided through design (embedded mitigation).</td>
</tr>
<tr>
<td></td>
<td>- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.</td>
</tr>
<tr>
<td></td>
<td>- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.</td>
</tr>
<tr>
<td></td>
<td><strong>Groundwater</strong></td>
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<tr>
<td></td>
<td>- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.</td>
</tr>
<tr>
<td></td>
<td>- Groundwater abstractions may require monitoring and possible replacement</td>
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</tbody>
</table>
### Section Design, mitigation and enhancement consideration for Stage 1B

<table>
<thead>
<tr>
<th>C2-2</th>
<th>Flood Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The route should be positioned away from the River Ray, where practicable.</td>
<td></td>
</tr>
<tr>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
<td></td>
</tr>
<tr>
<td>• There are areas of small fluvial flood risk, along Horton-cum-Studley which ideally should be explored in the initial instance.</td>
<td></td>
</tr>
<tr>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
<td></td>
</tr>
<tr>
<td>• May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
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</tr>
<tr>
<td>• Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.</td>
<td></td>
</tr>
<tr>
<td>• Groundwater mitigation may be required where groundwater flow paths are impeded.</td>
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</tr>
</tbody>
</table>

#### Geomorphology, WFD and Water Quality

- Crossing of large WFD water bodies to be avoided through design (embedded mitigation).
- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.
- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.

#### Groundwater

- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- Groundwater abstractions may require monitoring and possible replacement if they are impacted by works.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.

<table>
<thead>
<tr>
<th>C2-3</th>
<th>Flood Risk</th>
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<tbody>
<tr>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
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<tr>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
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<tr>
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<tr>
<td>• Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.</td>
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<tr>
<td>Section</td>
<td>Design, mitigation and enhancement consideration for Stage 1B</td>
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<td></td>
<td>of surface water flows.</td>
</tr>
<tr>
<td></td>
<td>• Groundwater mitigation may be required where groundwater flow paths are impeded.</td>
</tr>
<tr>
<td>Geomorphology, WFD and Water Quality</td>
<td></td>
</tr>
<tr>
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</tr>
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</tr>
<tr>
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<td>• Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.</td>
</tr>
<tr>
<td></td>
<td>• Groundwater abstractions may require monitoring and possible replacement if they are impacted by works.</td>
</tr>
<tr>
<td></td>
<td>• Pollution prevention control measures during construction and operation would mitigate potential quality impacts.</td>
</tr>
<tr>
<td>Flood Risk</td>
<td></td>
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<tr>
<td>C2-4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
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<tr>
<td></td>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
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<td>• May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
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</tr>
<tr>
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<td></td>
</tr>
<tr>
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<td>• Crossing of large WFD water bodies to be avoided through design (embedded mitigation).</td>
</tr>
<tr>
<td></td>
<td>• Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.</td>
</tr>
<tr>
<td></td>
<td>• Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.</td>
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<tr>
<td>Groundwater</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.</td>
</tr>
<tr>
<td></td>
<td>• Groundwater abstractions (including those for public supply) may require monitoring and possible replacement if they are impacted by works.</td>
</tr>
</tbody>
</table>
### 8.3 Assessment Summary

#### 8.3.1 Intervention objectives assessment

**Table 8-17 Intervention objective 1 assessment – C2**

<table>
<thead>
<tr>
<th>Discipline</th>
<th>C2-1</th>
<th>C2-2</th>
<th>C2-3</th>
<th>C2-4</th>
<th>Overall Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>For all sections it is assumed that traffic could be rerouted from the more densely populated areas (e.g. Oxford, Abingdon, Bicester, Caversfield, Milton Keynes etc.), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations) and on this basis would be beneficial overall.</td>
</tr>
<tr>
<td>Noise and Vibration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Overall potential net beneficial effect having regard for:</td>
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<td></td>
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<td></td>
<td><strong>Benefits:</strong></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Potential for reductions in noise levels at receptors in Bicester, Bletchley, Milton Keynes due to potential traffic flow being diverted away from these areas.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>• Potential positive noise benefits between Abingdon and Thame (A415, B4105 and the A329) resulting from possible reductions in traffic on these roads.</td>
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<td><strong>Disbenefits:</strong></td>
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<td></td>
<td></td>
<td>• Potential increases in noise for receptors adjacent to possible 'on-line' sections (A34, A421 between Buckingham and Bletchley, A421 – east of M1) due to possible increased traffic and speeds and road widening.</td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
<td>• Potential increases in noise for receptors adjacent to A413 (Buckingham to A43) and A422 due to possible increases in traffic flows.</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>Potential for adverse changes in noise at</td>
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</tbody>
</table>
sensitive receptors in rural areas where new offline sections could form part of a new route option.

- Potential for adverse noise and vibration impacts at sensitive receptors associated with construction and online widening.

Community constraints in the Horspath/Wheatley area (section C2-2) and the Woburn Sands area near Milton Keynes (section C2-4).

Community severance may be avoided within the remainder of the corridor through careful route design.

Corridor C2 has been scored Yellow reflecting constraints from existing communities to route development in this corridor.

### Table 8-18 Intervention objective 2 assessment – C2

<table>
<thead>
<tr>
<th>Discipline</th>
<th>C2-1</th>
<th>C2-2</th>
<th>C2-3</th>
<th>C2-4</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Heritage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It appears that C2 has sufficient flexibility in the corridor to allow for mitigation of significant effects on cultural heritage assets through careful route design.</td>
</tr>
<tr>
<td>Landscape and Visual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C2 does not contain any Tier I landscape constraints.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>Any route through section C1-3 north of the A421 could have a direct impact on the Stowe AAL and LLAs.</td>
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<tr>
<td></td>
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<td></td>
<td>With landscape in mind, any route through section C2-3 would preferably to go west of Great Brickhill, Little Brickhill and Bow Brickhill immediately adjacent to the edge of Milton Keynes to reduce the impact on the AAL designated landscape.</td>
</tr>
<tr>
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<td></td>
<td>The London Metropolitan green belt partially extends across section C2-4 although a route to the west of this section would avoid</td>
</tr>
</tbody>
</table>
Nature Conservation

Section C2-2 - habitat loss from some SSSIs, ancient wood lands and LWS and severance appears to be unavoidable given the extent of these features within the corridor. In addition to effects on Tier I nature conservation habitats, Otmoor RSPB reserve is sited just outside the corridor boundary north of Beckley which is a highly sensitive area.

Geology and Soils

The corridor contains a large coverage of Mineral Safeguarding Areas (MSGA’s) which would be unavoidable. There are a number of geological SSSI’s along the corridor but it is considered it may be possible to avoid these constraints through careful route design. There are a number of authorised landfills and historic landfills within the corridor however it is considered it may be possible to avoid these through careful route design.

Road Drainage and Water Environment

C2 has the potential to cross small areas of FZ3b in all sections. This includes crossings of the River Thames, River Great Ouse and River Ouzel.

Overall

Corridor C2 has been scored red because this corridor does offer sufficient flexibility to avoid all Tier I nature conservation constraints.

8.3.2 Overall findings

Table 8-19 Summary of C2 environment assessment

<table>
<thead>
<tr>
<th>Discipline</th>
<th>C2-1</th>
<th>C2-2</th>
<th>C2-3</th>
<th>C2-4</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature Conservation</td>
<td></td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td>Section C2-2 - habitat loss from some SSSIs, ancient wood lands and LWS</td>
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<td></td>
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<td>and severance appears to be unavoidable given the extent of these features</td>
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<td>within the corridor. In addition to effects on Tier I nature conservation</td>
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<td></td>
<td>habitats, Otmoor RSPB reserve is sited just outside the corridor boundary</td>
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<td>north of Beckley which is a highly sensitive area.</td>
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<tr>
<td>Geology and Soils</td>
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<td></td>
<td>The corridor contains a large coverage of Mineral Safeguarding Areas (MGS</td>
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<td>A’s) which would be unavoidable.</td>
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<td></td>
<td>There are a number of geological SSSI’s along the corridor but it is</td>
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<td>considered it may be possible to avoid these constraints through careful</td>
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<td>route design.</td>
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<td>There are a number of authorised landfills and historic landfills within</td>
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<td>the corridor however it is considered it may be possible to avoid these</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>through careful route design.</td>
</tr>
<tr>
<td>Road Drainage and Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C2 has the potential to cross small areas of FZ3b in all sections. This</td>
</tr>
<tr>
<td>Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>includes crossings of the River Thames, River Great Ouse and River Ouzel.</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td>Corridor C2 has been scored red because this corridor does offer sufficient</td>
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<td></td>
<td>flexibility to avoid all Tier I nature conservation constraints.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intervention objective 1</th>
<th>Intervention objective 2</th>
<th>Intervention objective 3</th>
<th>Strategic objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow – slightly disadvantageous</td>
<td>Red – highly disadvantageous</td>
<td>Grey - neutral</td>
<td>Red – highly disadvantageous</td>
</tr>
</tbody>
</table>
9. Corridor C3

9.1 Baseline conditions

9.1.1 Air quality

Section C3-1

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- AQMAs: The C3-1 area includes Abingdon AQMA (central Abingdon), and the southern part of the Oxford AQMA. Both have been declared due to exceedances in NO₂.

- Designated Sites: This area includes Dry Sandford Pit SSSI, Barrow Farm Fen SSSI, Sugworth SSSI and Cothill Fen SSSI and SAC.

- Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Oxford, Abingdon, Radley, Toot Baldon, Sunningwell, Garsington and Cuddesdon.

- Sensitive Receptors: Within the C3-1 boundary, there are approximately 20,000 potential air quality sensitive receptors.

- Clean Air Zone: The section is approximately 2km from the potential Oxford CAZ.

- PCM Model: Defra PCM links within the C3-1 area have been identified on A415 and A4183 in Abingdon. Concentrations are elevated but not exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: The Vale of White Horse District Council has 18 NO₂ monitoring locations within C3-1, in and around the centre of Abingdon. The latest monitoring data indicates elevated NO₂ concentrations, with one exceedance on the A415, and concentrations close to exceeding within the existing AQMA area.

- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the C3-1 area (at 1km square intervals) are below the relevant AQOs for NOx (9.8-19.9 μg/m³), NO₂ (7.5-14.3 μg/m³) and PM₁₀ (12.2-15.6 μg/m³).

There is potential for air quality benefits at sensitive receptors in Oxford and Abingdon, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Potential to improve journey routing in this area to reduce congestion (and thus emissions) within Oxford, and potentially reducing air quality concentrations within the AQMA.
Section C3-2

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs:** The C3-2 area includes the south-eastern part of the Oxford AQMA, and Cherwell DC No.4 AQMA in the centre of Bicester, which have been declared due to exceedances in the annual NO\(_2\) concentrations.

- **Designated Sites:** This area includes Holton Wood SSSI, Waterperry Wood SSSI, Shabbington Woods Complex SSSI, Murcott Meadows SSSI, Whitewcross Green and Oriel Woods SSSI, Muswell Hill SSSI, Arncott Bridge Meadows SSSI, Rushbeds Wood and Railway Cutting SSSI.

- **Residential Receptors:** Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Wheatley, Horton-cum-Studley, Worminghall, Piddington, Oakley, Ludgershall, Boarstall, Arncott, Murcott, Ambrosden, Blackthorn, Bicester.

- **Sensitive Receptors:** Within the C3-2 boundary, there are approximately 13,000 potential air quality sensitive receptors.

- **Clean Air Zone:** The section is approximately 10km from the potential Oxford CAZ.

- **PCM Model:** Defra PCM links within this area have been identified on A4095, A41, A4142 in Bicester and Oxford. Concentrations are elevated (but not exceeding) in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data:** Cherwell District Council undertake NO\(_2\) monitoring in and around Bicester. The latest monitoring data indicates locations within the AQMA are either close to, or exceeding the AQO. Monitoring locations outside of the AQMA show concentrations below the AQO.

- **Defra Background Concentrations:** The Defra background maps indicate 2018 background concentrations across the C3-2 area (at 1km square intervals) are below the relevant AQOs for NO\(_x\) (8.4-14.9 µg/m\(^3\)), NO\(_2\) (6.4-11.1 µg/m\(^3\)) and PM\(_{10}\) (11.5-15.6 µg/m\(^3\)).

There is potential for air quality benefits at sensitive receptors in Oxford, Wheatley and Bicester, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Potential to improve journey routing in this area to reduce congestion (and thus emissions) within Bicester, and potentially reducing air quality concentrations within the AQMA.
Section C3-3

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- **AQMAs:** No AQMA areas have been declared within the C3-3 boundary by either Aylesbury Vale District Council, Cherwell District Council or Milton Keynes Borough Council.

- **Designated Sites:** This area includes Stratton Audley Quarries SSSI, Ardley Cutting and Quarry SSSI, Tingewick Meadows SSSI, Foxcote Reservoir and Wood SSSI, Pilch Fields SSSI, Howe Park Wood SSSI, Long Herdon SSSI.

- **Residential Receptors:** Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Bicester, Caversfield, Stratton Audley, Buckingham, Padbury, Newton Purcell, Finmere, Tingewick, Thornborough, Great Horwood, Little Horwood, Marsh Gibbon, Twyford, South-west Milton Keynes.

- **Sensitive Receptors:** Within the C3-3 boundary, there are approximately 21,000 potential air quality sensitive receptors.

- **Clean Air Zone:** The section is approximately 19km from the potential Oxford CAZ.

- **PCM Model:** Defra PCM links within this area have been identified on A4095, A413, A421, A422, A4421. Concentrations are not exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- **Monitoring Data:** Aylesbury Vale District Council undertake NO\textsubscript{2} monitoring at one location within C3-3 area in Buckingham. The latest monitoring data indicates the majority of locations have concentrations below the AQO, with the exception of one location, which is close to exceeding (Market Square). Cherwell Valley District Council undertake NO\textsubscript{2} monitoring at one location within C3-3 area.

- **Defra Background Concentrations:** The Defra background maps indicate 2018 background concentrations across the C3-3 area (at 1km square intervals) are below the relevant AQOs for NO\textsubscript{x} (7.7-16.4 μg/m\textsuperscript{3}), NO\textsubscript{2} (6.0-12.1 μg/m\textsuperscript{3}) and PM\textsubscript{10} (11.4-14.8 μg/m\textsuperscript{3}).

There is potential for air quality benefits at sensitive receptors in Bicester, Caversfield and Buckingham, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Section C3-4

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:
- AQMAs: No AQMA areas have been declared within the C3-4 boundary by either Aylesbury Vale District Council, Central Bedfordshire Council or Milton Keynes Borough Council.

- Designated Sites: This area includes Wavendon Heath Ponds SSSI.

- Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Newton Longville, Bletchley, Lakes Estate, Little Brickhill, Bow Brickhill, Woburn Sands, Aspley Guise, Stoke Hammond, Ridgmont, south Milton Keynes.

- Sensitive Receptors: Within the C3-4 boundary, there are approximately 23,000 potential air quality sensitive receptors.

- Clean Air Zone: The section is approximately 40km from the potential Oxford CAZ.

- PCM Model: Defra PCM links within this area have been identified on A4146 and A5 south of Milton Keynes. Concentrations are elevated in 2018 (but not exceeding). PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: Milton Keynes Borough Council undertake NO$_2$ monitoring at two locations within the C3-4 area. The latest monitoring data indicates concentrations below the AQO.

- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the C3-4 area (at 1km square intervals) are below the relevant AQOs for NO$_x$ (8.8-19.0 μg/m$^3$), NO$_2$ (6.8-13.8 μg/m$^3$) and PM$_{10}$ (11.7-16.8 μg/m$^3$).

There is potential for air quality benefits sensitive receptors in Milton Keynes, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

### 9.1.2 Noise and vibration

Within the Corridor C3 study area there are 103,083 dwellings and 1,869 other sensitive receptors. The Corridor C3 study area contains the large settlements of Abingdon, the south east fringe of Oxford, Bicester, Buckingham, Bletchley and the southeast of Milton Keynes, as well as numerous smaller towns and villages.

It is expected that receptors in close proximity to major roads and within urban areas are subject to high noise levels dominated by road traffic. Within this corridor’s study area, a number of residential settlements exist in close proximity to the A34 (e.g. Abingdon and Shippon), A40 (e.g. Wheatley), A41 (e.g. Bicester), A421 (e.g. Finmere, Tingewick, Buckingham, and Thornborough), A4421 (e.g. Stratton Audley and Fringford), A4146 (e.g. Stoke Hammond), A5 (e.g. Little Brickhill) and A5130 (e.g. Woburn Sands). In addition, the M40 and M1 runs through this corridor study area.
Receptors located in more rural settings are expected to have their noise environment consisting of more local sources such as agriculture activities, road traffic on minor roads, railways and aircraft flights. There are rural expanses within the Corridor C3 study area between Abingdon and Oxford, Oxford and Bicester, Bicester and Buckingham, and Buckingham and Milton Keynes where non-traffic sources are more likely to dominate the noise environment.

There are numerous railway lines running through the Corridor C3 study area that would contribute to the surrounding noise environment: the Cherwell Valley line, London Marylebone to Oxford line, the Manchester to Bournemouth line, the London to Birmingham line, the West London Route, and Marston Vale line. In addition, Luton and Heathrow Airport have several flight paths and stacking areas through the Corridor C3 study area. The Abingdon Airfield, RAF Oakley, RAF Bicester, Finmere Aerodrome, and three rural runways (Slay Barn airstrip, south of Wheatley, one west of Marsh Gibbon and one west of Thornborough) are located within the corridor study area.

Numerous SSSIs exist within the corridor study area. These include: Barrow Farm, Culham Brake, Tingewick Meadows, Wavendon Heath Ponds, and Poker’s Pond Meadow.

The Corridor C3 study area contains a total of 38 NIAs. Three NIAs exist adjacent to the A34, four on the A4074, one in Littlemore, four along the A40, two on the A41, one adjacent to the A418, four exist adjacent to the A4421, five adjacent to the A421 (between Buckingham and Milton Keynes), one adjacent to the A421 (to the east of Milton Keynes near to the M1), and three on the A5130. The remainder of the NIAs are within Oxford, Abingdon and Milton Keynes. Two NIAs are designated due to rail noise on the London to Birmingham railway line south of Milton Keynes.

9.1.3 People and communities

Section C3-1

Abingdon is located in the south-west of the section, while the southern outskirts of Oxford (Blackbird Leys area) coincide with the northern edge of the section. Other key settlements within the west part of the corridor section are Shippon, Gozzard’s Ford, Cothill, Sunningwell, Nuneham Courtenay, Radley, Marsh Baldon and the Woodland/Pebble Hill/Bigwood mobile home estates north of Radley, while Nuneham Courtenay, Toot Baldon, Garsington, Chippinghurst, Denton and Cuddesdon are within the eastern part of the section. The western edge of Abingdon is bounded by the A34 which is a busy dual carriageway. However, the other settlements within the section are largely unaffected by major highway infrastructure.

There are areas of land allocated for development near Radley and the southern fringe of Oxford, while Dalton Barracks is used by the MOD and allocated for residential development in the emerging Vale of White Horse Local Plan.

In terms of recreation and open space, the Tilsley Park leisure complex abuts the eastern side of the A34 in Abingdon, while there are some areas of Local Green Space within some settlements, notably Chippinghurst. Radley College golf course (private), Bagley Wood.

In terms of education, health and other sensitive community receptors, the Manor Preparatory School, School of St Helen and St Katharine, Larkmead School, Church of St Mary Magdalene and Stowford House nursing home are within 250m of the A34. Radley
College, with its extensive grounds, is within the centre of the corridor (there is also a primary school within the village of Radley).

There are patches of best and most versatile agricultural land in the southern and eastern parts of section (some of which has been lost to the development of Abingdon).

Section C3-2

This corridor section includes much of Bicester and Graven Hill. Villages within the corridor section include Wheatley, Waterstock, Horton-cum-Studley, Boarstall, Murcott, Arncott, Piddington, Ludgershall, Blackthorn and Ambrosden. The A40 forms a bypass for Wheatley, while the M40 and A41 also cross the corridor section.

The main development allocations are on the outskirts of Bicester (north-west part of section). There is also a small residential allocation on the edge of Ambrosden.

The north-east part of the section boundary overlaps some linear areas of registered common land (Oakley/Brill area). Several large areas of woodland throughout the northern half of the corridor section are likely to be used for informal recreational purposes. There are also large golf courses located south of Horton-cum-Studley (Studley Wood Golf Club) and Boarstall (Magnolia Park Golf Club), and further small formal recreational facilities located within and on the outskirts of settlements.

There are some areas of best and most versatile agricultural land in the far south-west part of the section, and around Waterstock, which wouldn’t pose a constraint if the line of the M40 is selected as part of the expressway.

Section C3-3

This section approximately follows the A4421 from Bicester and then the A421 to Milton Keynes. It wholly incorporates the town of Buckingham in the centre of the section. The section incorporates the outskirts of Bicester at the south-western boundary and outskirts of Milton Keynes at the north-eastern boundary. There are several villages throughout the section, including Bucknell, Stratton Audley, Marsh Gibbon, Grendon Underwood, Edgcott, Godington, Twyford, Fringford, Newton Morrell, Chetwode, Newton Purcell, Preston Bissett, Barton Harthorn, Finmere, Water Stratford, Tingewick, Gawcott, Maids Moreton, Padbury, Thornborough, Great Horwood, Little Horwood, Nash, Whaddon and Mursley.

There is land allocated for development on the outskirts of Buckingham and Milton Keynes, as well as two small isolated sites proposed for industrial use – one to erect aircraft hangers at Finmere Aerodrome, the other, for agricultural buildings near Nash.

There are some notable areas of recreational or open space outside of settlements which may pose a constraint to route options within the corridor. This includes playing fields associated with Moretonville Junior Football Club in between Gawcott and Buckingham. Buckingham Golf Club has a large private course to the west of Buckingham. There are playing fields on the northern edges of the villages of Finmere and Tingewick and on the edges of Marsh Gibbon and Twyford.

The Lace Hill Academy is on the southern edge of Buckingham. No other sensitive community facilities have been identified outside of existing settlements.
There are two main patches of best and most versatile agricultural land along the northern boundary, one north of Fringford and the other around Buckingham and the A422 north-east of Buckingham.

Section C3-4

The outskirts of Milton Keynes and Bletchley coincide with the north-west edge of the section. There are several villages dispersed throughout the corridor including Little Great Brickhill, Bow Brickhill, Woburn Sands, Drayton Parslow, Stoke Hammond and Aspley Guise. The A5 crosses the section, bypassing Little Brickhill. The A4146 also crosses the section and is a two lane dual carriageway bypassing Stoke Hammond. The majority of the villages in the section are relatively rural and away from major highway infrastructure.

The main development allocations are along the fringe of Milton Keynes.

Key areas of open space and recreation within the corridor section include part of Woburn Safari Park, located north west of Woburn, and Stockgrove Country Park, located on the northern outskirts of Leighton Buzzard. There is a large private golf course (Woburn) near Aspley Heath. Crawley Park is located within Husborne Crawley and Caldecotte Lake is located between Bletchley and Wavendon. There are numerous small areas of playing fields within and on the outskirts of Milton Keynes and the smaller settlements. Extensive areas of woodland and heathland are present throughout the section and likely to be used for informal recreation (including King's Wood, Buttermilk Wood, Back Wood, Wavendon Wood and Wavendon Heath. There are several small areas of registered common land within or close to Stoke Hammond, Great Brickhill and Aspley Guise.

The Lindens Residential Care Home is located on Stoke Road between Bletchley and Stoke Hammond. St James's Church and Husborne Crawley Lower School are on the edge of Husborne Crawley. Otherwise, educational facilities, health care facilities and care/nursing homes are largely located within or in close proximity to existing settlement boundaries.

There is very little best and most versatile agricultural land within the corridor section.

9.1.4 Cultural heritage

Section C3-1

There are 55 designated cultural heritage assets of High value within the Section C3-1 corridor and 1 kilometre study area comprising:

- 9 scheduled monuments
- 10 Grade I listed buildings
- 34 Grade II* listed buildings
- 1 Grade I Registered Park and Garden
- 1 Grade II* Registered Park and Garden

There are a further 511 designated cultural heritage assets of Medium value within the Section C3-1 corridor and 1 kilometre study area comprising:
Abingdon itself contains a large number of High value cultural heritage assets comprising scheduled monuments and Grade I and II* listed buildings. The majority of these assets are located relatively central within the built up area of the town; however, the 3 settlement site scheduled monuments located on the fringes of the town to the north east and across the A34 to the west are situated in a more open environment.

Grade I and Grade II* listed buildings are also located within the villages of Garsington, Cuddesdon and Denton, Radley, Marsh Baldon, Sunningwell, Toot Baldon, Great Milton, Kennington, Littlemore, Sandford-on-Thames, and St. Helen Without. Garsington also contains a village cross scheduled monument.

The Grade I Registered Park and Garden of Nuneham Courtenay extends approximately 450 metres into the Section C3-1 corridor from the south; however, it is situated in a rural landscape on low, undulating hills with a steep slope towards its western boundary created by the River Thames. This situation creates important long views west towards Abingdon and north towards Oxford. The Grade II* Registered Park and Garden of Garsington Manor is much smaller in size, but is located more centrally within the corridor. Again, the rural setting and long panoramic views to the south to the Wittenham Clumps on the Sinodun Hills, and beyond these the Berkshire Downs in the far distance, contribute to the value of this asset.

Section C3-2

There are 47 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section C3-2 comprising:

- 11 scheduled monuments
- 9 Grade I listed buildings
- 24 Grade II* listed buildings
- 2 Grade I Registered Park and Garden
- 1 Grade II* Registered Park and Garden

There are a further 473 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section C3-2 comprising:

- 464 Grade II listed buildings
- 9 Conservation Areas

There are a number of smaller, discrete scheduled monuments dotted across this corridor comprising 3 Deserted Medieval Villages, 3 moated sites, and 1 village cross.
Section C3-2 incorporates the town of Bicester, which contains Grade I and Grade II* listed buildings. Just south of Bicester are the large Alchester Roman site and parade ground scheduled monuments and to the east of Bicester is the Wretchwick Deserted Medieval Settlement scheduled monument.

Further Grade I and II* listed buildings are located in Waterperry with Thomley, Boarstall, Ludgershall, Holton, Horton-cum-Studley, Wheatley, Oakley, Piddington, Ambrosden, and Worminghall.

The Wotton House Grade I Registered Park and Garden extends only slightly into the Section C3-2 corridor. It incorporates 24 listed buildings (4 Grade I, 1 Grade II*, and 19 Grade II) and a large part of the park is well screened by vegetation; however, the park is purposely aligned with views of the forested areas of Tittershall and Grove Woods to the north and east.

Section C3-3

There are 80 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section C3-3 comprising:

- 14 scheduled monuments
- 31 Grade I listed buildings
- 33 Grade II* listed buildings
- 2 Grade I Registered Park and Garden

There are a further 847 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section C3-3 comprising:

- 817 Grade II listed buildings
- 30 Conservation Areas

Just to the north of the town of Bicester is the RAF Bicester which contains 11 protected structures that together comprise the scheduled monument.

There are 4 scheduled monuments located on the fringes of Milton Keynes comprising the Fishpond in Water Spinney south east of St Giles’s Church Tattenhoe, the Moated site, fishponds and deserted medieval village of Tattenhoe west of Home Park Farm, the moated site and fishponds of Snelshall Benedictine Priory north of Briary Plantation, and a bowl barrow on Church hill in Whaddon. There are 3 further moated sites in the smaller villages of Stratton Audley and Little Horwood and in a more rural location near Grendon Underwood.

Two Roman barrows comprise a scheduled monument to the east of Buckingham very near to the current A421 and to the Thornborough Bridge scheduled monument. Also east of Buckingham and to the north of the Roman barrows lies a prehistoric hillfort scheduled monument which has been denuded by ploughing, but is thought to still retain valuable archaeological information ([https://historicengland.org.uk/listing/the-list/list-entry/1018453](https://historicengland.org.uk/listing/the-list/list-entry/1018453) [accessed 02/05/2018]).
The town of Buckingham itself contains a large number of High value assets including a scheduled monument and Grade I and Grade II* listed buildings. The St Rumbold’s well scheduled monument lies on the southwestern edge of the town and incorporates an area of cultivation earthworks to the south of the well itself.

There are further Grade I and II* listed buildings in Thornborough, Radcliffe-cum-Chackmore, Launton, Maids Moreton, Bucknell, Whaddon, Stratton Audley, Twyford, Chetwode, Water Stratford, Great Horwood, Marsh Gibbon, Grendon Underwood, Mursley, Padbury, Tingewick, Gawcott with Lenborough, Little Horwood, Caversfield, Preston Bissett, Shenley Brook End, and Foscott

A long approach of Stowe Grade I Registered Park and Garden and National Trust owned land extends across the corridor. Called Stowe Avenue (owned by National Trust), this approach runs for 2 kilometres from the edge of Buckingham to the Corinthian Arch which overlooks the park, pleasure grounds and mansion to the north.

Section C3-4

There are 42 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section C3-4 comprising:

- 7 scheduled monuments
- 2 Grade I listed buildings
- 32 Grade II* listed buildings
- 1 Grade I Registered Park and Garden

There are a further 313 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section C3-4 comprising:

- 297 Grade II listed buildings
- 16 Conservation Areas

The Roman town of Magiovinium scheduled monument is situated on the edge of Bletchley and Fenny Stratford and is divided by the Roman Watling Street. It is roughly bounded by the current A4146 and A5. There are 2 further scheduled monuments, a medieval manor and a shrunken medieval village, within the constituent towns of Milton Keynes.

The Danesborough Camp hillfort and the Motte castle 200m south east of Wavendon Manor scheduled monuments both survive well archaeologically and are good examples of their class.

There are Grade I and Grade II* listed buildings in West Bletchley, Newton Longville, Aspley Guise, Bletchley and Fenny Stratford, Husborne Crawley, Wavendon, Drayton Parslow, Stoke Hammond, Ridgmont, Little Brickhill, Great Brickhill, Bow Brickhill, and Aspley Heath.

The Grade I Registered Park and Garden of Woburn Abbey extends a maximum of 750 metres into the C3-4 corridor. Woburn Abbey is a large and complex site which incorporates 61 listed buildings (7 Grade I, 6 Grade II*, and 48 Grade II) on its grounds; most of which lay
outside of the Section C3-4 corridor and study area. The setting of the park is largely agricultural, with some areas of woodland and the villages lying close by. It is bounded to the southwest, northwest, and north by the current A4012 road where it is enclosed by high, red-brick walls.

9.1.5 Landscape and visual

Section C3-1

There are no designated landscapes in this section of the corridor, although there are a number of other designations that are relevant to landscape. These include Oxford green belt which, although green belts are not a landscape designation, they are relevant to LVIA due to the need to consider effects on its openness.

Also of relevance are Nuneham Courtenay, Marsh Baldon, Toot Baldon, Garsington, Little Milton, Great Milton conservation areas and numerous listed buildings whose setting may be affected by the proposals.

The area is characterised by the low lying river Thames floodplain and there are significant areas of ancient woodland within it.

A golf course and playing fields are associated with and adjacent to Radley College.

Sensitive visual receptors include residents on the northern edge of Abingdon, in rural settlements including Garsington, Denton and Cuddesdon, and isolated farmsteads and properties; users of PRoW including the Thames Path national trail.

Section C3-2

This section includes part of Brill-Winchendon Hills AAL which is noted for its ‘undulating hills and ridges, with magnificent panoramic views across the strongly scenic and rural landscape. Together with the Quainton-Wing Hills they form a series of low, generally open limestone hills with hilltop settlements, between the foot of the Chilterns escarpment and the dip slope of the Cotswolds’.

Other relevant designations include the Oxford green belt and there are significant blocks of ancient woodland, including Bernwood Forest ancient woodland immediately adjacent to the M40. Wotton House RPG grade I is located at the eastern extent of the section, albeit that the majority of the site lies outside of the corridor.

The area is characterised by the low lying River Ray floodplain.

Sensitive visual receptors include residents in villages and scattered properties including residents of Ambrosden and Blackthorn, and users of PRoW. Some visual receptors already experience views of the M40.

Section C3-3

This section includes the southern edge of Stowe AAL north of Buckingham, and also the Great Ouse Valley (West), Great Ouse Valley (East) and Whaddon-Nash Local Landscape Areas (LLA). Stowe AAL is noted for the ‘peaceful and picturesque, gently rolling agricultural landscape in and around the internationally important landscape park and gardens of Grade I
Stowe Registered Park and Garden, an 18th century designed landscape and recognised as one of Britain’s finest Historic Parks and Gardens. Blocks of ancient woodland, the remnants of the medieval Whittlewood Forest, and other parklands in the area contain great cultural and natural value, as well as rich visual texture and provide a wooded backcloth to the landscape. A landscape of streams, parklands and small villages of local materials with focal points of medieval church towers, mature oak trees and with occasional long views from vantage points."

Poundon Hill LLA lies within this section. It should, however, be noted that the updated Vale of Aylesbury Local Plan (2013 – 2033) Policies Map (November 2017), which has not yet been adopted, no longer shows Poundon LLA. This accords with the Defining the special qualities of local landscape designations in Aylesbury Vale District – Final Draft Report (LUC, March 2016) that forms part of the landscape supporting evidence, and which recommends the Poundon Hill LLA is not worthy of local landscape designation.

Stowe House is RPG grade I and National Trust property, the designated area includes Stowe Avenue that links from Stowe House to Buckingham.

RAF Bicester, Stratton Audley, Tingewick, Radcliffe, Buckingham Thornborough, Singleborough, Great Horwood, Nash and Whaddon conservation areas and numerous listed buildings also feature.

RAF Bicester is a very open landscape with views across the airfield, whilst the A4421 Buckingham Road (Roman Road) is characterised by established vegetation including mature woodland, hedgerows and hedgerow trees. The Existing A421 is a major highway and already partly dualled.

There are areas of ancient woodland south of Whaddon.

Sensitive visual receptors include residents of Launton, Stratton Audley, Fringford, Barton Hartshorn, and villages and properties along the A4421 including Newton Morrell and Newton Purcell. Also residents on the southern edge of Buckingham, and in the villages of Tingewick, Radcliffe, Buckingham Thornborough, Singleborough, Great Horwood, Nash and Whaddon.

Section C3-4

The majority of the western part of this section lies within the Brickhills AAL with the exception of a narrow area of non-designated land adjacent to the urban edge of Milton Keynes. Brickhills AAL is noted for its ‘distinct landform with wooded scarp slopes and interspersed agricultural areas and heathland’, and ‘open and panoramic views from the hilltops across the landscape of the Vale of Aylesbury to the Quainton Wing hills’.

To the east the AAL shares a boundary with the London Metropolitan green belt that extends beyond the extent of the corridor.

Other important designations include Woburn Abbey RPG grade I to the east of the corridor and Woburn, Aspley Heath, Aspley Guise and Husborne Crawley conservation areas. There is also a small area of common land south of Great Brickhill and the area is crossed by numerous PRoW including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths.
There are significant areas of woodland south and east of Brickhill and east of Woburn Abbey which includes areas of ancient woodland.

The area south of Aspley Heath includes extensive areas of heathland and woodland and includes Woburn Golf Course. Stockgrove Country Park also features within the area.

Sensitive visual receptors include residents on the southern edge of Milton Keynes, particularly the Lakes Estate area; residents in the rural villages and individual houses; and also users of PRoW and Stockgrove Country Park.

9.1.6 Nature conservation

Corridor C3 is broadly similar to C2 for much of the area north east of the M40. There are high numbers of designated sites, primarily ancient woodland between the A40 and M40, and west of Kennington.

Section C3-1

The key sensitive features within the corridor are Cothill Fen SAC, 3 SSSI, 27 AWs, and a cluster of veteran trees associated with Radley College grounds. As with section A-1, only a very small section of Cothill Fen SAC and its constituent SSSI intersect the corridor, immediately west of Abingdon Airfield. Two small SSSIs are situated on the west and southern edge of the corridor, one within Abingdon Airfield and the second to the airfield’s south west corner. The main constraint within the section is AW associated with Bagley Wood on the northern edge of the corridor near Kennington.

With respect to Tier III sites, 1 LNR, 14 LWS and 3 Proposed LWS lie within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise Cothill Fen SAC and Oxford Meadows SAC, 12 SSSI and 1 NNR. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 45 AW, 1 LNR, 29 LWS and 9 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section C3-2

The key sensitive features within the corridor are 7 SSSI and 31 AW. A large area wooded area within the centre of the section is designated as both SSSI and AW, associated with Holton Wood; Waterperry Wood; Hell Coppice and woodland to its north. Whitecross Green Wood and Rushbeds Wood lie further to the north and north east respectively. Areas of AW lie either side of the M40. When considered together, these designations make the area between the M40 and the A40 very heavily constrained.

With respect to Tier III sites, Otmoor RSPB reserve; 29 LWS and 1 Proposed LWS lie within the section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 14 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 46 AW, Otmoor RSPB reserve, 45 LWS and 2 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.
Section C3-3

The key sensitive features within the corridor are 6 SSSI and 65 AW. The SSSIs are widely distributed around Buckingham, to its north, south west and south east. AW is scattered more widely within the section but two distinct areas are present: one between Buckingham and Bicester, and a section between Buckingham and Milton Keynes. Whilst the overall area of AW is not large, the distribution of the woodland within latter two areas constrains route alignment options.

With respect to Tier III sites, 3 LNRs, 57 LWS and 2 Proposed LWS lie within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 12 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 112 AW, 3 LNR, 79 LWS and 3 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section C3-4

The key sensitive features within the corridor are 1 SSSI and 15 AWs, all located east of the A5 and associated with New Wavendon Heath, Black Wood and Buttermilk Wood. Although relatively small in area, their distribution and the presence of the A5, a railway line and Milton Keynes to its north makes the section quite constrained.

With respect to Tier III sites, 1 LNR and 13 LWS lie within the section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 4 SSSI, 1 NNR. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 23 AW, 1 LNR and 41 LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

9.1.7 Geology and soils

Section C3-1

The bedrock geology of Section C3-1 broadly comprises a geological succession of sandstones, mudstones and some limestone of decreasing age, gently dipping to the south-east, from the oldest Upper Jurassic Ancholme Group and Corallian limestones to the Lower Cretaceous Gault Formation. Superficial deposits are absent from large parts of Section C3-1 but sand and gravels and alluvium are common where they do occur, with Diamicton head deposits also common east of the River Thames.

The sites of geological importance present within Section C3-1 are summarised below:

- Cothill Fen: this is a mixed biological and geological SSSI, which is in a favourable condition, the tip of which slightly extends into the southwest of Section C3-1. The SSSI supports nationally rare calcareous fen and moss-rich mire communities together with associated wetland habitats; palaeovegetation can be interpreted from peat samples. Cothill Fen is also designated as a SAC.
- Dry Sandford Pit: this mixed biological and geological SSSI is situated in the southwest of section C3-1 and is in a favourable condition. A sequence of limestone...
rocks, formed during the Jurassic period in shallow coastal waters and containing fossil ammonites, is exposed at this site. The site is also designated as a LGS, the area of which is greater than the SSSI footprint.

- Sugworth: a geological SSSI in favourable condition sited adjacent to the A34 in the west of Section C3-1. The site is designated for its rare inland interglacial sediments containing various fossil remains.

Two MSGAs are present in Section C3-1: one designated for soft sand in the southwest of the section and another in the centre designated for sharp sand and gravel; the latter covers two-thirds of the width of the corridor.

The EA website identifies Radley PFA Lagoons, an authorised landfill site that extends into Section C3-1, southeast of Radley.

The EA website also lists a number of relatively small historical landfills (the largest has a total area of approximately 5.7 ha), mainly in southwestern and central parts of Section C3-1. A detailed review of potentially contaminative land uses is not possible at this stage, but notable current and historical land uses include Abingdon Airfield/Dalton Barracks (a semi-active historical RAF site) and Oxford sewage treatment works.

Groundsure COMAH data indicate that a site located just a few metres within the 250m buffer zone of the corridor was historically listed under the Notification of Installations Handling Hazardous Substances Regulations 1982 (NIHHS hereafter), registered to Johnson and Company.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA.

There are no active, dormant or historic mineral extraction sites recorded in the area based on BritPits data provided by the BGS.

**Section C3-2**

The bedrock geology of Section C3-2 again comprises a succession of sandstones, mudstones and some limestone of decreasing age, gently dipping to the south-east, from the Great Oolite Formation in the north, with Upper Jurassic Ancholme Group present across much of the northern section, and Corallian limestones to the south and east. There are inliers of Great Oolite limestone in the north, and some outliers of Portland Group and Lower Cretaceous Wealden around Muswell Hill.

Alluvium and river terrace deposits are mapped near to watercourses in Section C3-2 but superficial deposits are otherwise largely absent.

Muswell Hill is a geological SSSI in favourable condition, in the north of the section. The site has considerable potential for research in Jurassic/Cretaceous dating and palaeogeography.

Buckinghamshire proposed sand and gravel MSGA is located within the east of Section C3-2, spanning over half the corridor width.

The EA website identifies an authorised landfill, Wheatley Railway Cutting, that extends into the southeast of Section C3-2. The EA website also lists 4 small historical landfills, which are located within Section C3-2. Other potentially contaminative current and historical land uses
include RAF Oakley, Arncott and Graven Hill Ordnance Depots, Piddington Depot, St George’s Barracks and sewage works. Otmoor Range also extends slightly into the west of the section.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA.

Section C3-3

The bedrock geology comprises mainly sandstone, limestone and argillaceous rocks of the Middle Jurassic Great Oolite Formation in the north-west, and mudstone, siltstone and sandstone of the Upper Jurassic Ancholme Group in the south-east and east of the section.

Glacial till is located across the majority of Section C3-3, with pockets of glacial sands and gravels and a band of alluvium around the River Great Ouse and the Padbury Brook; they are absent in the vicinity of and to the east of Bicester.

The following SSSIs with geological interest are located within section C3-3:

- Ardley Cutting and Quarry: a biological and geological SSSI in unfavourable recovering condition, northwest of Bicester. The geological interest lies in the exposures of Jurassic rocks, but the variations in soils also influence habitat variations at the site.
- Stratton Audley Quarries: a geological SSSI destroyed due to infilling with waste material and water. There are no practical means of restoring access to the interest feature and so the site must be considered destroyed.

Buckinghamshire proposed MSGA for sand and gravel is present within Section C3-3, spanning the width of the corridor in several places. Milton Keynes sand and gravel MSGA also extends into the north-east of the section and the tip of the Oxfordshire ‘crushed rock’ MSGA extends into the south-western area of the section.

The historical Finmere Quarry is located in the north of this section, and is recorded as a number of records having mined glacio-fluvial deposits of sand and gravel.

The EA website identifies several authorised landfills that are located within Section C3-3:

- Glebe Farm in the west of the section
- Finmere Quarry Landfill in the northwest
- Finmere Railway Cutting adjacent to Finmere Quarry Landfill
- Buffers Holt northwest of Buckingham
- Foxcote Pumping Station in the north.

The EA website also lists several small historical landfills that are located within Section C3-3, mainly around Buckingham. Calvert historical landfill is also located approximately 130m east of the corridor boundary. Other potentially contaminative current/historical land uses include RAF Bicester, RAF Finmere, RAF Little Horwood and Thornborough Grounds Airstrip (not shown on Groundsure mapping).
No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA. There are no COMAH sites recorded in the area.

**Section C3-4**

Bedrock geology in Section C3-4 comprises, mudstone, siltstone and sandstone of the Anchoile Group in the west and north of the section, and sandstone and mudstone of the Lower Cretaceous Lower Greensand Formation in the east to southeast.

Glacial till dominates the superficial geology in the west of Section C3-4, with glaciofluvial deposits also common. Alluvium and river terrace deposits surround the River Ouzel and Grand Union Canal. East of these watercourses, head deposits of clay, silt sand and gravel are common, as are glacial till, glaciofluvial deposits and chalky boulder clay in the north.

No sites of geological importance are located within Section C3-4.

Buckinghamshire proposed sand and gravel MSGA is present in the west of the section, adjoining a Milton Keynes sand and gravel MSGA to the north; these collectively span the width of the corridor. A Bedfordshire MSGA for Woburn Sands is present in the east of the section and a Bedfordshire MSGA for river valley/glacial sand and gravel extends approximately 10m into the section within the north.

Bletchley Rail Depot is located to the northwest of the section and this is associated with transport of mineral resources.

The EA website identifies 1 authorised landfill that is located in Section C3-4 in the northwest: Bletchley Landfill.

The EA website also lists a number of historical landfills that are present in Section C3-4. These are distributed across the section, with the largest surrounding the authorised Bletchley Landfill. Other potentially contaminative current and historical land uses include brick works and industrial estates.

Two sites have formerly been determined as contaminated land under Part IIA of the Environmental Protection Act 1990 in Bletchley. The first is located at Buckingham House in Bletchley; the contamination was caused by a heating oil leak from underground pipework but was remediated. The second is listed in George Street, with the contamination caused by diesel leaking from a disused underground tank; the site has now been remediated.

### 9.1.8 Road drainage and the water environment

**Section C3-1**

**Flood Risk**

**Fluvial**

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s (EA) ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the rivers in the study area, detailed in Table 9-1. There are two rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):
- River Thames - flows south of Oxford and meanders south-east of Abingdon where it then flows in an easterly direction towards the A4074

- River Thame (a tributary of the River Thames) – flows south-west of the Wheatley Interchange and joins the River Thames at Dorchester-On-Thames.

Flood Zones 2 and 3 associated with the River Thames and River Thame are extensive within this section.

**Table 9-1 Quantitative Analysis of Rivers and Fluvial Flood Risk**

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>50.6</td>
<td>136.6</td>
<td>7.6</td>
<td>10.5</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 3% increase in the area identified as Flood Zone 3. Areas in south-east Abingdon are likely to be at greater risk of fluvial flooding.

**Surface Water**

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment identifies that 2.1% of the section is within an area of high surface water flood risk (3.3% (1 in 30) AEP) and 4.0% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area has a low to very low risk of surface water flooding. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

**Groundwater**

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASTGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 29% of the study area is within an area of medium to high risk (see Table 9-2).

**Table 9-2 Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>12.6</td>
<td>• South and east of Abingdon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South-east of Oxford</td>
</tr>
<tr>
<td>Medium</td>
<td>15.9</td>
<td>• Central Abingdon</td>
</tr>
</tbody>
</table>
Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 9-3.

**Table 9-3 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Flows south of Oxford and meanders south-east of Abingdon, following the route of the River Thames</td>
</tr>
<tr>
<td>2 Flows west of the town Thame, it then flows past the M40 in a south-westerly direction towards Warborough</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of previous recorded flooding events from the sea, river and groundwater. There are records of flooding outside published Flood Zones, identifying additional areas at risk, particularly south-east of Oxford.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**

Table 9-4 shows the WFD operational catchments and WFD water body catchments which lie within Section C3-1.

**Table 9-4: WFD operational and WFD water body catchments within Section C3-1**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames</td>
<td>Gloucestershire and the Vale</td>
<td>Ock</td>
<td>Northfield Brook (Source to Thames) at Sandford</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Thames (Evenlode to Thame)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td>River Basin District</td>
<td>WFD Management Catchment</td>
<td>WFD Operational Catchment</td>
<td>WFD Water Body Catchment</td>
<td>WFD Water Body Status (Cycle 2, 2016)</td>
<td>Large WFD Water Body Crossing</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------</td>
<td>---------------------------</td>
<td>--------------------------</td>
<td>----------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td>Thame (Scotsgrove Brook to Thames)</td>
<td>Poor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ock and tributaries (Land Brook confluence to Thames)</td>
<td>Poor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sandford Brook (source to Ock)</td>
<td>Good</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frilford and Marcham Brook</td>
<td>Moderate</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

**Groundwater**

**Section C3-1**

- Crosses 4 Secondary A bedrock aquifers
- Crosses 2 Secondary A superficial deposit aquifers
- Contains 2 licensed groundwater abstractions
- Contains 4 potential GWDTE
- Contains approximately 10 springs as marked on the OS 1:25,000 map

**Section C3-2**

**Flood Risk**

**Fluvial**

The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area. There are a number of Main Rivers and Ordinary Watercourses within the study area, detailed in Table 9-5. There are rivers within this section that have significant areas of Flood Zone 3b (functional floodplain), including:

- River Thame (a tributary of the River Thames) – flows south-west of the Wheatley Interchange and joins the River Thames at Dorchester-On-Thames
- River Ray (a tributary of the River Thames) – flows in a south-westerly direction from the A41 towards the south of M40
Flood Zone 2 and 3 associated with the River Ray (including the Otmoor) is extensive in comparison with the River Thame, within this section.

Table 9-5 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>141.3</td>
<td>218.7</td>
<td>16.0</td>
<td>18.9</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 3% increase in the area identified as Flood Zone 3. The published Flood Zones indicate that areas in south-east Bicester are likely to be within a greater risk from fluvial flooding over the lifetime of the development.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 3.1% of the study area is designated to be in an area of high surface water flood risk (3.6% (1 in 30) AEP) and 6.8% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s AStGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 22% of the study area is within an area of medium to high risk (see Table 9-6).

Table 9-6 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>9.3</td>
<td>• East of Thame</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South of Bicester (following the River Ray)</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>10.7</td>
<td>• South of Bicester (following the River Ray)</td>
</tr>
</tbody>
</table>

Reservoir Failure
EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 9-7.

**Table 9-7 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows west from Wilstone Reservoir past north of Aylesbury heading south-west towards Thame. It the flows past the M40 and heads in a south-westerly direction towards Warborough.</td>
</tr>
<tr>
<td>2</td>
<td>Flows from North Dorton along the A41 down to Lower Arncott</td>
</tr>
</tbody>
</table>

**Historic Flooding**

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA data set 2.6% of the study area has been recorded to have flooded historically. There are no records of flooding to have occurred outside of the existing Flood Zone 2 and 3.

**Other Flood Sources**

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**

Table 9-8 shows the WFD operational catchments and WFD water body catchments which lie within Section C3-2.

**Table 9-8: WFD operational and WFD water body catchments within Section C3-2**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Oxon Ray</td>
<td>Summerstown Ditch and Launton and Cutters Brook</td>
<td>Bad</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Oxon Ray (upstream A41 to Cherwell) including Otmoor</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Langford Brook (Bicester to Ray inc Gagle Brook)</td>
<td>Poor</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Groundwater

**Section C3-2**

- Crosses a limestone Principal bedrock aquifer (underlies less than 10% of the section)
- Crosses 5 Secondary A bedrock aquifers
- Crosses 2 Secondary A superficial deposit aquifers
- Contains 1 licensed groundwater abstraction
- Contains 7 potential GWDTE
- Contains approximately 20 springs as marked on the OS 1:25,000 map

**Section C3-3**

**Flood Risk**

**Fluvial**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td>Thame (Scotsgrove Brook to Thames)</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Latchford Brook at Tetsworth</td>
<td>Poor</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peppershill and Shabbington Brooks</td>
<td>Moderate</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worminghall Brook and tributaries</td>
<td>Poor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dorton, Chearsley and Waddesdon Brooks</td>
<td>Poor</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Holton Brook and tributaries</td>
<td>Moderate</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the rivers in the study area, detailed in Table 9-9. There are three rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):

- **River Ray** (a tributary of the River Thames) – flows in a south-westerly direction from the A41 towards the south of M40
- **Padbury Brook** (a tributary of the River Great Ouse) – flows in south-easterly direction from the A421, near M40 J10. It then meanders and heads north towards Buckingham before joining the River Great Ouse
- **River Great Ouse** – flows north-east from Brackley, meanders through Buckingham then flows north-east and connects on Stony Stratford.

The Flood Zone 2 and 3 associated with the River Great Ouse is substantially smaller in comparison to the floodplain area associated with the River Ray.

**Table 9-9 Quantitative Analysis of Rivers and Fluvial Flood Risk**

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>95.8</td>
<td>466.5</td>
<td>5.9</td>
<td>7.2</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be approximately 1% increase in the area identified as Flood Zone 3. The published Flood Zones indicate that small areas in Bicester and Buckingham are likely to be within an area of greater fluvial flood risk over the lifetime of the development.

**Surface Water**

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 3.7% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 6.2% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

**Groundwater**

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASIGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available...
data approximately 12% of the study area is within an area of medium to high risk (see Table 9-10).

**Table 9-10 Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>1.5</td>
<td>• South-east of Bicester (following the River Ray)</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>11.0</td>
<td>• South-east of Bicester (following the River Ray)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South-west of Buckingham</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• West of Bletchley</td>
</tr>
</tbody>
</table>

**Reservoir Failure**

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 9-11.

**Table 9-11 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Flows from North Dorton along the A41 down to Lower Arncott</td>
</tr>
<tr>
<td>2 Flows from pond in Claydon Park heading in westerly direction towards Stoke Lyne</td>
</tr>
<tr>
<td>3 Flows north-east from Buckingham towards north-west of Milton Keynes, following the River Great Ouse.</td>
</tr>
<tr>
<td>4 Flows from Milton Keynes center to the outskirts of Milton Keynes where it continues to follow the River Great Ouse.</td>
</tr>
</tbody>
</table>

**Historic Flooding**

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA’s dataset, 2.3% of the section has been recorded to have flooded historically. There are records of flooding to have occurred outside of the existing Flood Zone 2 and 3 (i.e. south-east of Buckingham) identifying additional areas at risk of flooding.

**Other Flood Sources**

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**
Table 9-12 shows the WFD operational catchments and WFD water body catchments which lie within Section C3-3.

**Table 9-12: WFD operational and WFD water body catchments within Section C3-3**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Great Ouse Upper</td>
<td>Horwood Tributary</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook (DS Granborough)</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Padbury Brook (The Twins)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Padbury Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Beachampton Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leckhampstead Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Stowe Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouse (Buckingham to Cosgrove)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weald Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Claydon Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouse (Brackley to Buckingham)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td>Ouzel and Milton Keynes</td>
<td></td>
<td></td>
<td>Ouzel US Caldecote Mill</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Newton Longville Brook</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Loughton Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Thames</td>
<td>Cherwell and Ray</td>
<td>Oxon Ray</td>
<td>Gubbinsnole and Broadmoor ditch to Ray (Oxon)</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Summerstown Ditch and Launton and Cutters Brook</td>
<td>Bad</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Oxon Ray (upstream A41 to Cherwell) including Otmoor</td>
<td>Bad</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Langford Brook (Bicester to Ray inc Gagle Brook)</td>
<td>Poor</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ray and tributaries NorthEast of Grendon Underwood</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tetchwick Brook, Source to Ray and trib</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Town Brook at Bicester</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ludgershall Brook and Muswellhill Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Groundwater

Section C3-3

- Crosses a limestone Principal bedrock aquifer (underlies less than 25% of the section)
- Crosses 2 Secondary A bedrock aquifers
- Crosses 3 Secondary A superficial deposit aquifers
- Contains 6 licensed groundwater abstractions
- Contains 4 potential GWDTE
- Contains approximately 41 springs as marked on the OS 1:25,000 map

Section C3-4

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the rivers in the study area, detailed in Table 9-13. There is one river within this section that has significant areas of Flood Zone 3b (functional floodplain):

- River Ouzel (a tributary of the River Great Ouse) – flows from south-west Leighton Buzzard through Milton Keynes where it joins the River Great Ouse.

The Flood Zone 2 and 3 associated with the River Ouzel is relatively small within this section.

Table 9-13 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.8</td>
<td>157.9</td>
<td>3.2</td>
<td>3.8</td>
</tr>
</tbody>
</table>

The detailed hydraulic model for Central Bedfordshire Council has been used to assess the potential future extent of Flood Zone 3 as a result of climate change (upper end, 65% climate change):
change allowance has been assessed). In the absence of hydraulic modelling for all other areas the extent of Flood Zone 2 has been adopted to assess future Flood Zone 3 extent. The assessment identifies that there will be approximately 1% increase in the area identified as Flood Zone 3. The published Flood Zones indicate that small areas in the outskirts of Bletchley are likely to be within an area at greater risk of fluvial flooding.

**Surface Water**

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 2.3% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 4.2% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

**Groundwater**

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASTGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 22% of the study area is within an area of medium to high risk (see Table 9-14).

**Table 9-14 Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>5.8</td>
<td>• North-east of Leighton Buzzard (i.e. Stoke Hammond)</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>16.3</td>
<td>• South-east of Bletchley</td>
</tr>
</tbody>
</table>

**Reservoir Failure**

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 9-15.

**Table 9-15 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows north through Milton Keynes Center where it continues to follow the River Great Ouse</td>
</tr>
<tr>
<td>2</td>
<td>Flows north-east from Woburn towards the M1 where it continues to flow parallel with the</td>
</tr>
</tbody>
</table>
Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA’s dataset, 2.6% of the section has been recorded to have flooded historically. There are records of flooding outside of the existing Flood Zone 2 and 3 associated with the River Ouzel, identifying additional areas on the outskirts of Bletchley towards Leighton Buzzard to be at risk.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

Geomorphology, WFD and Water Quality

Table 9-16 shows the WFD operational catchments and WFD water body catchments which lie within Section C3-4.

Table 9-16: WFD operational and WFD water body catchments within Section C3-4

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>WFD Water Body Status (Cycle 2, 2016)</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Ouse Upper and Bedford</td>
<td>Ivel</td>
<td>Flit tributary</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Running Waters-Steppingley</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Great Ouse Upper</td>
<td>Claydon Brook</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td>Ouzel and Milton Keynes</td>
<td></td>
<td></td>
<td>Broughton Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ouzel US Caldecote Mill</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Newton Longville Brook</td>
<td>Poor</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Loughton Brook</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Thames</td>
<td>Thames and Chilterns South</td>
<td>Thame</td>
<td>Hardwick Brook (Source to Thame)</td>
<td>Moderate</td>
<td>No</td>
</tr>
</tbody>
</table>

C3-4 also traverses 1 artificial water body, the Grand Union Canal, Milton Keynes trough pound.

Groundwater
Section C3-4

- Crosses a sandstone Principal bedrock aquifer (underlies 25 to 50% of the section)
- Crosses 3 Secondary A superficial deposit aquifers
- Contains 1 SPZ1 associated with licenced potable abstractions
- Contains 1 SPZ2 associated with licenced potable abstractions
- Contains 1 SPZ3 associated with licenced potable abstractions
- Contains 6 licensed groundwater abstractions
- Contains 2 potential GWDTE
- Contains approximately 5 springs as marked on the OS 1:25,000 map

9.2 Environmental assessment

9.2.1 Air quality

9.2.1.1 Key findings

Section C3-1

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section C3-1 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes routes to the north of Abingdon and Oxford.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The changes in traffic flow look to provide reductions in traffic within part of the Abingdon AQMAs.

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential Oxford CAZ, which may be in place by then.

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (7.6-15.8 μg/m³), NO₂ (5.9-11.7 μg/m³) and PM₁₀ (11.8-15.2 μg/m³).
Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Oxford and Abingdon), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Section C3-2

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section C3-2 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes J8a of the M40.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that some routes in the centre of Bicester could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.3-11.4 μg/m³), NO₂ (5.0-8.6 μg/m³) and PM₁₀ (11.1-15.2 μg/m³).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Oxford, Bicester and Aylesbury), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.
However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

**Section C3-3**

**Basic Screening Exercise**

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section C3-3 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes in Buckingham and north of Bicester.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes through Bicester could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

**Predicted Information**

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.0-13.2 μg/m³), NO2 (4.7-9.9 μg/m³) and PM10 (11.0-14.3 μg/m³).

**Section Impacts**

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Bicester, Caversfield and Buckingham), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.
Section C3-4

Basic Screening Exercise

Based on consideration of provisional traffic data, an assessment of the changes in AADT traffic within corridor section C3-4 indicates road links where traffic flow would meet the DMRB screening criteria defined in section 2.4.1. Those road links with an increase (which meet the DMRB criteria) are likely to result in an increase in air pollutant concentrations at sensitive receptors within 200m (of the road link). For this corridor section, this includes the A4146 and A5.

Those road links with a decrease (which meet the DMRB criteria), are likely to result in a decrease in air pollutant concentrations at sensitive receptors within 200m (of the road link). The screening calculations indicate that main routes to the south of Milton Keynes could see a reduction in traffic flow (and therefore emissions).

It should be noted that the traffic data used for this assessment is provisional only and will be refined in the next stage of this study (Stage 1B). The above analysis should be viewed as indicative only.

Predicted Information

- The current PCM predictions indicate that concentrations in 2025 would not be in exceedance. This information does not however take into account the potential CAZ (and the impacts this may have on car journey behaviour).

- The projected Defra background concentrations for 2025 do not identify exceedances in NOx (6.9-14.5 μg/m$^3$), NO$_2$ (5.4-10.8 μg/m$^3$) and PM$_{10}$ (11.3-16.4 μg/m$^3$).

Section Impacts

It is assumed that traffic would be rerouted from the more densely populated areas (e.g. Milton Keynes), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations). This has the potential to improve air quality concentrations at sensitive receptors where traffic flow is reduced, and on this basis, the corridor section has the potential to be beneficial.

However, the development of new road alignment would have the potential to result in adverse changes in pollutant concentrations at sensitive receptors in proximity to the road alignment. At this stage of the project, and without route options, the extent and significance of these potential impacts cannot be assessed.

It is assumed that good construction site practice controls would be adopted to reduce potential effects from vehicle and plant emissions and dust generation during construction.

Overall

The available information highlights the AQMAs within Corridor C3 (Abingdon, Bicester and Oxford), and the ongoing exceedances of the relevant AQOs. The corridor includes parts of large urban areas including Abingdon, Oxford, Bicester, Buckingham and Milton Keynes, as well as a number of designated sites.
Corridor C3 has approximately 77,000 air quality sensitive receptors that could be impacted (both adversely and beneficially) by route options through this corridor. The monitoring exceedances within the AQMAs highlights the opportunity to reduce congestion in these areas and potentially improve air quality within the AQMAs.
9.2.1.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3-1</td>
<td>Avoidance of AQMAs (and journey re-routing through them).</td>
</tr>
<tr>
<td></td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
<tr>
<td>C3-2</td>
<td>Avoidance of AQMAs (and journey re-routing through them).</td>
</tr>
<tr>
<td></td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
<tr>
<td>C3-3</td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
<tr>
<td>C3-4</td>
<td>Best practice dust and site management mitigation measures during construction.</td>
</tr>
</tbody>
</table>

9.2.2 Noise and vibration

9.2.2.1 Key findings

The effect of traffic noise on sensitive receptors is very sensitive to exact alignment, which is not known at this early stage of scheme development. The qualitative key findings for this study area are based on indicative predictions of how sensitive receptors could be impacted based on whether the ultimate route alignment is ‘on-line’ (following an existing main road) or ‘off-line’ (creating a new main road).

If the route alignment was to be ‘on-line’ for the relevant sections of the A34, M40, A4421, A421 and A4146 within the study area, then there is potential for sensitive receptors nearby to these roads (e.g. Abingdon, Shippon, Stratton Audley, Fringford, Finmere, Tingewick, Buckingham, Thornborough and Stoke Hammond), including a number of NIAs, to experience adverse noise effects as traffic possibly moves closer, and/or traffic flows and speeds increase. Significant adverse effects are possible.

Should the route alignment move ‘off-line’ from the A34, M40, A4421, A421 and A4146, then sensitive receptors near these roads would have the potential to experience beneficial effects. The beneficial effects would be dependent on whether vehicles would be diverted away from the A34, M40, A4421, A421 and A4146, thus reducing the amount of traffic on those roads, with the ‘off-line’ alignment. Settlements set back from the A34 (i.e. Sunningwell and Bayworth), M40 (i.e. Oakley and Boarstall), A4421 (i.e. Fringford and Stratton Audley), A421 (i.e. Tingewick, Gawcott, Thornborough, Nash, Great Horwood, and Whaddon), and the A4146 (i.e. Little Brickhill and Great Brickhill) could be adversely affected should an ‘off-line’ route alignment be introduced near to such settlements.

The sensitive receptors located in the large rural areas where the route either would, or has the potential to be, ‘off-line’ may experience adverse effects due to the introduction of a new noise source. These include Little London, Radley, Sandford-on-Thames, Blackbird Leys, Garsington, the west side of Wheatley, Waterperry, Worminghall Horton-cum-Studley, Oakley, Arnscott (including nearby army barracks), Ambrosden, Blackthorn, Marsh Gibbon, Launton, Twyford, Newton Longville, Little Horwood, Mursley, Water Eaton, Stoke Hammond, Great Brickhill, Woburn Sands, Aspley Guise, Cross End, Aspley Heath, and Bow Brickhill. This also includes numerous individual receptors throughout the rural areas. The ultimate route alignment is key in determining the potential effect for such receptors.
For the larger settlements of Abingdon, the southeast of Oxford, Bicester, Buckingham, Bletchley and the southeast of Milton Keynes, the sensitive receptors on the boundaries of these settlements could be adversely affected through the introduction of a new route. The effects would depend on the proximity of the route alignment to the settlement boundaries. The same sensitive receptors could potentially be beneficially affected if the route alignment bypasses the larger settlements. Similar effects could occur for the NIAs in the settlements.

The indicative traffic data shows potential noise benefits between Abingdon and Thame (A415, B4105 and the A329) resulting from possible reductions in traffic on these roads. Furthermore, the A4012 to the east of Leighton Buzzard, roads within Oxford (including A4142 and B4495), within Milton Keynes (including A4146, A421 and B4034), within Bicester (A4095, B4100, and A41), and an approximate 5 km section of the A41 to the northwest of Aylesbury show potential noise benefits. Receptors located nearby to these roads, including a number of NIAs, could therefore potentially experience noise reductions from the corridor option.

The indicative traffic data shows potential adverse noise effects on the A413 north of Buckingham, A422 (Thornton to Old Stratford), A4146 (Leighton Buzzard to Bletchley), as well as on a number of minor roads on the road network. Receptors located nearby to these roads could experience noise increases from this corridor option.

The construction of a new or improved highway requires the use of noise and vibration emitting plant. Sensitive receptors that will be situated close to the ultimate route alignment would have the potential to be exposed to adverse noise and vibration effects from such works. This would particularly apply to those receptors in proximity to potential ‘off-line’ carriageway alignments within rural areas that could be associated with Corridor C3 (i.e. Abingdon and Oxford, Oxford and Bicester, Bicester and Buckingham, and Buckingham and Milton Keynes), where existing ambient noise and vibration levels are relatively low.

Sensitive receptors located adjacent to existing ‘on-line’ road sections where road widening would be likely as a result of the scheme (e.g. sections of the A34, M40, A4421, A421 and A4146), would already be exposed to high ambient noise levels. Nevertheless, potential adverse effects are still possible for nearby receptors.

Given the transient nature of the majority of the construction activities, any adverse noise and vibration effects experienced by sensitive receptors would be limited in duration. This reduces the potential for significant effects to arise. Nevertheless, any effects would be minimised through the use of specific mitigation measures and controlled via the relevant Local Authority’s Environmental Health departments.

### 9.2.2.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3-1</td>
<td>The typical mitigation measures that would be considered are as follows:</td>
</tr>
<tr>
<td></td>
<td>• Thin Surfacing (Low Noise Road Surfacing) – In accordance with HD 213/11, low noise surfacing provides a benefit, relative to traditional Hot Rolled Asphalt of 3.5 dB(A) at speeds of 75kph and above. Such a measure can be considered a holistic mitigation measure, as it reduces noise at source for the entire scheme.</td>
</tr>
<tr>
<td>C3-2</td>
<td>• Noise Bunds and Noise Barriers – Earth bunds or noise barriers of sufficient</td>
</tr>
</tbody>
</table>
### 9.2.3 People and communities

#### 9.2.3.1 Key findings

For all sections there is potential for a new route to cause significant effects on sensitive receptors. Potential impacts include the loss of land and property for some residents, landowners and businesses and loss of amenity to local recreational assets (including PRoW) and communities from the introduction of a new expressway infrastructure into areas that are currently relatively rural. Such impacts could give rise to effects on physical and mental health, access, land use and viability of businesses.

**Section C3-1**

There is potential loss of amenity and adverse effects on wellbeing for residents in communities close to where a new highway infrastructure may be introduced, notably the Woodland, Pebble Hill and Bigwood park home estates and properties along Sugworth Lane (north of Radley).

A route in this area could potentially result in land-take from Radley College’s grounds and golf course.

Some loss of best and most versatile agricultural land is considered likely in this section.

**Section C3-2**

Whilst there is potential for loss of best and most versatile land within the southern part of this section, there is scope to avoid most other people and community constraints.

**Section C3-3**

There is potential to avoid most constraints within this section if a southerly route alignment is developed.

**Section C3-4**

This section is very constrained in the Woburn Sands area. Development of a route here would likely result in significant adverse effects caused by community severance and loss of amenity for local communities.
Overall

The constrained nature of the Woburn Sands area means that there is likely to be significant community severance from route options within this corridor.

9.2.3.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3-1</td>
<td>Select a route alignment that minimises impacts on nearby communities, whilst maintaining viability of recreational assets. Good route alignment is required to minimise impacts on agricultural viability, for example by maintaining tenable field sizes. Any proposed widening of the A34 or other existing roads should seek to avoid sensitive features such as playing fields and cemeteries.</td>
</tr>
<tr>
<td>C3-2</td>
<td>Good route alignment is required to minimise impacts on agricultural viability, for example by maintaining tenable field sizes.</td>
</tr>
<tr>
<td>C3-3</td>
<td>Avoid playing fields and main communities through route alignment. Potential to mitigate effects through good highway alignment, landscaping and noise abatement.</td>
</tr>
<tr>
<td>C3-4</td>
<td>Seek to avoid community severance. Should this not be achievable, then seek to build in cycle and pedestrian networks between communities severed by the new route, to create improved active travel opportunities between local community destinations. This could contribute to health benefits in the longer term.</td>
</tr>
</tbody>
</table>

9.2.4 Cultural heritage

9.2.4.1 Key findings

Section C3-1

The 3 settlement site scheduled monuments are moderately discrete areas on the fringes of the corridor which could be avoided with careful design; although it should be noted that the presence of this type of asset may be indicative of further associated unknown archaeological remains of potentially High value outside of the scheduled area. The 5 scheduled monuments within Abingdon and the 1 scheduled monument within Garsington are well screened by the current built environment, and are unlikely to be significantly affected.

Within Abingdon, the 278 listed buildings, 1 Grade II Registered Park and Garden, and 3 Conservation Areas are at least partially screened from new development, particularly if any route were to remain online with the current A34. However, there is still the potential for significant adverse effects on the setting of these assets through noise and visual intrusion during construction and operation. The remaining listed buildings are primarily located in groups within smaller villages which provide some screening; however, those on the fringes of the built up area or on higher ground have a higher potential to be more adversely affected by noise and visual intrusion during operation and construction. Those listed buildings within Toot Baldon, Garsington, and Cuddesdon Denton are also located relatively central to the corridor, meaning that they are more likely to be next to any new development and to be adversely affected. There are also a small number of Grade II listed buildings that are located
independently in more rural settings which may be significantly affected by noise and visual intrusion from construction and operation of any offline development.

A cluster of 13 listed buildings (12 Grade II, 1 Grade II*) are located within 350 metres of the current A34 in an area where online development is possible. In particular, the Grade II Manor Preparatory School and Manor Cottage, as well as the Grade II* listed barn associated with the Manor Preparatory School, are within 100 metres of the current A34 and, although they are currently well screened, there is the potential for significant effects to their setting from noise and visual intrusion during construction and operation of any online development.

The Grade I Registered Park and Garden of Nuneham Courtenay extends approximately 450 metres into the Section C3-1 corridor from the south; however, it is situated on low, undulating hills with a steep slope towards its western boundary created by the River Thames. This situation creates important long views west towards Abingdon and north towards Oxford. The Grade II* Registered Park and Garden of Garsington Manor is much smaller in size, but is located more centrally within the corridor. Again, the rural setting and long panoramic views to the south to the Wittenham Clumps on the Sinodun Hills, and beyond these the Berkshire Downs in the far distance, contribute to the value of this asset.

Section C3-2

The moated sites and the town cross scheduled monuments are discrete and well defined assets, some of which are sheltered by the surrounding built environment, and could be avoided through careful design. The Thomley and Boarstall Deserted Medieval Villages are both located within 500 metres of the current M40 and any online development has the potential for an adverse impact on these assets through the removal of archaeological remains. It should be noted that the presence of assets of an occupational nature may be indicative of further associated unknown archaeological remains of potentially high value outside of the scheduled area.

Similarly, the Wretchwick Deserted Medieval Settlement scheduled monument survives as earthworks just south of Langford Village and the current A4421 as two separated areas bisected by a current working farm. However, a much smaller area is included in the scheduling here than in the Alchester Roman site, and the location of the monument is such that only online development of the A4421 would be likely to have the potential for significant adverse effects on this asset. It should be noted that, due to the nature of settlement sites, there is the potential for associated archaeological remains of High value to be found outside of the scheduled areas.

The majority of listed buildings within this section are located within the centre of Bicester (comprising 114 listed buildings) and would not be significantly affected by on or offline development. The other listed buildings within this corridor are also situated a good distance from the current M40 (only 2 Grade II listed buildings are within 250m of the current route) and are either in small village groups or are individual assets within rural settings with varying...
levels of screening. Online development would therefore be unlikely to cause a significant adverse effect on these assets. Offline development would have the potential for a significant adverse effect to the setting of these assets through noise and visual intrusion during construction and operation.

The Grade I Registered Park and Garden of Wotton House only slightly intrudes into the corridor. A large part of the park is well screened by vegetation; however, views to the west of the Park, into the corridor, are unscreened, and the Proposed Development would likely adversely affect the value of the asset during construction and operation.

**Section C3-3**

RAF Bicester scheduled monument comprises eleven distinct scheduling areas; including structures such as bomb stores, air raid shelters, a hanger complex, and pillboxes. It is likely that the any route within the section C3-3 corridor would have to be situated well to the north or south in order to bypass Bicester and would therefore be a suitable distance away from these scheduled areas. It is therefore unlikely that there would be a significant impact on this scheduled monument.

Many of the other scheduled monuments are also in built environments or other locations that would be unsuitable for a route alignment and would therefore not be significantly impacted by the Proposed Development. Those within more rural environments are discrete assets that could generally be avoided through design.

Any online development of the current A421 has the potential for a significant effect on those assets which are located within close proximity to the current highway through the removal of archaeological remains during construction or through noise and visual intrusion on the setting of the asset during construction and operation. These assets comprise:

- Two Roman barrows 200 metres east-northeast of Thornborough Bridge and approximately 60 metres north of the current A421
- the Thornborough Bridge scheduled monument (and Grade I listed building) located less than 30 metres north of the current A421 with direct views of the highway
- St. Rumbold’s Well scheduled monument is located approximately 300 metres from the current A421 but incorporates within the scheduling, an area of cultivation earthworks to the south of the well itself. These earthworks extend beyond the scheduled area and could be adversely affected by online development of the A421 thereby affecting the setting of the scheduled monument itself

The majority of listed buildings within the corridor are located within small villages, often Conservation Areas, with only a small number of structures situated in more isolated rural locations. Varying levels of screening exist from neighbouring properties and vegetation; however, there is the potential for significant adverse effects through noise and visual intrusion during construction and operation on the setting of these assets.

Online development is unlikely to significantly impact upon the majority of the listed buildings apart from:
the Grade I listed Church of St Mary and the Grade II* listed Barn in Launton, which are both located on the northern edge of the village and west of Bicester, 250 metres from the current A4421

- 20 Grade II listed buildings and 1 Conservation Area associated with the RAF Bicester and bordering the A4421 just north of Bicester

- 11 further Grade II listed buildings within 100 metres of the current A4421

- 2 Grade II listed buildings within 100 metres of the current A421

A south-eastern avenue of Stowe Grade I Registered Park and Garden extends into the corridor and into Buckingham. Although tree lined, the avenue is surrounded by open agricultural land. The distance from the current A421 route and its location on the opposite side of Buckingham means that this asset restricts route development along the north of Buckingham, but is unlikely to be significantly affected by online development or offline development to the south of the current A421.

The Grade I Registered Park and Garden of Wotton House extends from within the Section C3-2 corridor and into Section C3-3 study area. A large part of the park is well screened by vegetation. However, the park is purposely aligned with views of the forested areas of Tittershall and Grove Woods to the north, which lies within the Section C3-3 corridor, and it is situated to command important views to the west, both of which have a potential for significant effects on the setting of the asset from noise and visual intrusion during construction and operation.

**Section C3-4**

The Roman town of Magiovinium scheduled monument flanks the Roman Road of Watling street and is roughly bordered by the river Ouzel, the current A4146 and the current A5. The nature of this site suggests the potential for further unknown archaeological remains of High value associated with this asset that lie outside of the scheduling boundary. Proposed development online or offline within the vicinity of the A4146, and to the current roundabout would have a potential significant effect on this asset through removal of archaeological deposits during construction.

The other scheduled monuments within the Section C3-4 corridor are located in positions that are unlikely to be situated within close proximity to the Proposed Development. There is therefore unlikely to be a significant effect on these assets; however, the Danesborough Camp hillfort is specifically located on a prominent hill and the setting of this asset may be significantly affected through noise and visual intrusion during construction and operation.

Sixty-four listed buildings within Section C3-4 are within the built up areas of Bletchley and Milton Keynes and are unlikely to be situated within close proximity to the Proposed Development. It is therefore unlikely that there would be a significant effect on the setting of these assets. The rest of the listed buildings within the corridor are located within small town and village Conservation Areas with a small number of assets situated independently in more rural settings. These assets have varying levels of screening from vegetation and neighbouring properties; however, there is the potential for a significant adverse effect on the setting of these assets through noise and visual intrusion during construction and operation. The spread of the assets is such that mitigation through design should be possible; however,
it may be more difficult within the northern section of the corridor where 4 Conservation Areas are situated linearly from east to west.

The Grade I Registered Park and Garden of Woburn Abbey extends a maximum of 750 metres into the C3-4 corridor. The park is bounded on the north by Turnpike Road, and is well screened in this area by dense vegetation. However, without further assessment of the potential noise and visibility of the Proposed Development it is not possible to completely rule out the potential for a significant adverse effect on the Registered Park and Garden and the associated designated asset through noise and visual intrusion during construction and operation.

**Overall**

Overall, the spread and nature of the assets within Corridor C3 suggests the potential for a significant adverse effect for which mitigation may be possible.

### 9.2.4.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3-1</td>
<td>The overall spread and density of the cultural heritage assets in Section C3-1 should allow for a route design that could mitigate the potential significant adverse effects. Of specific note for Section C3-1 is the Nuneham Courtenay Grade I Registered Park which is located on low, undulating hills with a steep slope towards the western boundary created by the River Thames. This situation creates important long views west towards Abingdon and north towards Oxford which would require particular attention in order to mitigate appropriately through design.</td>
</tr>
<tr>
<td>C3-2</td>
<td>The lighter density of cultural heritage assets within this section would likely allow for the mitigation of any potential significant adverse effect from online or offline development. Of particular note for Section C3-2 is the Grade I Registered Park and Garden of Wotton House, which has noted views west within the section C3-2 corridor. Sensitive design would be required in order to not impact the setting of this High value asset.</td>
</tr>
<tr>
<td>C3-3</td>
<td>The lighter density of cultural heritage assets within this section would likely allow for the mitigation of any potential significant adverse effects. Of particular note for Section C3-3 is that the south-eastern avenue of the Stowe Grade I Registered Park and Garden would limit route development to the north of Buckingham. Also of note for Sections C3-3 is the Grade I Registered Park and Garden of Wotton House, which has noted views north within the section C3-3 corridor. Sensitive design would be required in order to not impact the setting of this High value asset.</td>
</tr>
<tr>
<td>C3-4</td>
<td>Overall, the dispersed nature of the assets within Corridor C3-4 has the potential for appropriate design mitigation. Of particular note for Corridor C3-4 is the Roman town of Magiovinium and Roman fort along the current A4146. Any online development would</td>
</tr>
<tr>
<td>Section</td>
<td>Design, mitigation and enhancement consideration for Stage 1B</td>
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<tr>
<td></td>
<td>be likely to have a significant adverse effect on this asset through the removal of archaeological remains. There is also a density of cultural heritage assets within the north of the corridor comprising the Grade I Registered Park and Garden of Woburn Abbey and 4 Conservation Areas that are situated linearly from east to west restricting the potential for suitable route options in this area.</td>
</tr>
</tbody>
</table>

9.2.5  **Landscape and visual**

9.2.5.1 **Key findings**

**Section C3-1**

If a route option was developed to the east of the corridor where the landscape is more open and less built up there would potentially be adverse landscape and visual impacts on the setting of the North Wessex Downs and Chilterns AONBs due to the relationship of the designated landscape with the adjacent low lying landscapes and the likelihood of extensive views to and from the AONB. Users of PRoW within the AONBs, including the Ridgeway and Icknield Way national trails, would potentially experience long distance views from high ground.

The corridor runs to the north of Abingdon and south and south east of Oxford and includes the villages of Garsington, Denton and Cuddesdon that are located on undulating higher ground to the north west the corridor. Routes developed in this section could result in adverse visual impacts affecting the residents of these areas along with those in scattered rural properties, and users of PRoW including the Thames Path national trail.

To the west, new or improved routes would be set in the context of the existing built up area and A34 corridor. However, where the corridor crosses the railway and River Thames and River Thame floodplains it is likely to require extensive lengths of embankment or viaduct that would be at odds with the low lying landscape and highly visible. Additionally, there could potentially be secondary landscape impacts if borrow pits are needed to create embankments.

There are also potential impacts on Radley golf course and Radley College sports fields and/or the nearby ancient woodland, a balance needs to be struck to find the least damaging route.

**Section C3-2**

The eastern part of this section is particularly sensitive. There would be potential direct impacts on the Brill-Winchendon AAL and registered common land at Brill Common if routes are developed here. There is also potential for indirect impacts on the panoramic views from and the setting of the AAL arising from any route that is located in this area. Additionally, there could be potential impacts on the network of ancient woodlands of Bernwood Forest to the west of the M40.

The central part of the corridor is already impacted upon by the M40. Development of an expressway would create a second piece of major infrastructure in this area; aligning the new
route as closely to the M40 would limit the effects of major infrastructure on the wider landscape.

Wotton House RPG grade I lies abuts the corridor to the east and indirect impacts are possible on the setting of and views from the historic park.

The corridor includes high ground at Arncott Hill. This is an area associated with industrial and commercial development and, as such, sensitive visual receptors are limited. Having regard for the topography and scattered ancient woodlands it would be difficult to find a route through this area.

The area north of Arncott is characterised by the low lying landscape of the River Ray floodplain and routes developed in this area would likely to require an extensive length of embankment or viaduct that would be highly visible. Additionally, there could potentially be secondary landscape impacts if borrow pits are needed to create embankments.

Section C3-3

Any route developed across the low lying floodplain east of Bicester is likely to require an embankment or viaduct that would be at odds with the open landscape and highly visible.

Impacts on RAF Bicester from a route developed in this section could be difficult to mitigate due to the open character of the airfield. Restrictions may also apply to elements associated with the expressway such as the height of gantries; extent and height of lighting, and planting types to avoid conflict with aircraft.

A route that follows and widens the existing A4421 potentially result in the loss of mature established vegetation and adverse landscape and visual impacts on the settlements and residents along the route. Offline improvements would impact on open countryside.

Route options north of the A421 would have a direct impact on regional and local landscape designations (Stowe AAL and the Great Ouse Valley (West), Great Ouse Valley (East) and Whaddon-Nash LLAs). There would also be a direct impact on Stowe RPG grade I as Stowe Avenue would be severed. Stowe is a National Trust property. Routes south of the A421 would have potential impacts on views from and the setting of the designated landscapes and Stowe RPG grade I.

Section C3-4

The corridor crosses the Brickhills AAL which would be affected by routes developed in this section. Route alignments here would pass the through the London Metropolitan green belt and may have an impact on its sense of openness. There is also the potential for direct and indirect impacts on Woburn Abbey RPG grade I including impacts on views and on its setting. There are extensive areas of heathland and woodland south of Aspley Heath which includes Woburn Golf Course that could be difficult to mitigate. Whilst the woodland cover provides potential for screening there are numerous PRoWs in this area including the Greensand Ridge Walk and Milton Keynes Boundary Walk long distance paths.

The corridor passes to the south of the Lakes Estate on the southern edge of Milton Keynes. Whilst this area is already affected by the A4146, there is potential for increase visual impacts from the expressway due to the requirements for signs and gantries and from new junction arrangements.
Between the A5 and M1 there are a number of constraints including numerous settlements some with conservation area status, extensive areas of heathland and woodland south of Aspley Heath and a number of golf courses that could be difficult to mitigate if additional land is required for compensation. Routes developed in this section would require grade separated junctions with the A5 and M1 and also a crossing for the railway line, which could result in landscape and visual impacts on residents and users of PRoW and open space.

**Overall**

The most sensitive part of Corridor C3 lies to the north of the A421 which includes Stowe AAL, Stowe RPG grade I and the Great Ouse Valley (West), Great Ouse Valley (East) and Whaddon-Nash LLAs. Routes south of the A421 would have potential impacts on views from and the setting of the designated landscapes and Stowe RPG grade I.

To the east of the corridor there is potential direct for impacts on, Brill-Winchendon Hills AAL and registered common land at Brill Common. These include indirect effects on the setting of these distinctively undulating areas that are noted for their panoramic views. There are also potential impacts on the networks of ancient woodlands around Radley, Bernwood Forest and Brickhills. Other sensitive constraints in this part of the corridor include Wotton House RPG grade I where there is potential for significant adverse effects including impacts on views and setting. There are also potential adverse effects where the corridor crosses the floodplains of the River Thames, River Thame and River Ray, and Otmoor. A route through these areas would be at odds with the low lying landscape and highly visible.

Throughout the corridor there are other areas of sensitive landscape. Amongst these are areas of greenspace including a number of golf courses and sports fields at Radley College. Impacts on RAF Bicester would be difficult to mitigate due to the open character of the airfield.

Any routes developed at the northern extent of the corridor would likely directly impact on the Brickhills AAL. In landscape terms, route options would preferably be located immediately adjacent to the edge of Milton Keynes to minimise the impact on the designated landscape. An eastern route would impact on the openness of the London Metropolitan green belt and potentially on the setting of Woburn Abbey, with the potential loss of extensive areas of heathland and woodland.

Overall, Corridor C3 is very constrained by landscape considerations, due to the potential impacts on views from and the setting of nationally important landscapes at Stowe as well as series of local landscape designations to the north of the corridor.

### 9.2.5.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3-1</td>
<td>Follow existing A34 as closely as possible as far as practicable, having regard for other environmental constraints, seek to avoid routes that directly impact on Radley College, associated playing fields and the golf course.</td>
</tr>
<tr>
<td></td>
<td>Keep vertical alignment as low as possible in the landscape to minimise visual impact. Careful consideration to be given to the location of gantries, lighting and signs to avoid additional visual impacts, particularly close to sensitive visual receptors.</td>
</tr>
</tbody>
</table>
### Section C3-2

Route selection should seek to avoid blocks of ancient woodland and Brill-Winchendon Hills AAL. The least damaging option would be to align as closely as possible to the existing M40. Careful consideration to be given to the location of gantries, lighting and signs to avoid additional visual impacts, particularly close to sensitive visual receptors.

### Section C3-3

Seek to avoid routes that have a potential impact on AAL and LLAs north of the A421, and Stowe RPG grade I, including impacts on views from and the setting of these constraints. Consider routes east of Stratton Audley to reduce impact on views from and setting of RAF Bicester conservation area. Align route away from A4421 to avoid significant impacts on residents and setting of listed buildings. Investigate alignments south of Buckingham to bypass urban area. Investigate link south of Whaddon to avoid ancient woodlands. Keep vertical alignment as low as possible in the landscape to minimise visual impact. Careful consideration to be given to the location of gantries, lighting and signs to avoid additional visual impacts, particularly close to sensitive visual receptors.

### Section C3-4

Keep route options as close as possible to the existing A4146 corridor to minimise severance of and direct impacts on the Brickhills AAL and other constraints and sensitive visual receptors that are not currently affected by infrastructure. Consideration should be given to creating a buffer/visual screen to reduce visual impacts on residents south of Milton Keynes.

### 9.2.6 Nature conservation

#### 9.2.6.1 Key findings

For all sections, in addition to direct habitat loss, there is the potential for significant effects on key sensitive features through factors such as habitat fragmentation, air quality changes, hydrological changes, and increased disturbance from changes in noise, vibration and lighting levels. Designated sites lying outside the corridor boundary may potentially be affected by noise and visual disturbance, and changes to air quality as a result of construction and operational phases, or if hydrologically sensitive and connected to areas affected by construction and operational effects. These indirect effects are most likely in the areas where the route alignment is most constrained by designated sites.

### Section C3-1

This section corresponds with Section A-1 and the potential impacts on nature conservation designations are considered to be the same. Direct habitat loss from within the Cothill Fen SAC, SSSI and LNR should be avoidable through route alignment. However, direct loss of AW, veteran trees, and LWS appears to be more difficult to avoid as there are significant extents of these designations north of Radley College with limited route alignment opportunities given the presence of urban areas.
Section C3-2

Much of the boundary of this section corresponds with C2-2. Direct habitat loss from SSSI, AW and LWS may be challenging given the extent of these areas within the corridor, although there appears to be some scope for route alignment to avoid the SSSI and AW areas between the A40 and M40 given the limited number of designated sites east of the M40 and south of Oakley. However, there may be difficulties in avoiding LWS sites in the northern part of the section if route alignment is constrained to avoid the SSSI and AW areas.

Section C3-3

This section corresponds with Section C2-3 and the potential impacts on nature conservation are considered to be the same. The limited extent of SSSI and LNR within this section mean that direct habitat loss should be avoidable through route alignment. However, there are more extensive areas of AW and LWS and this, in association with the distribution of residential areas, may make avoiding these sites through appropriate route alignment more difficult.

Section C3-4

This section corresponds with Section C2-4 and the potential impacts on nature conservation are considered to be the same. The section appears relatively constrained in terms of potential route alignment options given the extent of residential areas. It may be possible to avoid direct habitat loss from within SSSI, NNR and LNR, but the extent of LWS and AW are such that direct loss of habitats within these designations may not be possible to avoid.

Overall

The potential for route alignment to avoid direct impacts on Tier I constraints is limited given the extensive areas of SSSI and AW, between the A40 and M40, and east of Bletchley. This is likely to also be the case for Tier III constraints given the extensive residential areas in the northern and eastern sections meaning limited opportunity for route alignment to avoid these constraints exist.

9.2.6.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3-1</td>
<td>There is the potential to avoid most habitat loss to key sensitive features through appropriate route alignment. Mitigation for other effects on key sensitive features could include creation of compensatory habitats, habitat screening by planting/fencing, and appropriate drainage, dust suppression and lighting strategies.</td>
</tr>
<tr>
<td>C3-2</td>
<td>There appears to be limited opportunity to avoid habitat loss to key sensitive features, in particular LWS, through appropriate route alignment. Mitigation for this and other effects on key sensitive features could include creation of compensatory habitats, habitat screening by planting/fencing, and appropriate drainage, dust suppression and lighting strategies.</td>
</tr>
<tr>
<td>C3-3</td>
<td>There is the potential to avoid most habitat loss to key sensitive features through appropriate route alignment. Mitigation for other effects on key sensitive features could include creation of compensatory habitats, habitat screening by</td>
</tr>
<tr>
<td>C3-4</td>
<td></td>
</tr>
</tbody>
</table>

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9.2.7 Geology and soils

9.2.7.1 Key findings

Section C3-1

There is the potential for significant effects relating to SSSIs, however as these are relatively small then careful route selection could likely avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these sand and gravel resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs in one location span two-thirds of the corridor width and so it is unlikely to be possible to route around this when taking into account other environmental discipline constraints. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses (in particular Radley PFA Lagoons and Abingdon Airfield), however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, however it is expected that these impacts could be mitigated.

Section C3-2

There is the potential for a significant effect relating to the SSSI, however careful route selection could avoid this. There is no other mitigation that could be applied as the feature is only valuable in its current location and condition.

A MSGA is present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGA in one location spans two-thirds of the corridor width and so it is unlikely to be possible to route around this when taking into account other environmental discipline constraints. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses, however this could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

Section C3-3
There is the potential for significant effects relating to the SSSIs, however careful route selection could avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the width of the corridor and so routing to avoid them is not possible. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses (largely airfields in this area), however this could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, although it is expected that these impacts could be mitigated.

Section C3-4

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the corridor width and so routing to avoid these is not possible. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses in particular Bletchley landfill, however these could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is generally considered possible in terms of engineering and remediation, however in the case of Bletchley this would be a significant constraint given that the landfill serves Milton Keynes and has planning permission till 2022.

Overall

There is the potential for significant effects relating to the SSSIs, however careful route selection could avoid these. There is no other mitigation that could be applied as the features are only valuable in their current locations and conditions.

MSGAs are present within this section; these resources could potentially be sterilised if there is no mitigation in place for a route developed in this area. The MSGAs span the width of the corridor and so routing to avoid them is not possible. However, it may be possible to extract the minerals (to an extent) prior to development and to use them or relocate them elsewhere.

There is the potential for significant effects associated with authorised and historic landfills and potentially contaminative historical land uses, however this could be avoided by route selection. If the route were to cross an authorised landfill, mitigation is possible, however there could be significant costs related to re-engineering, remediation and regulatory constraints to take into account. There may also be engineering challenges and costs to consider if a historical landfill or historical land use were crossed, however it is expected that these impacts could be mitigated.
### 9.2.7.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3-1</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span two-thirds of the width of the corridor, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources.</td>
</tr>
<tr>
<td>C3-2</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGA which spans over half the width of the corridor however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>C3-3</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGA which spans the width of the corridor, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills and historical land uses.</td>
</tr>
<tr>
<td>C3-4</td>
<td>Given the area and location of the features the majority could be avoided by route selection, with the exception of the MSGAs which span the corridor width, however in this case mitigation is expected to be possible in the form of prior extraction and re-use or relocation of resources. Mitigation is also considered possible in the form of engineering and remediation solutions in respect to landfills however Bletchley landfill may represent more of a constraint from a regulatory perspective.</td>
</tr>
</tbody>
</table>

### 9.2.8 Road drainage and the water environment

#### 9.2.8.1 Key findings

**Section C3-1**

*Flood Risk*

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas in south-east Abingdon.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

*Geomorphology, WFD and Water Quality*
Section C3-1 has the potential for significant effects on 7 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section C3-1 has the potential for significant effects on the water quality of 7 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Section C3-1 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and a spring discharge.

**Section C3-2**

**Flood Risk**

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas south-east Bicester.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

**Geomorphology, WFD and Water Quality**

Section C3-2 has the potential for significant effects on 8 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section C3-2 has the potential for significant effects on the water quality of 8 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Section C3-2 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and a spring discharge.
Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to areas in Bicester and Buckingham.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

Geomorphology, WFD and Water Quality

Section C3-3 has the potential for significant effects on 18 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section C3-3 has the potential for significant effects on the water quality of 18 large WFD water bodies from outfalls associated with the drainage of the new expressway.

Groundwater

Section C3-3 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions and a spring discharge.

Section C3-4

Flood Risk

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development, in particular this may increase flood risk to small areas on the outskirts of Bletchley.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.
Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

**Geomorphology, WFD and Water Quality**

Section C3-4 has the potential for significant effects on 4 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.

Section C3-4 has the potential for significant effects on the water quality of 4 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Section C3-4 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing the SPZ1 within this section.

**Overall**

**Flood Risk**

The development of a route in this area could result in loss of floodplain that could increase flood risk to properties.

Climate change has the potential to increase peak water levels and flood risk over the lifetime of the development.

The development of a route in this area could affect existing surface water flow routes consequently it may increase flood risk to surrounding areas.

The development of a route in this area could affect existing groundwater flow paths consequently could alter or increase flood risk to surrounding areas.

Historic flood records identify that there are areas outside Flood Zones 2 and 3 that have flooded in the past.

**Geomorphology, WFD and Water Quality**

Section C3 has the potential for significant effects on 37 large WFD water bodies caused by a loss of geomorphological features due to crossings, realignments, bank/bed protection and/or outfalls. The section also has the potential for significant effects to the large WFD water bodies caused by localised changes to flow patterns, sediment movement and in-channel vegetation.
Section C3 has the potential for significant effects on the water quality of 37 large WFD water bodies from outfalls associated with the drainage of the new expressway.

**Groundwater**

Corridor C-3 has the potential for significant effects due to a reduction in groundwater quantity arising from dewatering of any potential cuttings, and reduction in groundwater quality from construction activities, contaminated drainage discharging to groundwater and from fuel leaks or spills. These effects could impact on the identified secondary groundwater receptors in this section including GWDTE, groundwater abstractions (including potable public water supplies) and spring discharges. The assessment has been made based on the assumption that all possible means will be taken to avoid crossing the SPZ1 within this corridor.

### 9.2.8.2 Design, mitigation and enhancement considerations

<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3-1</td>
<td><strong>Flood Risk</strong></td>
</tr>
<tr>
<td></td>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
</tr>
<tr>
<td></td>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
<td></td>
<td>• May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
</tr>
<tr>
<td></td>
<td>• Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.</td>
</tr>
<tr>
<td></td>
<td>• Groundwater mitigation may be required where groundwater flow paths are impeded.</td>
</tr>
<tr>
<td></td>
<td><strong>Geomorphology, WFD and Water Quality</strong></td>
</tr>
<tr>
<td></td>
<td>• Crossing of large WFD water bodies to be avoided through design (embedded mitigation).</td>
</tr>
<tr>
<td></td>
<td>• Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.</td>
</tr>
<tr>
<td></td>
<td>• Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.</td>
</tr>
<tr>
<td>C3-2</td>
<td><strong>Flood Risk</strong></td>
</tr>
</tbody>
</table>
|         | • The route should be positioned away from the River Ray, where is
### Design, mitigation and enhancement consideration for Stage 1B

- Crossings should be made at locations with the smallest floodplain width.
- There are areas of significantly small fluvial flood risk, along Horton-cum-Studley, which should ideally be explored in the initial instance.
- A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.
- May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.
- Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.
- Groundwater mitigation may be required where groundwater flow paths are impeded.

**Geomorphology, WFD and Water Quality**

- Crossing of large WFD water bodies to be avoided through design (embedded mitigation).
- Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.
- Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.

**Groundwater**

- Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.
- Groundwater abstractions may require monitoring and possible replacement if they are impacted by works.
- Pollution prevention control measures during construction and operation would mitigate potential quality impacts.

### C3-3 Flood Risk

- Crossings should be made at locations with the smallest floodplain width.
- A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.
- May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.
- Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.
- Groundwater mitigation may be required where groundwater flow paths are impeded.

**Geomorphology, WFD and Water Quality**

- Crossing of large WFD water bodies to be avoided through design
<table>
<thead>
<tr>
<th>Section</th>
<th>Design, mitigation and enhancement consideration for Stage 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(embedded mitigation).</td>
</tr>
<tr>
<td></td>
<td>• Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.</td>
</tr>
<tr>
<td></td>
<td>• Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.</td>
</tr>
<tr>
<td>Groundwater</td>
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</tr>
<tr>
<td></td>
<td>• Groundwater abstractions may require monitoring and possible replacement if they are impacted by works.</td>
</tr>
<tr>
<td></td>
<td>• Pollution prevention control measures during construction and operation would mitigate potential quality impacts.</td>
</tr>
<tr>
<td>C3-4</td>
<td>Flood Risk</td>
</tr>
<tr>
<td></td>
<td>• Crossings should be made at locations with the smallest floodplain width.</td>
</tr>
<tr>
<td></td>
<td>• A wide clear span crossing would be required to avoid Flood Zone areas, in particular Flood Zone 3b.</td>
</tr>
<tr>
<td></td>
<td>• May need to increase vertical alignment of road network to ensure that the proposed road is safe for users (as required by NPS and NPPF) this should account for future peak water levels as a result of climate change.</td>
</tr>
<tr>
<td></td>
<td>• Areas of high surface water flood risk should be avoided. Where not feasible, additional storage may be required to manage any displacements of surface water flows.</td>
</tr>
<tr>
<td></td>
<td>• Groundwater mitigation may be required where groundwater flow paths are impeded.</td>
</tr>
<tr>
<td>Geomorphology, WFD and Water Quality</td>
<td>Crossing of large WFD water bodies to be avoided through design (embedded mitigation).</td>
</tr>
<tr>
<td></td>
<td>• Watercourse crossings, realignments, bank/bed protection and outfalls to be designed with consideration given to geomorphological forms and processes.</td>
</tr>
<tr>
<td></td>
<td>• Appropriate mitigation (e.g. treatment ponds) to be incorporated into outfall designs.</td>
</tr>
<tr>
<td>Groundwater</td>
<td>Further assessment will be undertaken to identify the impacts of dewatering activities, both on groundwater quantity and quality.</td>
</tr>
<tr>
<td></td>
<td>• Groundwater abstractions (including those for public supply) may require monitoring and possible replacement if they are impacted by works.</td>
</tr>
<tr>
<td></td>
<td>• Pollution prevention control measures during construction and operation would mitigate potential quality impacts.</td>
</tr>
</tbody>
</table>
### Assessment Summary

#### 9.3.1 Intervention objectives assessment

Table 9-17 Intervention objective 1 assessment – C3

<table>
<thead>
<tr>
<th>Discipline</th>
<th>C3-1</th>
<th>C3-2</th>
<th>C3-3</th>
<th>C3-4</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>For sections C3-1, C3-3 and C3-4 - it is assumed that traffic could be rerouted from the more densely populated areas (e.g. Oxford, Abingdon, Milton Keynes etc.), which have higher existing air quality concentrations, to less densely populated areas (with relatively low existing air quality concentrations), and on this basis would be beneficial overall. For section C3-2 it is assumed the benefits in some locations would likely be of broadly similar extent to dis-benefits in other locations and on this basis is assessed as neutral. Overall, providing that the expressway could be routed away from the more densely populated areas mentioned above, it is expected that net community benefits in terms of air quality could be possible.</td>
</tr>
</tbody>
</table>
| Noise and Vibration |      |      |      |      |         | Overall potential net neutral effect having regard for: Benefits:  
  • Potential for reductions in noise levels at receptors in Bicester, Bletchley, Milton Keynes due to potential traffic flow being diverted away from these areas.  
  • Potential positive noise benefits between Abingdon and Thame (A415, B4105 and the A329) resulting from possible reductions in traffic on these roads. Disbenefits:  
  • Potential increases in noise for receptors adjacent to possible ‘on-line’ sections (A34, A421 between Buckingham and Bletchley, A421 – east of M1) due to possible increased traffic and speeds and road widening. |
Oxford to Cambridge Expressway  
Appendix E: Supplementary Environmental Information

### People and Communities

- Potential for possible adverse effects in section C3-1 on wellbeing within communities.
- Potential loss of some BMV in the southern part of section C3-2 although effects could be potentially avoided through careful route design and mitigation.
- Potential community constraints in the Woburn Sands area near Milton Keynes (section C3-4). However, community severance may be avoided within the remainder of the corridor through careful route design.

### Overall

- Corridor C3 has been scored Yellow reflecting constraints from existing communities to route development in this corridor.

### Table 9-18 Intervention objective 2 assessment – C3

<table>
<thead>
<tr>
<th>Discipline</th>
<th>C3-1</th>
<th>C3-2</th>
<th>C3-3</th>
<th>C3-4</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Heritage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It appears that C3 has sufficient flexibility in the corridor to allow for mitigation of significant effects on cultural heritage assets through careful route design.</td>
</tr>
<tr>
<td>Landscape and Visual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C3 does not contain any Tier I landscape constraints. Any route through section C3-3 north of the</td>
</tr>
</tbody>
</table>
## Oxford to Cambridge Expressway
### Appendix E: Supplementary Environmental Information

<table>
<thead>
<tr>
<th>Discipline</th>
<th>C3-1</th>
<th>C3-2</th>
<th>C3-3</th>
<th>C3-4</th>
<th>Overall</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature Conservation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A421 could have a direct impact on the Stowe AAL and LLAs. The London Metropolitan green belt partially extends across section C3-3 although a route to the west of this section would avoid this.</td>
</tr>
<tr>
<td>Geology and Soils</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>There is a contiguous belt of SSSI and ancient woodland constraints between the A40 and M40 and which could only be avoided in this corridor for potential routes developed to the east of the M40 although even then other sites of ecological importance would be at risk.</td>
</tr>
<tr>
<td>Road Drainage and Water Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The corridor contains a large coverage of Mineral Safeguarding Areas (MSGA’s) which would be unavoidable. There are a number of geological SSSI’s along the corridor but it is considered that it may be possible to avoid these constraints through careful route design. There are a number of authorised landfills within the corridor however it is considered these could possibly be avoided through careful route design. There are a number of historic landfills and potentially contaminative historical and current land uses within the corridor. However, it is considered these could possibly be avoided through careful route design.</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C3 has the potential to cross small areas of FZ3b in all sections. This includes crossings of the River Thames, River Great Ouse and River Ouzel.</td>
</tr>
</tbody>
</table>

Corridor C3 has been scored Amber assuming that a route can be developed:
- in section C3-2 to the east of the M40 to avoid significant effects on Tier I nature conservation habitats to the west of the section.
- in Section C3-3 to the south of Buckingham to avoid effects on Stowe House and RPG.
### 9.3.2 Overall findings

**Table 9-19 Summary of C3 environment assessment**

<table>
<thead>
<tr>
<th>Score</th>
<th>Intervention objective 1</th>
<th>Intervention objective 2</th>
<th>Intervention objective 3</th>
<th>Strategic objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow – slightly disadvantageous</td>
<td>Amber – moderately disadvantageous</td>
<td>Grey - neutral</td>
<td>Amber – moderately disadvantageous</td>
<td></td>
</tr>
</tbody>
</table>
10. Common Corridor

This corridor has not been assessed as it does not have a direct bearing on the review of ‘missing link’ corridor options between the A34 Abingdon and the M1 at Milton Keynes, which is the focus of this report.

Nevertheless, baseline information has been collated for this section and is reviewed here to provide context.

The subsection CS-3 is not considered here as this section is subject to separate study (A248 Black Cat to Caxton Gibbet).

10.1 Baseline conditions

10.1.1 Air quality

Section CS-1

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- AQMAs: The CS-1 area includes Marcham AQMA (west of Abingdon), which was declared due to exceedances in annual NO$_2$.

- Designated Sites: This area includes Snelsmore Common SSSI, Ashridge Wood SSSI, Aston Upthorpe Downs SSSI, Little Wittenham SSSI, Culham Brake SSSI, Frilford Heath Ponds and Fens SSSI.

- Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Chieveley, Peasemore, East Ilsley, West Ilsley, Blewbury, Chilton, Didcot, Steventon, Wallingford, Harwell, Drayton, Dorchester on Thames, Clifton Hampden, Berinsfield, Stadhampton, Culham, Caldecott, Marcham.

- Sensitive Receptors: Within the CS-1 boundary, there are approximately 33,000 potential air quality sensitive receptors.

- Clean Air Zone: The section is approximately 7km from the potential Oxford CAZ.

- PCM Model: Defra PCM links within this area have been identified on the A4130. Concentrations are not in exceedance in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: The Vale of White Horse District Council undertakes NO$_2$ monitoring within CS-1, to the south of Abingdon. The latest monitoring data indicates elevated NO$_2$ concentrations, with one exceeding location within the existing AQMA. South Oxfordshire District Council also undertake NO$_2$ monitoring...
within CS-1, within Didcot, Watlington and Stadhampton. The latest monitoring data indicates NO$_2$ concentrations below the AQO.

- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the CS-1 area (at 1km square intervals) are below the relevant AQOs for NOx ($7.6-25.2$ μg/m$^3$), NO$_2$ ($5.9-17.4$ μg/m$^3$) and PM$_{10}$ ($11.5-16.4$ μg/m$^3$).

There is potential for air quality benefits sensitive receptors within Didcot and Abingdon, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Potential to improve journey routing in this area to reduce congestion (and thus emissions) within Abingdon, and potentially reducing air quality concentrations within the AQMA.

**Section CS-2**

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- AQMAs: No AQMA areas have been declared within the CS-2 boundary by either Bedford Borough Council or Central Bedfordshire Council.

- Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Brogborough, Lidlington, Steppingley, Houghton Conquest, Wilstead, Kempston, Shortstown, Cotton End, Cardington, Willington, Great Barford, Roxton, south of Bedford.

- Designated Sites: This area includes Coopers Hill SSSI, Kings Wood and Glebe Meadows, Houghton Conquest SSSI, Marston Thrift SSSI, Maulden Wood and Pennyfather's Hill SSSI.

- Sensitive Receptors: Within the CS-2 boundary, there are approximately 22,000 potential air quality sensitive receptors.

- Clean Air Zone: The section is approximately 57km from the potential Oxford CAZ.

- PCM Model: Defra PCM links within this area have been identified on A513, A6 and A600. Concentrations are not exceeding in 2018. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: Bedford Borough Council undertakes NO$_2$ monitoring within CS-2, to the south of Bedford. The latest monitoring data indicates elevated NO$_2$ concentrations, with one exceeding location.

- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the CS-2 area (at 1km square intervals) are below the relevant AQOs for NOx ($9.8-21.1$ μg/m$^3$), NO$_2$ ($7.5-15.2$ μg/m$^3$) and PM$_{10}$ ($12.4-17.2$ μg/m$^3$).
There is potential for air quality benefits at sensitive receptors in Bedford, should scheme route options change traffic routings away from these areas (and therefore a reduction in vehicle emissions at sensitive receptors along routes in these areas).

Section CS-4

The air quality constraints and receptors sensitive to changes in air quality concentrations within this broad corridor section are as follows:

- AQMAs: The CS-4 area includes the A14 Corridor AQMA, which has been declared due to exceedances in annual NO$_2$ concentrations.
- Designated Sites: This area includes the Madingley Wood SSSI.
- Residential Receptors: Within the broad corridor area, there are residential areas which may be impacted (adversely or beneficially) from changes in air quality concentration. These include properties in Cambourne, Hardwick, Madingley, Girton.
- Sensitive Receptors: Within the CS-4 boundary, there are approximately 4,000 potential air quality sensitive receptors.
- Clean Air Zone: The section is approximately 97km from the potential Oxford CAZ.
- PCM Model: There are no Defra PCM links within this area. PCM projections do not include for the impacts of CAZ implementation or the proposed scheme.

The existing air quality situation in this broad corridor section has been highlighted as follows:

- Monitoring Data: South Cambridgeshire District Council do not undertake any monitoring within the CS-4 area.
- Defra Background Concentrations: The Defra background maps indicate 2018 background concentrations across the CS-4 area (at 1km square intervals) are below the relevant AQOs for NO$_x$ (8.8-11.8 μg/m$^3$), NO$_2$ (6.8-8.9 μg/m$^3$) and PM$_{10}$ (13.0-16.0 μg/m$^3$).

There is the potential to improve journey routing in this area to reduce congestion (and thus emissions) at the A14, and potentially reducing air quality concentrations within the AQMA.

10.1.2 Noise and vibration

Section CS-1

Within this common section corridor study area there are a total of 40,677 dwellings and 879 other sensitive receptors. The common section corridor study area contains the large settlements of Didcot and the south of Abingdon, as well as numerous smaller towns and villages.

It is expected that receptors in close proximity to major roads and within urban areas are subject to high noise levels dominated by road traffic. Within this corridor’s study area, a number of residential settlements exist in close proximity to the A34 (e.g. Chieveley, Beedon, East Ilsley, Chilton, Harwell, Steventon and Drayton) A415 (e.g. Clifton Hampden and
Receptors located in more rural settings are expected to have their noise environment consisting of more local sources such as agriculture activities, road traffic on minor roads, railways and aircraft flights. There are various pockets of rural area throughout this common section corridor study area where non-traffic sources are more likely to dominate the noise environment.

There are numerous railway lines running through this common section corridor study area that would contribute to the surrounding noise environment. In addition, Heathrow Airport has several flight paths and stacking areas through this corridor study area. There are also a number of small airfields within this corridor study area, including Chalgrove Airfield, Brimpton Airfield, and Abingdon Airfield.

Numerous SSSIs exist within the corridor’s study area. These include: Little Wittenham, Ashridge Wood, and Ashton Upthorpe Downs. The North Wessex Downs AONB also covers a large proportion of this corridor.

This common section corridor study area contains a total of 17 NIAs. Five of these exist adjacent to the A34, two next to the M4. The remainder are distributed across the large number of major roads and railways that are contained within this corridor study area.

**Sections CS 2,3 and 4**

Future noise assessments are likely to consider impacts from traffic across the common section as a whole and hence the three subsections have not been considered individually here.

Within this common section corridor study area, which includes Section CS-3, which is subject to separate study (A428 Black Cat to Caxton Gibbet), there are approximately 70,000 dwellings and 1,200 other sensitive receptors. This common section corridor study area contains the large settlements of south Bedford, and south of St Neots, as well as numerous smaller towns and villages.

It is expected that receptors in close proximity to major roads and within urban areas are subject to high noise levels dominated by road traffic. Within this corridor’s study area, a number of residential settlements exist in close proximity to the A421 (e.g. Marston Moretaine, Wootton, south of Bedford, and great Barford), A428 (e.g. south of St Neots, Eltisley, Cambourne, and Hardwick), A6 (e.g. Wixams), A600 (e.g. Shortstown and Cotton End), and A603 (e.g. Cople and Willington).

Receptors located in more rural settings are expected to have their noise environment consisting of more local sources such as agriculture activities, road traffic on minor roads, railways and aircraft flights. There are pockets of rural area throughout this corridor study area where non-traffic sources are more likely to dominate the noise environment.

There are three railway lines running through this common section corridor study area that would contribute to the surrounding noise environment: Marston Vale line (Bedford to Bletchley), Bedford to London line and the Peterborough to London line. In addition, Luton
Airport has a number of flight paths through this corridor study area. There are also a number of small airfields within this corridor study area, including Little Gransden Airfield and Little Staughton Airfield.

Numerous SSSIIs exist within the corridor study area. These include: Kings Wood and Glebe Meadows, and Madingley Wood.

This common section corridor study area contains approximately 60 NIAs. These include six next to the A421, three adjacent to the A1, and six next to the A428. The remainder are distributed across the large number of major roads and railways that are contained within this corridor study area.

10.1.3 People and communities

Section CS-1

Didcot is the largest settlement wholly within the corridor section, while the northern part of the section coincides with Abingdon. There are several smaller settlements throughout the corridor section including Chieveley, East Ilsley, West Ilsley, Compton, Chilton, Blewbury, Aston Upthorpe, Aston Tirrold, South Moreton, North Moreton, Brightwell-cum-Sotwell, Shillingford, Dorchester-On-Thames, Little Wittenham, Long Wittenham, Clifton Hampden, Appleford, Sutton Courtenay, Drayton, Milton, Steventon, Marcham, Culham, Berinsfield, Drayton Saint Leonard, Newington, Shillingford, Warborough, Stadhampton, Chiselhampton and Little Milton.

The A34 (dual carriageway) passes through this corridor section in a north-south alignment. There are several sites allocated for development and/or with planning permission, including a site adjacent to the existing Harwell Science and Innovation Campus, a large site between Didcot and the existing A34, sites near the Milton Interchange, sites at the former Didcot Power Station site and a large site near Culham. Much of the proposed development is for industrial/business growth associated with technology industries.

In relation to recreation and open space, the Drayton Park golf course abuts the eastern side of the A34 to the south of Drayton, while there is another golf course (Hadden Hill) to the east of Didcot. These are both private golf courses. There is a large area of allotments (West End) south-west of Marcham Interchange. The existing A34 crosses the North Wessex Downs AONB. The North Wessex Downs is strongly associated with the horseracing industry which is important the local economy and community. There are many gallops and other horserace training facilities throughout the area.

Most of the sensitive community facilities such as schools, care homes etc. are located within existing settlements.

There are large areas of best and most versatile agricultural land throughout the section so most route options would affect best and most versatile agricultural land within this area.

Section CS-2

Communities: Large settlements of Bedford and Kempston, and several smaller settlements (including Brogborough, Marston Moretaine, Elstow, Shortstown, Wootton, Great Barford, Roxton).
There are allocations of development land near Marston Junction, Stewartby and on the southern outskirts of Bedford.

There are several recreational and leisure assets. The Forest of Marston Vale is a 61 square mile area between Bedford and Milton Keynes which was designated as a community forest by the government in the early 1990s. There are several sites within the area where tree planting has taken place which provide recreational assets. This includes the Marston Vale Millennium Country Park and open access land (located adjacent to existing A421, north of Marston Moretaine). Shocott Spring is part of the community forest and is located between Shortstown and Cotton End. The Ampthill Country Park which is located in the north-west outskirts of Ampthill. The Woburn Forest Centre Parcs facility is located in the south-east area of the corridor section (between Lidlington and Ampthill). The Grange Estate with public rights of way through it is east of Bedford.

Sensitive community facilities such as schools and nursing homes are within settlements so no constraints of this type have been identified on the assumption that settlements will be avoided.

There is best and most versatile agricultural land throughout the north-east part of the section.

**Section CS-4**

The main communities within this corridor section are Cambourne and Hardwick which abut the southern side of the A428 and Madingley which is north of the A428 in the eastern part of the section.

There are large allocations of development land east and west of Cambourne and smaller ones around Hardwick, which would provide a constraint to any options south of the A428. The North-West Cambridge allocation is by the Girton Interchange.

Green spaces and recreational land uses are largely within the settlements and in south of the A428. The American Military Cemetery is adjacent to Madingley Wood, south of the A428.

There is a nursing/care home present on Saint Neots Road, west of Hardwick. Other sensitive facilities are within settlements.

The majority of the land corridor section is best and most versatile agricultural land.

**10.1.4 Cultural heritage**

**Section CS-1**

There are 182 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section CS-1 comprising:

- 59 scheduled monuments
- 29 Grade I listed buildings
- 93 Grade II* listed buildings
1 Grade I Registered Park and Garden

There are a further 1517 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section CS-1 comprising:

- 1468 Grade II listed buildings
- 46 Conservation Areas
- 3 Grade II Registered Park and Gardens

There are a notably large number of scheduled monuments within Section CS-1. These comprise:

- 9 settlement site scheduled monuments ranging from prehistoric to Medieval date
- 17 barrow scheduled monuments, including the barrow cemeteries at Fullamoor Plantation and Dike Hills
- the Grim’s Ditch scheduled monument, comprising 7 scheduled areas of earthworks
- the Coscote and Hagbourne village cross scheduled monuments
- the Church Piece Cemetery site scheduled monument
- the Bussock, Lowbury, Blewburton, and Sinodun Hill Camps scheduled monuments
- the Roman town scheduled monument at Dorchester, and the site of Roman kilns at Marsh Baldon
- the ring ditches, cursus, enclosures and settlement site at Warborough
- the Chiselhampton and Culham bridge scheduled monuments
- the Motte castle scheduled monument at South Moreton
- the Dovecote at Culham Manor scheduled monument
- the Carfax Conduit scheduled monument
- the Ice House as Ascott House scheduled monument

Many of these scheduled monuments are relatively large assets, particularly the line of settlement sites located to the north of Didcot. Grim’s Ditch is also of note; this is a prehistoric boundary that survives as bank and ditch earthworks. This South Oxfordshire Grim’s Ditch runs for approximately 8 kilometres across the whole of the corridor and is one of a number of ‘Grim’s Ditches’ found in southern England.

Grade I and II* listed buildings are located in the villages/towns of Sutton Courtenay, Dorchester, Steventon, Harwell, Great Milton, Brightwell-cum-Sotwell, East Hagbourne, East Hendred, Milton, Newington, East Ilsley, Blewbury, Long Wittenham, North Moreton, Beedon, Warborough, Aston Tirrold, Culham, Stadhampton, Marcham, Chieveley, Drayton, Clifton,
Drayton St. Leonard, Little Milton, Didcot, West Hagbourne, South Moreton, Aston Upthorpe, Chilton, Upton, Little Wittenham, and Radley.

The Grade I Registered Park and Garden of Nuneham Courtenay is located centrally on the northern edge of the corridor and contains 21 listed buildings within its grounds (1 Grade I, 2 Grade II*, and 18 Grade II). It is situated on low, undulating hills with a steep slope towards its western boundary created by the River Thames. This situation creates important long views west towards Abingdon and north towards Oxford.

Section CS-2

There are 90 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section CS-2 comprising:

- 45 scheduled monuments
- 20 Grade I listed buildings
- 25 Grade II* listed buildings

There are a further 569 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section CS-2 comprising:

- 544 Grade II listed buildings
- 19 Conservation Areas
- 6 Grade II Registered Park and Gardens

There are a large number of relatively small, discrete scheduled monuments within the Section CS-2 corridor. These comprise:

- 9 Neolithic - Bronze age barrows and enclosure scheduled monuments forming a larger mortuary complex north of Octagon Farm
- the Howbury ringwork and trackway scheduled monument
- the bowl barrow scheduled monument known as ‘Round Hill’
- 10 moated site scheduled monuments comprising: a moated site and two fishponds at The Rectory, Moat Farm moated enclosure and associated settlement earthworks, ‘The Docks’ moated site and dock in Willington, Medieval village and moated site at Thrupp End, Birchfield Farm moated site and associated fishponds and leats, Palaceyard Wood medieval moated enclosure and associated enclosures, woodland bank and cultivation earthworks, Bolebec Farm moated enclosure, Kempston Hardwick moated site, Manor Farm moated site, and Malting Spinney Medieval moat.
- the Moot Hall scheduled monument
- a settlement site scheduled monument north of Chapel End Farm
- the remains of Elstow Manor scheduled monument
- the Tempsford Bridge scheduled monument
- a ringwork at The Round House scheduled monument at Brogborough Park Farm
- 2 bowl barrow scheduled monuments, a Hengi-form scheduled monument, and a henge type monument and bowl barrow scheduled monument south and south east of Dairy Farm
- the Willingdon Stables and Dovecote scheduled monuments
- the Barford Bridge and Tempsford Bridge scheduled monuments
- a ‘site discovered by aerial photography south of village’ in Cardington
- the ‘Ampthill Castle: a medieval magnate’s residence’ scheduled monument
- a long barrow and a bowl barrow scheduled monuments south east of Bury Farm
- the remains of Houghton House mansion and formal gardens scheduled monument

Grade I and II* listed buildings are located within Elstow, Marston Moretaine, Willington, Hulcote and Salford, Great Barford, Moggerhanger, Ampthill, Haynes, Cople, Houghton Conquest, Eastcotts, Roxton, Cardington, Wilshamstead, Millbrook, and Ridgmont

Section CS-4

There are 14 designated cultural heritage assets of High value within the Corridor and 1 kilometre study area for Section CS-4 comprising:

- 2 Grade I listed building
- 10 Grade II* listed buildings
- 1 Grade I Registered Park and Garden
- 1 Grade II* Registered Park and Garden

There are a further 54 designated cultural heritage assets of Medium value within the Corridor and 1 kilometre study area for Section CS-4 comprising:

- 50 Grade II listed buildings
- 3 Conservation Areas
- 1 Grade II Registered Park and Garden

The High value cultural heritage assets within Section CS-4 are located closer to Cambridge at the eastern edge of the corridor. There are Grade I and II* listed buildings in Madingley, as well as a Conservation Area and a Grade II Registered Park and Garden.
Also within Madingley, but across the current A428, is the American Military Cemetery Grade I Registered Park and Garden.

There is a further Grade II* listed building in Girton.

10.1.5 Landscape and visual

Section CS-1

This section lies almost entirely within the North Wessex Downs AONB, whilst the Chilterns AONB is located just over 1km from the eastern extent of the corridor.

Other relevant designations include numerous conservation areas and many listed buildings. There is also an area of registered common land east of East Ilsley.

The North Wessex Downs is a large scale open landscape with a characteristically strong structural landform of elevated rolling downland with round or flat-topped hills, intersected by dry valleys. The race horse industry is prominent with numerous equestrian centres plus a large number of gallops.

The north and east of the corridor are characterised by the low lying open floodplains of the River Thames and River Thame.

Sensitive visual receptors include residents in rural settlements and the south western edge of Abingdon-on-Thames, and south and east of Didcot, along with those in isolated farmsteads and properties; users of PRoW including Thames Path and The Ridgeway national trails.

Section CS-2

A significant part of this section is designated as the Marston Vale Community Forest extending from the M1 to the south of Bedford. This area includes Marston Vale Millennium Country Park within it.

Other relevant designations include Millbrook, Ampthill, Stewartby, Cardington, Great Barford, Barford Hill and Roxton conservation areas and many scattered listed buildings.

Former quarries and areas of landfill, including tracts of open water are characteristic of much of the area.

Sensitive visual receptors include residents on the southern edge of Bedford, in rural villages and scattered properties; along with users of PRoW, public parks and the community forest in its general sense.

Section CS-4

There are no landscape designations in this section, although Cambridge green belt lies to the east of Hardwick. Other relevant designated areas include Madingley Hall RPG grade II and the American Military Cemetery RPG grade I.

Sensitive visual receptors include residents of villages and properties that are close to the existing A428 and in particular in the villages of Cambourne and Hardwick which are tight to the southern edge of the A428.
10.1.6 Nature conservation

Section CS-1

The key sensitive features within the corridor are Little Wittenham SAC, 6 SSSI, and 60 AW. The majority of the SSSI lie to the east of the A34 and are widely dispersed within the corridor. The largest SSSI is that associated with Little Wittenham SAC, north east of Didcot. The key constraint in this section is the designated AW, the majority of which lie south of East Ilsley, making the southern end of the section relatively constrained. Further north, the main area of AW is that associated with Little Wittenham SAC.

With respect to Tier III sites, 2 LNRs, 64 LWS and 4 Proposed LWS lie within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise Little Wittenham SAC, Kennet and Lambourn Floodplain SAC, Kennet Valley Alderwoods SAC, River Lambourn SAC, and 22 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 113 AW, 2 LNR, 111 LWS and 5 Proposed LWS.

No SAC with bats as a primary qualifying feature are within 30km of this corridor section.

Section CS-2

The key sensitive features within the corridor are 4 SSSI and 16 AW. The SSSI are located in the south western end of the section around Ampthill and Cranfield. Three of the four SSSI are also designated AW, associated with the woodlands Marston Thrift, Kings Wood, and Maulden Wood, only a very small section of the latter site lying within this section. The fourth SSSI at Ampthill is associated with the Coopers Hill nature reserve; and area primarily designated for its heathland habitat. Aside from the small areas of AW around the Millbrook golf club, the other areas of AW are all located along the southern boundary of this section.

With respect to Tier III sites, 5 LNR and 51 LWS lie within the section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 12 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 37 AW, 7 LNR and 82 LWS. Eversden and Wimpole SAC, designated for barbastelle bat (*Barbastella barbastellus*), is within 30km of the section.

Section CS-4

The key sensitive features within the corridor are 1 SSSI and 2 AW. The SSSI is also designated AW: Madingley Wood which lies between the A428 and the A1303. The second AW is associated with Knapwell Wood and lies north of Upper Cambourne and the A428. With respect to Tier III sites, 5 LWS lie within this section.

The statutory designated sites for nature conservation within 5km of the corridor comprise 7 SSSI. The non-statutory designated sites for nature conservation within 2km of the corridor comprise 6 AW and 15 LWS. Eversden and Wimpole SAC, designated for barbastelle bat, is within 30km of the section.
10.1.7 Geology and soils

Section CS-1

The bedrock geology of CS-1 broadly comprises a geological succession of decreasing age gently dipping to the south, from the oldest Late Jurassic Corallian to the northwest and the youngest Tertiary Thames Group around Chieveley in the south. Intervening geology includes Jurassic clay formations of the Ancholme Group, localised limestones and sandstones of the Corallian and Portland Groups, localised Wealden group, the Cretaceous Greensand and Gault Clay, and the Cretaceous Chalk.

Clay, silt, sand and gravel are common to the south of the section, with head deposits in southern and central parts and alluvium and river terrace deposits in the north to east.

There are no recorded SSSIs of geological interest within the area. The following LGSs are present within Section CS-1:

- Snelsmore Common: demonstrates landscape features such as swallow holes and changes in hydrology and vegetation resulting from geological variations; extends into the southwest of the section.

- Chieveley Old Kiln Quarry: an extensively exposed sandpit; over half of this LGS lies within the southeast of the section.

- Chapel Farm Sarsens: a small group of Sarsen stones on the edge of a field; located directly adjacent to the western boundary of Section CS-1 but may extend to within the section.

- Hill Farm Pit: a small outcrop of Malmstone in the northeast of the section.

The Oxfordshire sharp sand and gravel MSGA is present in the north to northeast of Section CS-1, and the Oxfordshire soft sand MSGA in the north-western extent of the section. West Berkshire MSGAs are based on the BGS mineral mapping and these are expected to extend over the majority of the corridor width at the southern end of the section.

Three active quarries are located within Section CS-1:

- Sutton Courtenay mining sand and gravel of the Northmoor Sand and Gravel Member in the southeast of the section

- Bridge Farm Quarry, mining sand and gravel of the Northmoor Sand and Gravel Member in the southeast

- Thrupp Lane Quarry, mining sand and gravel of the Northmoor Sand and Gravel Member in the north.

Sutton Courtenay Rail Depot is also listed in BritPits data as an active depot receiving minerals.

One dormant quarry, Thrupp Farm is located in the north, and an historical quarry, Oday Hill Quarry, is located in the southwest, both of which mined sand and gravel.
The EA website identifies several authorised landfills that are located within Section CS-1:

- Chilton Railway Cutting Landfill
- UKAEA, taking non-biodegradable wastes
- Sutton Courtenay Landfill north of Didcot
- Sutton Courtenay Landfill – Phase 3 north of Didcot
- Sutton Wick, in the northwest of the section
- Sutton Wick (2), adjacent to the east of Sutton Wick
- Radley PFA Lagoons in the northern extent of the section.

The EA website also lists a number of historical landfills that are listed within Section CS-1, the largest being concentrated north of Didcot but with many smaller landfills to the south, particularly west of Compton. Other potentially contaminative current and historical land uses include UKAEA Harwell, the Harwell Innovation Centre, Didcot Power Station, RAF Mount Farm, Chalgrove Airfield, sewage farms, iron works, barracks and a rifle range.

The Groundsure COMAH data show a current COMAH site and historical NIHHS listings are registered at Air Products Ltd. adjacent to the east of Didcot Power Station. Historical NIHHS and COMAH sites are listed in association with Harwell UKAEA and Didcot Power Station. An historical NIHHS site is also listed for Didcot Holder Station (Southern Gas) in Didcot.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA.

**Section CS-2**

Mudstone, siltstone and sandstone of the Upper Jurassic Ancholme Group are shown as the bedrock across the majority of the section, with sandstone and mudstone of the Cretaceous Lower Greensand Formation is shown in the southern extents.

Glacial till is common around southwestern, eastern and northern fringes of the section. River terrace deposits, head deposits and alluvium are common elsewhere, especially in the northern half, since superficial deposits are absent from much of the south.

There are no sites of geological importance within Section CS-2.

Bedfordshire MSGAs for Woburn Sands (Lower Greensand Formation), Oxford Clay (Ancholme Group and River Valley/Glacial Sand and Gravel, are located across much of Section CS-2, spanning the width of the corridor in one location.

Elstow Rail Depot is located in the centre of the section this is associated with transport of crushed rock resources. Two historical quarries (Willington Quarry and Dairy Farm Quarry) which mined sand and gravel, are located in the northeast. Another active quarry (Black Cat) is located 80m north of the north eastern site boundary, this is described in Section C2-3.
The EA website identifies a number of authorised landfills that are located wholly or partly within Section CS-2, as follows.

- Brogborough Landfill, extending into the southwest of the section
- Stewartby, south of Wootton
- Elstow Landfill Site A6 south of Kempston
- Octagon Farm North Landfill, east of Bedford
- Land Near Dog Farm, east of Bedford
- Dairy Farm, north of Willington.

The EA also lists a number of relatively large (up to approximately 150 ha) historical landfills that are located in Section CS-2, particularly in the north-western half of the corridor, these are often associated with the authorised landfills at Brogborough, Stewartby and Elstow. Other potentially contaminative current and historical land uses include sewage works, a rifle range, brickworks and Elstow storage depot.

A current COMAH site is listed at Veolia ES (UK) Limited south of Stewartby landfill. A historical NIHHS site (London Brick Products Ltd) is listed in association with Stewartby Brickworks (now disused). Additional historical NIHHS sites are registered within Wilstead Industrial Estate for K Watson Ltd., and Woodbridge Foam (UK) Ltd.

No sites within the area have been designated as Part IIA sites under Environmental Protection Act 1990 and no sites are designated as ‘Special Sites’ by the EA.

**Section CS-4**

The bedrock is composed of mudstone, siltstone and sandstone, of the Jurassic Ancholme Group in the western section, sandstone and mudstone, The Lower Greensand Formation is located around Bourne, passing up through the Cretaceous Gault and Upper Greensand to the east. There is an outlier of Cretaceous Chalk (Grey Chalk Sub Group) in the eastern part of the section.

Glacial till extends across the majority of the section, although superficial deposits are absent from the eastern end, with the exception of a band of river terrace deposits at the eastern extend, orientated north-south.

There are no sites of geological importance within Section CS-4.

One Cambridgeshire sand and gravel MSGA occupies a very small proportion of the corridor in the eastern extent of the section.

No authorised or historic landfills have been identified within Section CS-4.

Other potentially contaminative current and historical land uses include Bourn Airfield (formerly RAF Bourn) and smithies.
The Groundsure COMAH data show a historical NIHHS site is listed east of Cambourne, adjacent Bourn Airfield at Pre-star (Luton) Ltd.

10.1.8 Road drainage and the water environment

Section CS-1

Flood Risk

Fluvial

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 10.1.

There are three rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):

- River Thames – Flows south of Oxford and meanders around south-east of Abingdon where it then meanders back in easterly direction towards the A4074, it then continues to head south towards Reading
- River Thame (a tributary of the River Thames) – flows south-west of the Wheatley Interchange and joins the River Thames at Dorchester-On-Thames
- River Ock (a tributary of the River Thames) – flows in a westerly direction towards Abingdon.

Table 10-1 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>212.2</td>
<td>426.5</td>
<td>7.7</td>
<td>11.8</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be an approximately 4% increase in the area identified as Flood Zone 3. Areas to the south of the A415 near to the river corridor (i.e. Dorchester-On-Thames and Caldecott) are likely to be at greater risk from fluvial flooding over the lifetime of the development.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment of the section identifies that 1.5% of the study area is designated to be in an area of high surface water flood risk (3.3% (1 in 30) AEP) and 2.7% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area is detailed to have low to very low surface water flood risk. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.
Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities' SFRA’s and the EA’s ASIGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 31% of the study area is within an area of medium to high risk (see Table 10-2).

Table 10-2 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>15.4</td>
<td>• Abingdon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South of Abingdon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• North of Didcot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wallingford</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>15.9</td>
<td>• South-west Abingdon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Abingdon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• South-west of Didcot</td>
</tr>
</tbody>
</table>

Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 10-3.

Table 10-3 Reservoir Breach Extents

<table>
<thead>
<tr>
<th>Flow Path</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flows south of Oxford and meanders around south-east of Abingdon</td>
</tr>
<tr>
<td>2</td>
<td>Flows in south-westerly direction from north-east of Aylesbury following the River Thame and heads in a south westerly direction towards the north of Wallingford</td>
</tr>
</tbody>
</table>

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of previous recorded flooding events from the sea, river and groundwater. According to the EA data set 7.5% of the study area has been recorded to have flooded historically. There are records of flooding outside of the existing Flood Zone 2 and 3 associated with the River Thames and River Thame, identifying additional areas north of Didcot at risk of fluvial flooding.

Other Flood Sources
The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**

Table 10-4 shows the WFD operational catchments and WFD water body catchments which lie within Section CS-1.

### Table 10-4: WFD operational and WFD water body catchments within Section CS-1

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thames</td>
<td>Gloucestershire and the Vale</td>
<td>Ock</td>
<td>Thames (Evenlode to Thame)</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ock and tributaries (Land Brook confluence to Thames)</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sandford Brook (source to Ock)</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cow Common Brook and Portobello Ditch</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ginge Brook and Mill Brook</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Moor Ditch and Ladygrove Ditch</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frilford and Marcham Brook</td>
<td>Yes</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Childrey Brook and Norbrook at Common Barn</td>
<td>Yes</td>
</tr>
<tr>
<td>Kennet and Trib</td>
<td>Kennet</td>
<td>Winterbourne</td>
<td>Thames Wallingford to Caversham</td>
<td>Yes</td>
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<td></td>
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<td></td>
<td>Cholsey Brook and tributaries</td>
<td>Yes</td>
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<td>Mill Brook and Bradfords Brook system, Wallingford</td>
<td>Yes</td>
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<td></td>
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<td></td>
<td>Ewelme Stream (Source to Thames)</td>
<td>Yes</td>
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<td></td>
<td></td>
<td></td>
<td>Berrick Stream and Lady Brook</td>
<td>Yes</td>
</tr>
<tr>
<td>Thames and Chilterns South</td>
<td>Chilterns South</td>
<td>Pang</td>
<td>Thame (Scotsgrove Brook to Thames)</td>
<td>Yes</td>
</tr>
</tbody>
</table>
River Basin District | WFD Management Catchment | WFD Operational Catchment | WFD Water Body Catchment | Large WFD Water Body Crossing |
---|---|---|---|---|
| Baldon Brook (South of Oxford) | Yes |
| Latchford Brook at Tetsworth | No |
| Haseley Brook | Yes |
| Chalgrove Brook | Yes |

*Groundwater*

Section CS-1:

- Crosses a chalk Principal bedrock aquifer (underlies 50 to 75% of the section)
- Crosses a sandstone Principal bedrock aquifer
- Crosses 2 Secondary A bedrock aquifers
- Crosses 2 Secondary A superficial deposit aquifers
- Contains 2 SPZ1s associated with licenced potable abstractions
- Contains 1 SPZ2 associated with licenced potable abstractions
- Contains 5 SPZ3s associated with licenced potable abstractions
- Contains 76 licensed groundwater abstractions
- Contains 5 potential GWDTE
- Contains approximately 25 springs as marked on the OS 1:25,000 map

*Section CS-2*

*Flood Risk*

*Fluvial*

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 10-5. There are two rivers within this section that have significant areas of Flood Zone 3b (functional floodplain):

- River Great Ouse – flows east through Bedford heading north towards St Neots
- River Ivel (a tributary of the River Great Ouse) – flows in a north-westerly direction from Biggleswade prior to joining the River Great Ouse north of Blunham.

Flood Zones 2 and 3 associated with the River Great Ouse is extensive within this section.
Table 10-5 Quantitative Analysis of Rivers and Fluvial Flood Risk

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>36.8</td>
<td>550.6</td>
<td>10.2</td>
<td>7.7</td>
</tr>
</tbody>
</table>

In the absence of detailed hydraulic modelling at this early stage in the development of the scheme, the extent of Flood Zone 2 has been adopted to assess the potential future extent of Flood Zone 3 as a result of climate change. The assessment identifies that there will be an approximately 2% increase in the area identified as Flood Zone 3. The published Flood Zones indicate that there will be areas such as Bedford that may be at a greater risk of fluvial flooding.

Surface Water

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment identifies that 3.1% of the section is within an area of high surface water flood risk (3.3% (1 in 30) AEP) and 6.0% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area has a low to very low risk of surface water flooding. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

Groundwater

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASTGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 41% of the study area is within an area of medium to high risk (see Table 10-6).

Table 10-6 Areas at high to medium risk of groundwater flooding

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 75%)</td>
<td>22.2</td>
<td>• South-east of Bedford (following the River Great Ouse)</td>
</tr>
<tr>
<td>Medium (50 – 75%)</td>
<td>18.8</td>
<td>• South-east of Bedford (following the River Great Ouse)</td>
</tr>
</tbody>
</table>

Reservoir Failure

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975 Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding.
should they fail, that have not been considered in this assessment. The flow routes that intersect this section have been detailed in Table 10-7.

**Table 10-7 Reservoir Breach Extents**

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A number of flow paths identified from various ponds/basin which seem to flow in a northerly direction towards to the St Neots, following the River Great Ouse and tributaries.</td>
</tr>
</tbody>
</table>

**Historic Flooding**

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA’s dataset, 6.3% of the section has been recorded to have flooded historically. There are records of flooding outside the existing flood zones, identifying additional areas at risk of flooding particularly in Bedford.

**Other Flood Sources**

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

**Geomorphology, WFD and Water Quality**

Table 10-8 shows the WFD operational catchments and WFD water body catchments which lie within Section CS-2.

**Table 10-8: WFD operational catchments and WFD water body catchments which lie within Section CS-2**

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Cam and Ely Ouse</td>
<td>Great Ouse Lower</td>
<td>Ouse (Roxton to Earith)</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Begwary Brook</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Stone Brook</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ivel</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ivel (DS Langford to Roxton)</td>
<td>Yes</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Flist tributary</td>
<td>No</td>
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<td></td>
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<td></td>
<td>Running Waters-Steppingley</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flist and Ivel Navigation d/s of Shefford</td>
<td>No</td>
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<td></td>
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<td></td>
<td>Chicksands Brook</td>
<td>No</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Ickwell Brook</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Great Ouse</td>
<td>Renhold Brook</td>
</tr>
<tr>
<td>River Basin District</td>
<td>WFD Management Catchment</td>
<td>WFD Operational Catchment</td>
<td>WFD Water Body Catchment</td>
<td>Large WFD Water Body Crossing</td>
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<tr>
<td>Bedford</td>
<td></td>
<td>Cople Brook</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ouse (Newport Pagnell to Roxton)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elstow Brook (DS Shortstown)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elstow Brook (US Shortstown)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Harrowden Brook</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Ouse and Milton Keynes</td>
<td></td>
<td>Broughton Brook</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

**Groundwater**

Section CS-2:

- Crosses a sandstone Principal bedrock aquifer (underlies less than 25% of the section)
- Crosses a limestone Principal bedrock aquifer (underlies less than 10% of the section)
- Crosses 1 Secondary A bedrock aquifer
- Crosses 2 Secondary A superficial deposit aquifers
- Contains 2 SPZ3s associated with licenced potable abstractions
- Contains 23 licensed groundwater abstractions
- Contains 3 potential GWDTE
- Contains approximately 5 springs as marked on the OS 1:25,000 map

**Section CS-4**

**Flood Risk**

**Fluvial**

There are a number of Main Rivers and Ordinary Watercourses within the study area. The EA’s ‘Flood Map for Planning’ indicates that there are areas of Flood Zone 2 and 3 associated with the watercourses in the study area, detailed in Table 10-9. There is one river within this section that has a small area of Flood Zone 3b (functional floodplain):

- Washpit Brook (a tributary of the River Great Ouse) – flows north of Girton Interchange in a north-westerly and then joins the River Great Ouse.
Flood Zones 2 and 3 associated with the Beck Brook and other tributaries in this section is small.

**Table 10-9 Quantitative Analysis of Rivers and Fluvial Flood Risk**

<table>
<thead>
<tr>
<th>Total length of Main Rivers (km)</th>
<th>Total length of Ordinary Watercourses (km)</th>
<th>% of area within Flood Zone 3</th>
<th>% of area within Flood Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>155.0</td>
<td>2.6</td>
<td>4.2</td>
</tr>
</tbody>
</table>

In the absence of hydraulic modelling the extent of Flood Zone 2 has been adopted to assess future Flood Zone 3 extent. The assessment identifies that there will be approximately 2% increase in the area identified as Flood Zone 3. The published Flood Zones indicate that there will be areas such as north-west of Cambridge that may be at a greater risk of fluvial flooding.

**Surface Water**

There are a number of flow paths identified in the RoFSW mapping representing ordinary (smaller) watercourses and overland flow paths. A detailed assessment identifies that 3.0% of the section is within an area of high surface water flood risk (3.3% (1 in 30) AEP) and 4.2% is within an area of medium (1% (1 in 100) AEP) surface water flood risk. The remaining area has a low to very low risk of surface water flooding. The majority of the surface water flow paths are attributed to watercourses; however, some do appear to represent overland flow paths away from watercourses.

**Groundwater**

The groundwater susceptibility maps identified in the Local Planning Authorities’ SFRA’s and the EA’s ASIGWF dataset indicates that the predicted risk of groundwater flooding varies across the section. The risk varies from low (within a 1km grid square where less than 25% of the areas is susceptible to groundwater flooding) to high risk (within a 1km grid square where greater than 75% of the areas is susceptible to groundwater flooding). Based on the available data approximately 27% of the study area is within an area of medium to high risk (see Table 10-10).

**Table 10-10 Areas at high to medium risk of groundwater flooding**

<table>
<thead>
<tr>
<th>Rankings</th>
<th>Area (%)</th>
<th>Major Areas at Risk</th>
</tr>
</thead>
</table>
| High (> 75%) | 10.3 | • North-west of Cambridge  
|           |          | • West of Cambourne      |
| Medium (50 – 75%) | 16.8 | • South-west of Cambourne |  

**Reservoir Failure**

EA mapping provides an indication of areas potentially at risk of flooding due to the failure of a reservoir. It should be noted that this dataset only includes those registered under the 1975...
Reservoirs Act. There could be further reservoirs, not registered, that pose a risk of flooding should they fail, that have not been considered in this assessment. The mapping indicates there are no areas that will be impacted by reservoir failure.

Historic Flooding

The EA’s Historic Flood Maps detail the maximum extent of recorded flood outlines from the sea, river and groundwater. According to the EA’s dataset, 2.0% of the section has been recorded to have flooded historically. There are records of flooding outside the existing flood zones, identifying additional areas at risk of flooding particularly in south-east of Oakington.

Other Flood Sources

The study area lies outside areas that would be influenced by tidal or coastal flooding. However further information will be sought from the relevant flood risk management authorities at Stage 1B to determine if there is predicted to be any change in the assessment of flood risk from these sources over the lifetime of the development.

Geomorphology, WFD and Water Quality

Table 10-11 shows the WFD operational catchments and WFD water body catchments which lie within Section CS-4.
Table 10-11: WFD operational and WFD water body catchments within Section CS-4

<table>
<thead>
<tr>
<th>River Basin District</th>
<th>WFD Management Catchment</th>
<th>WFD Operational Catchment</th>
<th>WFD Water Body Catchment</th>
<th>Large WFD Water Body Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglian</td>
<td>Cam and Ely Ouse</td>
<td>Cam Lower</td>
<td>Bourn Brook</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cam</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bin Brook</td>
<td>No</td>
</tr>
<tr>
<td>South Level and Cut-Off Channel</td>
<td></td>
<td></td>
<td>Old West River</td>
<td>No</td>
</tr>
<tr>
<td>Great Ouse Lower</td>
<td></td>
<td></td>
<td>Swavesey Drain</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fen Drayton Drain</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>West Brook</td>
<td>No</td>
</tr>
</tbody>
</table>

**Groundwater**

Section CS-4:

- Crosses a chalk Principal bedrock aquifer and a sandstone Principal aquifer (underlie 25 to 50% of the section)
- Contains 1 SPZ3 associated with licenced potable abstractions
- Contains 4 licensed groundwater abstractions
- Contains 2 potential GWDTE
- Contains approximately 2 springs as marked on the OS 1:25,000 map

**10.2 Environmental assessment**

This corridor has not been assessed as it does not have a direct bearing on the review of ‘missing link’ corridor options between the A34 Abingdon and the M1 at Milton Keynes, which is the focus of this report.
11. **Summary of Scores**

The overall breakdown of scores by discipline by section for each corridor is provided in Table 11-1.

A summary of the outcome of the Stage 1A environment assessment against the project intervention objectives and overall strategic objective for environment is provided in Table 11-2.
Table 11-1 Summary of environment assessment by section

<table>
<thead>
<tr>
<th>Intervention Objective</th>
<th>Discipline</th>
<th>Qualitative section score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Corridor A</td>
</tr>
<tr>
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</tbody>
</table>
## Oxford to Cambridge Expressway

### Appendix E: Supplementary Environmental Information

<table>
<thead>
<tr>
<th>Overall Environment</th>
<th>Overall Corridor</th>
<th>Overall Section</th>
<th>B3-4</th>
<th>C3-3</th>
<th>C3-2</th>
<th>C3-1</th>
<th>C2-4</th>
<th>C2-3</th>
<th>C2-2</th>
<th>C2-1</th>
<th>C1-4</th>
<th>C1-3</th>
<th>C1-2</th>
<th>C1-1</th>
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<td>B</td>
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<td>Cultural Heritage</td>
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<td>Landscape and Visual</td>
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<td>Overall Corridor</td>
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<td>Air Quality</td>
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<td>Noise and Vibration</td>
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<td>People and Communities</td>
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<td>Overall Section</td>
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<td>Overall Corridor</td>
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</tbody>
</table>
## Table 11-2 Summary of environment assessment

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Intervention objectives assessment</th>
<th>Strategic objective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Objective 1</td>
<td>Objective 2</td>
</tr>
<tr>
<td>A</td>
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<td></td>
</tr>
<tr>
<td>B1</td>
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<td>C1</td>
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<td>C3</td>
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</table>
Annex A. Figures
## Annex B. Constraints mapping NN NPS justification

<table>
<thead>
<tr>
<th>Receptor</th>
<th>NN NPS paragraph for consideration</th>
<th>Other National Legal / Policy text consideration (if necessary)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Quality</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Air Quality Management Area SPA, SAC, SSSI and Ramsar sites designated for the conservation of protected species and habitats</td>
<td>5.11 Air quality considerations are likely to be particularly relevant where schemes are proposed within or adjacent to AQMAs;... or nature conservation sites (including Natura 2000 sites and SSSIs...)</td>
</tr>
<tr>
<td>III</td>
<td>Residential properties and other sensitive human receptor sites</td>
<td>4.79 National road and rail networks... have the potential to affect the health, well-being and quality of life of the population. They can have direct impacts on health because of traffic,... air quality and emissions.</td>
</tr>
<tr>
<td><strong>Cultural Heritage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>World Heritage Sites Scheduled Monuments Grade I and Grade II* Listed Buildings Grade I and Grade II* Registered Park and Gardens Registered battlefields (To have regard for the settings of the above constraints)</td>
<td>5.131 Substantial harm to or loss of designated assets of the highest significance including World Heritage Sites, Scheduled Monuments, grade I and grade II* listed buildings, Registered Battlefields, and grade I and grade II* Registered Park and Gardens should be wholly exceptional. 5.131 Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting.</td>
</tr>
<tr>
<td>II</td>
<td>Grade II listed buildings</td>
<td>5.131 Substantial harm to or loss of a grade II Listed Building or a grade II Registered Park</td>
</tr>
<tr>
<td>Receptor</td>
<td>NN NPS paragraph for consideration</td>
<td>Other National Legal / Policy text consideration (if necessary)</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>Grade II Registered Park and Garden (To have regard for the settings of the above constraints)</td>
<td>and Garden should be exceptional. 5.131 Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting.</td>
<td></td>
</tr>
<tr>
<td>Conservation Area</td>
<td>5.123 Some heritage assets have a level of significance that justifies official designation. Categories of designated heritage assets include Conservation Areas.</td>
<td>No specific decision making criteria in NPS for Conservation Areas. However, this is considered to be an important environmental constraint to avoid. Conservation Areas are given similar value to Grade II listed buildings to adhere with the nationally accepted significance criteria defined in DMRB guidance.</td>
</tr>
<tr>
<td>III Non-designated heritage assets of archaeological interest (<em>not considered in Stage 1A for reasons of proportionality</em>)</td>
<td>5.128 and 5.129 The Secretary of State should seek to identify and assess the particular significance of any heritage asset that may be affected by the proposed development… to avoid or minimize conflict between their conservation and any aspect of their proposal.</td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I National Parks Areas of Outstanding Natural Beauty</td>
<td>5.151 The Secretary of State should refuse development consent in these areas [National Parks... Areas of Outstanding Natural Beauty] except in exceptional circumstances and where it can be demonstrated that it is in the public interest. 5.152 There is a strong presumption against any significant road widening or the building of new roads… in a National Park, the Broads and</td>
<td></td>
</tr>
</tbody>
</table>

HE565628-JAC-EGN-SCHW_MT-RP-LE-0009 | Rev P01
September 2018
### Receptor | NN NPS paragraph for consideration | Other National Legal / Policy text consideration (if necessary)
--- | --- | ---
**Areas of Outstanding Natural Beauty, unless it can be shown there are compelling reasons for the new or enhanced capacity and with any benefits outweighing the costs vary significantly. Planning of the Strategic Road Network should encourage route that avoid National Parks, the Broads and Areas of Outstanding Natural Beauty.**

**II** Setting of National Parks and/or AONB | 5.154 The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries of these areas which may have impacts within them. The aim should be to avoid compromising the purposes of designation and such projects should be designed sensitively given the various sifting, operational, and other relevant constraints.

**III** Local landscape designations | 5.156 Where a local development document in England has policies based on landscape character assessment, these should be given particular consideration. However, local landscape designations should not be used in themselves as reasons to refuse consent, as this may unduly restrict acceptable development.

---

**Nature Conservation**

**I** Special Areas of Conservation Special Protection | 5.27 The most important sites for biodiversity are those identified through international
### Receptor

<table>
<thead>
<tr>
<th>Areas Ramsar sites</th>
<th>NN NPS paragraph for consideration</th>
<th>Other National Legal / Policy text consideration (if necessary)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>conventions and European Directives. The Habitats Regulations provide statutory protection for European sites. This includes candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas. The National Planning Policy Framework states that the following wildlife sites should have the same protection as European sites: listed or proposed Ramsar sites.</td>
<td></td>
</tr>
<tr>
<td>Sites of Special Scientific Interest</td>
<td>5.29 Where a proposed development on land within or outside a SSSI is likely to have an adverse effect on an SSSI, development consent should not normally be granted.</td>
<td></td>
</tr>
<tr>
<td>National Nature Reserves</td>
<td>5.28 All National Nature Reserves are notified as Sites of Special Scientific Interest (SSSIs).</td>
<td></td>
</tr>
<tr>
<td>Ancient woodland Aged or veteran trees</td>
<td>5.32 The Secretary of State should not grant development consent for any development that would result in the loss or deterioration of irreplaceable habitats including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the national need for and benefits of the development, in that location, clearly outweigh the loss.</td>
<td></td>
</tr>
</tbody>
</table>

### II

<p>| Non-statutory designated sites | 5.31 Sites of regional and local biodiversity interest (which | |</p>
<table>
<thead>
<tr>
<th>Receptor</th>
<th>NN NPS paragraph for consideration</th>
<th>Other National Legal / Policy text consideration (if necessary)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(including Local Nature Reserves and Local Wildlife Sites)</td>
<td>include Local Nature Reserves and Local Wildlife Sites and Nature Improvement Areas) have a fundamental role to play in meeting overall national biodiversity targets, in contributing to the quality of life and the well-being of the community, and in supporting research and education. The Secretary of State should give due consideration to such regional or local designation. However, given the need for new infrastructure, these designations should not be used in themselves to refuse development consent.</td>
<td></td>
</tr>
<tr>
<td>RSPB reserves</td>
<td>5.26 In taking decisions, the Secretary of State should ensure that appropriate weight is attached to designated sites of international, national and local importance, protected species, habitats and other species of principal importance for the conservation of biodiversity, and to biodiversity and geological interests within the wider environment.</td>
<td></td>
</tr>
<tr>
<td>Priority habitat</td>
<td>4.25 Where a development may negatively affect any priority habitat or species on a site for which they are a protected feature, any Imperative Reasons of Overriding Public Interest (IROPI) case would need to be established solely on one or more of the grounds relating to human health, public safety or beneficial consequences of primary importance to the environment.</td>
<td></td>
</tr>
</tbody>
</table>
### Geology and soils

<table>
<thead>
<tr>
<th>Receptor</th>
<th>NN NPS paragraph for consideration</th>
<th>Other National Legal / Policy text consideration (if necessary)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Sites of Scientific Interest</td>
<td>5.29 Where a proposed development on land within or outside a SSSI is likely to have an adverse effect on an SSSI, development consent should not normally be granted.</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>Regionally Important Geological Sites and other locally designated sites</td>
<td>5.31 Sites of regional and local geological interest (which include Local Geological Sites) have a fundamental role … in contributing to the quality of life and the well-being of the community, and in supporting research and education. The Secretary of State should give due consideration to such regional or local designation. However, given the need for new infrastructure, these designations should not be used in themselves to refuse development consent.</td>
</tr>
<tr>
<td>Permitted mineral reserves</td>
<td>5.169 Applicants should safeguard any mineral resources on the proposed site as far as possible.</td>
<td></td>
</tr>
<tr>
<td>Operational mines and quarries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mineral Safeguarding Areas</td>
<td>5.182 Where a proposed development has an impact on a Mineral Safeguarding Area (MSGA), the Secretary of State should ensure that the applicant has put forward appropriate mitigation measures to safeguard mineral resources.</td>
<td></td>
</tr>
<tr>
<td>Authorised landfill sites</td>
<td></td>
<td>No specific decision making criteria in NPS. However, these are considered to be environmental constraints to</td>
</tr>
</tbody>
</table>
## Noise and Vibration

<table>
<thead>
<tr>
<th>Receptor</th>
<th>NN NPS paragraph for consideration</th>
<th>Other National Legal / Policy text consideration (if necessary)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>avoid where practicable.</td>
</tr>
</tbody>
</table>

### I

### II Noise Important Areas

5.200 Applicants should consider opportunities to address the noise issues associated with the Important Areas as identified through the noise action planning process.

### III Noise sensitive premises

5.188 Factors that will determine the likely noise impact include: the proximity of the proposed development to noise sensitive premises (including residential properties, schools and hospitals) and noise sensitive areas (including certain parks and open spaces).  
5.189 Where a development is subject to EIA and significant noise impacts are likely to arise from the proposed development, the applicant should include… identification of noise sensitive premises and noise sensitive areas that may be affected… an assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas.

---

## People and communities

### I Communities (where the highway would introduce severance)

3.22 Where appropriate applicants should seek to deliver improvements that reduce community severance and improve accessibility.  

### II Existing open space

5.166 Existing open space,
<table>
<thead>
<tr>
<th>Receptor</th>
<th>NN NPS paragraph for consideration</th>
<th>Other National Legal / Policy text consideration (if necessary)</th>
</tr>
</thead>
<tbody>
<tr>
<td>sports and recreational buildings and land, including country parks and war cemeteries</td>
<td>sports and recreational buildings and land should not be developed unless the land is surplus to requirements or the loss would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location.</td>
<td></td>
</tr>
<tr>
<td>III Best and most versatile agricultural land (grade 1 – 3a)</td>
<td>5.168 Applicants should take into account the economic and other benefits of the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification). Where significant development of agricultural land is demonstrated to be necessary, applicants should seek to use areas of poorer quality land in preference to that of a higher quality.</td>
<td></td>
</tr>
<tr>
<td>National trails</td>
<td>5.184 Public rights of way, National Trails, and other rights of access to land (such as open access land) are important recreational facilities for walkers, cyclists and equestrians. Applicants are expected to take appropriate mitigation measures to address adverse effects on National Trails, other public rights of way and open access land and, where appropriate, to consider what opportunities there may be to improve access.</td>
<td></td>
</tr>
<tr>
<td>National and regional cycle routes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public rights of way (not considered in Stage 1A for reasons of proportionality)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential properties</td>
<td>No specific decision making criteria in NPS. However, these are considered to be obvious community constraints to avoid where practicable.</td>
<td></td>
</tr>
<tr>
<td>Educational facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary healthcare facilities and hospitals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Places of worship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptor</td>
<td>NN NPS paragraph for consideration</td>
<td>Other National Legal / Policy text consideration (if necessary)</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Nursing and care homes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road drainage and the water environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Flood zone 3b</td>
<td>5.105 If the development is not essential transport infrastructure that has to cross the area at risk, it is not appropriate in Flood Zone 3b, the functional floodplain where water has to flow and be stored in times of flood.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.109 Any project that is classified as ‘essential infrastructure’ and proposed to be located in Flood Zone 3a or b should be designed and constructed to remain operational and safe for users in times of flood; and any project in Zone 3b should result in no net loss of floodplain storage and not impede water flows.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EA Exception Test requirements apply for developments in Flood Zone 3.</td>
</tr>
<tr>
<td>II</td>
<td>Source protection zones 1</td>
<td>No specific decision making criteria in NPS. However, this is considered an environmental constraint to avoid for the reasons set out below:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In “The Environment Agency’s Approach to Groundwater Protection” (November 2017):</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Approach N8 states “within SPZ1, the Environment Agency will normally object in principle to any planning application for a development that may physically disturb an aquifer.”</td>
</tr>
<tr>
<td>II</td>
<td>Flood zone 3 Surface water flood risk</td>
<td>5.105 If there is no reasonably available site in Flood Zones 1 or 2, then national networks infrastructure projects can be</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptor</td>
<td>NN NPS paragraph for consideration</td>
<td>Other National Legal / Policy text consideration (if necessary)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Groundwater flood risk                                                 | located in Flood Zone 3, subject to the Exception Test.  
5.106 The [Exception] test provides a method of managing flood risk while still allowing necessary development to occur.  
5.109 Any project that is classified as ‘essential infrastructure’ and proposed to be located in Flood Zone 3a or b should be designed and constructed to remain operational and safe for users in times of flood.  
5.93 This [Flood Risk Assessment] should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account. |                                                                                                                                                                                                             |
| Principal aquifers Secondary A aquifers Source protection zone 2 and 3 GWDTE SSSI Licensed groundwater abstractions Significant spring discharges | No specific decision making criteria in NPS. However, these are considered important environmental constraints to avoid for the reasons explained below:  
In “The Environment Agency’s Approach to Groundwater Protection” (November 2017):  
Approach N11 states “for any proposal that would physically disturb aquifers, lower groundwater levels, or impede or intercept groundwater flow, the Environment Agency will seek to achieve equivalent protection for water resources and the related groundwater-dependent environment as if the effect were caused by a
<table>
<thead>
<tr>
<th>Receptor</th>
<th>NN NPS paragraph for consideration</th>
<th>Other National Legal / Policy text consideration (if necessary)</th>
</tr>
</thead>
<tbody>
<tr>
<td>III Flood zone 2</td>
<td>5.105 If there is no reasonably available site in Flood Zone 1, then projects can be located in Flood Zone 2.</td>
<td>licensesable abstraction.”</td>
</tr>
<tr>
<td>Reservoir flooding</td>
<td>5.93 This [Flood Risk Assessment] should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account.</td>
<td></td>
</tr>
<tr>
<td>Large WFD water body</td>
<td>5.226 In terms of Water Framework Directive compliance, the overall aim of projects should be no deterioration of ecological status in watercourses.</td>
<td></td>
</tr>
<tr>
<td>Secondary B aquifers</td>
<td>No specific decision making criteria in NPS. However, this is considered to be an environmental constraint to avoid where practicable for the reasons explained below:</td>
<td>In “The Environment Agency’s Approach to Groundwater Protection” (November 2017): Approach N11 states “for any proposal that would physically disturb aquifers, lower groundwater levels, or impede or intercept groundwater flow, the Environment Agency will seek to achieve equivalent protection for water resources and the related groundwater-dependent environment as if the effect were caused by a licensesable abstraction.”</td>
</tr>
</tbody>
</table>


Annex C. Materials and waste note

1. Introduction

This note provides details of the progress made to date (in Stage 1A) with regards to the material assessment for the proposed Oxford to Cambridge Expressway.

The scope of the ‘materials’ topic is defined as comprising the:

- use of material resources; and
- generation and management of waste

With regards to materials and waste, it is not possible to evaluate each corridor individually using DMRB guidance to further understand the possible significant effects. This is due to the lack of design information on material and waste quantities such that a quantitative assessment cannot be carried out to compare the corridors. It is likely that all corridors would have a significant impact due to the scale and length of the propose scheme.

2. Baseline

The expressway would be routed through a number of local authority jurisdictions. The below provides a high level summary of the materials and waste baseline information that has been collated for the relevant areas.

2.1 Materials

The principal raw materials used in road construction are aggregates, including sand and gravel. ‘Primary aggregate’ is the term used for aggregate produced from naturally occurring mineral deposits and used for the first time. Other types of materials likely to be required for construction include, bulk earthworks materials, road paving materials, steel, concrete, bricks and timber.

Data for the materials baseline has been taken from a report produced by the British Geological Survey which provides an overall summary of information on regional and national sales, consumption, and permitted reserves of primary aggregates.

Table C.1 shows a summary of permitted reserves of land-won primary aggregates (sands and gravel and crushed rock) in active and inactive sites at 31st December 2014, within the East Midlands, East of England and South East. Active sites are those that are currently operational, inactive sites are sites that have either been worked in the past or are yet to be worked that contain permitted reserves of aggregates. It shows that the largest permitted reserves for sands and gravel were highest in the East Midlands and for crushed rock in the South East. The overall permitted reserve of land-won primary aggregates in active and inactive sites totalling 605 million tonnes.
Table C.1 Permitted reserves of land-won primary aggregates in active and inactive sites at 31st Dec 2014 (thousand tonnes)

<table>
<thead>
<tr>
<th>Region</th>
<th>Sands and Gravels</th>
<th>Crushed Rock</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Active</td>
<td>Inactive - worked in the past</td>
</tr>
<tr>
<td>East of England</td>
<td>45,491</td>
<td>7,993</td>
</tr>
<tr>
<td>East Midlands</td>
<td>101,528</td>
<td>4,854</td>
</tr>
<tr>
<td>South East</td>
<td>70,560</td>
<td>17,362</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>217,579</strong></td>
<td><strong>30,209</strong></td>
</tr>
</tbody>
</table>

With an overall total sales of primary aggregates for all the regions considered being approximately 88 million tonnes.

Table C.1 shows a summary of land won sand and gravel, marine sand and gravel and crushed rock sales in 2014, within the East Midlands, East of England and South East. Table C.2 shows that the sales of land-won sands and gravels was highest in the East of England and sales of crushed rock was highest in the East Midlands in 2014. With an overall total sales of primary aggregates for all the regions considered being approximately 88 million tonnes.
Table C.2 Summary sales of primary aggregates in 2014

<table>
<thead>
<tr>
<th>Region</th>
<th>Land-won sand and gravel</th>
<th>Marine sand and gravel</th>
<th>Total sand and gravel</th>
<th>Crushed rock</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Thousand tonnes</td>
<td></td>
<td>Thousand tonnes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>East of England</td>
<td>11,586</td>
<td>350</td>
<td>11,936</td>
<td>632</td>
<td>24,504</td>
</tr>
<tr>
<td>East Midlands</td>
<td>6,600</td>
<td>-</td>
<td>6,600</td>
<td>23,808</td>
<td>37,008</td>
</tr>
<tr>
<td>South East</td>
<td>5,858</td>
<td>6,626</td>
<td>12,484</td>
<td>1,795</td>
<td>26,763</td>
</tr>
<tr>
<td>Total</td>
<td>24,044</td>
<td>6,976</td>
<td>31,020</td>
<td>26,235</td>
<td>88,275</td>
</tr>
</tbody>
</table>

Table C.3 shows a summary of consumption of sand and gravel, marine sand and gravel and crushed rock in 2014, within the East Midlands, East of England and South East. Table C.3 shows that the consumption of land-won sands and gravels was highest in the East Midlands and consumption of crushed rock was highest in the East of England in 2014. With an overall total consumption of primary aggregates for all the regions considered being approximately 76 million tonnes.

Table C.3 Summary of consumption of primary aggregates in 2014

<table>
<thead>
<tr>
<th>Region</th>
<th>Land-won sand and gravel</th>
<th>Marine sand and gravel</th>
<th>Total sand and gravel</th>
<th>Crushed rock</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Thousand tonnes</td>
<td></td>
<td>Thousand tonnes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>East of England</td>
<td>5,623</td>
<td>6,448</td>
<td>12,071</td>
<td>7,126</td>
<td>31,268</td>
</tr>
<tr>
<td>East Midlands</td>
<td>9,965</td>
<td>1,311</td>
<td>11,276</td>
<td>4,841</td>
<td>27,393</td>
</tr>
<tr>
<td>South East</td>
<td>5,750</td>
<td>4</td>
<td>5,754</td>
<td>6,289</td>
<td>17,797</td>
</tr>
<tr>
<td>Total</td>
<td>21,338</td>
<td>7,763</td>
<td>29,101</td>
<td>18,256</td>
<td>76,458</td>
</tr>
</tbody>
</table>

Table C.2 and Table C.3 show that the regions export slightly more aggregates than they consume. Depending on the reserves available during construction of the Proposed Scheme it might be that aggregates will need to be imported from outside the regions (East of England, East Midlands and the South East).

Further baseline information on quarries including quarry locations and material availability will be collected during the Stage 1B assessment when routes are shortlisted.

2.2 Waste

Construction works are likely to produce a range of waste types including inert, non-hazardous and hazardous wastes. The majority of wastes produced would be construction

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and demolition type wastes (including green wastes from site clearance) as well as non-construction and demolition waste associated with construction workers including packaging, food waste and sewerage.

Available latest published data from the Environment Agency has been used to collate information on the landfill capacity and the transfer, treatment and metal recycling site inputs baseline. Table C.4 provides details of the total available landfill capacity in the East Midlands, East of England and South East.

**Table C.4 Landfill capacity in 2016 (all figures are provided in 000 cubic meters)**

<table>
<thead>
<tr>
<th>Landfill Type</th>
<th>East Midlands</th>
<th>East of England</th>
<th>South East</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous Merchant</td>
<td>1,040</td>
<td>-</td>
<td>550</td>
<td>1,590</td>
</tr>
<tr>
<td>Hazardous Restricted</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Non Hazardous with SNRHW cell*</td>
<td>19,119</td>
<td>6,528</td>
<td>29,386</td>
<td>55,033</td>
</tr>
<tr>
<td>Non Hazardous</td>
<td>16,360</td>
<td>28,620</td>
<td>17,237</td>
<td>62,217</td>
</tr>
<tr>
<td>Non Hazardous Restricted</td>
<td>3,564</td>
<td>484</td>
<td>-</td>
<td>4,048</td>
</tr>
<tr>
<td>Inert</td>
<td>23,524</td>
<td>35,952</td>
<td>29,795</td>
<td>89,271</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>63,607</strong></td>
<td><strong>71,584</strong></td>
<td><strong>76,978</strong></td>
<td><strong>212,169</strong></td>
</tr>
</tbody>
</table>

Table C.5 provides details of the transfer, treatment and metal recycling site inputs in 2016 for the East Midlands, East of England and South East.

**Table C.5 Transfer, treatment and metal recycling site inputs 2016 (all figures are provided in 000 tonnes)**

<table>
<thead>
<tr>
<th>Transfer</th>
<th>East Midlands</th>
<th>East of England</th>
<th>South East</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous Waste</td>
<td>621</td>
<td>1,094</td>
<td>849</td>
<td>2,564</td>
</tr>
<tr>
<td>HIC</td>
<td>2,709</td>
<td>2,832</td>
<td>4,381</td>
<td>9,922</td>
</tr>
<tr>
<td>Clinical</td>
<td>12</td>
<td>186</td>
<td>125</td>
<td>323</td>
</tr>
<tr>
<td>Civic amenity site</td>
<td>433</td>
<td>576</td>
<td>1,497</td>
<td>2,506</td>
</tr>
</tbody>
</table>

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Further baseline information on waste infrastructure including the location of the facilities in the region will be collected during the Stage 1B Assessment.

3. Corridor Assessment

At corridor assessment stage, with regards to materials and waste, it is not possible to evaluate each corridor individually using DMRB guidance to further understand the possible significant effects. This is due to the lack of design information on material and waste quantities such that a quantitative assessment cannot be carried out to compare the corridors. A high level, non-quantitative assessment, using professional judgement, was therefore carried out to provide an overview of the impacts associated with the consumption of materials and the generation of waste that could arise for all corridors during both construction and operation.

Issues common to all corridor options include the following:

- cut and fill volumes;
- depletion of finite material resources;
- potential impact on local waste management infrastructure; and
- impact on landfill capacity.
It is considered that the assessment of materials is unlikely to be a deciding factor between the corridor options as it is anticipated the effects would be significant for all options given the scale of the Proposed Scheme. Some factors may differentiate between the corridor options to a certain extent which could impact on the consumption of materials and the generation of waste, including route lengths, the number and size of structures (such as bridges) along the route, earthworks activities and the length and proportion of offline sections. However, this information is only likely to be available after a preferred corridor is chosen and outline designs are generated for specific shortlisted route options within the preferred corridor.

A summary of the potential effects associated with the consumption of material resources and the production and management of waste that could arise from all corridor options is provided in Table C.6.

**Table C.6 Potential effects associated with consumption of material resources and the production and management of waste for all corridor options**

<table>
<thead>
<tr>
<th>Element</th>
<th>Use of material resources and the potential to generate significant effects</th>
<th>Production and management of waste and the potential to generate significant effects</th>
</tr>
</thead>
</table>
| Demolition         | No potential significant effects identified with regards to material resources use during demolition. | The potential for significant effects from waste disposal is associated with the commensurate reduction in landfill capacity. Landfill capacity is increasingly considered as a sensitive receptor in the UK. Waste would be produced during the demolition of any bridges, redundant carriageways, removal of footbridges, concrete crash barriers and areas of the central reserve and from any buildings / hardstandings along the line of the route. Wastes generated during demolition activities are likely to include:  
- Broken out concrete, cut steel and road surface planings.  
- Hazardous or contaminated material.  

As far as possible, arisings from demolition would be reused and / or recycled on or off-site, resulting in a beneficial effect. Where diverting site arisings from landfill is not possible, the impacts associated with waste disposal would be adverse, permanent and direct. |
<p>| Site remediation and | The following material resources are anticipated to be consumed as part of any | Wastes likely to be generated during site remediation and preparation include: |
|                    |                                                                              |                                                                                  |</p>
<table>
<thead>
<tr>
<th>Element</th>
<th>Use of material resources and the potential to generate significant effects</th>
<th>Production and management of waste and the potential to generate significant effects</th>
</tr>
</thead>
</table>
| preparation | site remediation and preparation works:  
- timber and other products required for perimeter fencing; and  
- aggregate and stone for ground improvement at site, haul roads and compounds.  
Any impacts associated with material resource consumption would be significant, adverse, temporary and direct. | • vegetation and other above ground materials produced by site clearance (potentially, including invasive weeds);  
• surplus subsoil or topsoil materials; and  
• hazardous or contaminated material.  
The presence or extent of any hazardous or contaminated substances is currently unknown.  
Any impacts associated with waste to be generated and disposed of during site remediation and preparation works would be significant, adverse, permanent and direct. However, some adverse impacts might be reduced where waste arisings can be reused such as top soil and sub soil or recycled/composted (vegetation). |
| Construction | Construction materials required are anticipated to include:  
- bulk materials for earthworks (volumes will be dependent on the cut and fill balance)  
- road paving materials, including sub-base and bituminous materials  
- steel – for structures and sheet piling  
- concrete including for pre-cast or prefabricated elements  
- bricks and aggregate | Waste likely to be generated during the construction phase:  
• green waste from vegetation clearance  
• timber  
• concrete, brick and aggregate waste  
• road paving materials including sub-base and bituminous materials  
• hazardous or contaminated material found or generated on site  
• cabling  
• redundant signage  
• steel waste such as safety barriers |
Element | Use of material resources and the potential to generate significant effects | Production and management of waste and the potential to generate significant effects
--- | --- | ---
| | • timber for fencing and formwork | • general construction waste such as packaging and ducting
| | • new signage | The volumes of waste likely to be generated and disposed of would be identified and assessed at a later stage when more information is available. Impacts as a result of waste generation would be significant, adverse, direct, and permanent.
| | • cabling | The resultant adverse effects would be the reduction of capacity at waste management facilities. As far as possible, all waste arisings would be targeted for reuse or recycling either on, or off, the Scheme. Where this is not possible, disposal is likely to be required.
| | • other general construction materials | |

The volumes of material resources required will be identified and assessed at a later stage when more design information is available. Given the scale of the scheme, impacts are likely to be significant, adverse, direct and permanent.

Operation and future maintenance

During future maintenance, renewal, or improvement works of the scheme the potential to consume material resources and produce and treat/dispose of waste may be required. The scale of any future maintenance, renewal, or improvement works is not currently known, however, given the scale and nature of the scheme it is predicted that the consumption of material resources and generation of waste has the potential to result in significant adverse effects.

### 4. Stage 1B assessment

For Stage 1A a high level assessment has been carried out to provide an overview of the potential impacts associated with the consumption of materials and the generation of waste. At this stage, given the lack of design information, the materials assessment has not been taken further and do not form part of the scoring in the Stage 1A assessment. It is intended that during the subsequent Stage 1B assessment, DMRB Interim Advice Note (IAN) 153/11 Guidance on the Environmental Assessment of Material Resources, which provides guidance on the likely impacts arising from use of materials and generation of waste from road projects, would be used as a basis to compare route options as quantitative data become available.