Figure 6.3 Phase 1 Habitat map of the Chesterton sidings earmarked for the new Cambridge Railway Station and Interchange
Figure 6.4 - Phase 1 Habitat Survey Map showing the habitats along the Highway and Busway Access Routes
Figure 6.5 - Phase 1 Habitat Survey Map showing the Bramblefields LNR and allotments along the south western boundary of the Site
Figure 6.6 - Phase 1 Habitat map of the area of Chesterton sidings north east of the Station/Interchange area
Figure 6.7 - Updated (2013) Phase 1 Habitat map of the Chesterton sidings earmarked for the new Cambridge Railway Station and Interchange
Appendix 10 provides details of the habitats recorded including:

- **Broadleaved plantation/semi-natural woodland** comprising 2% of the Study Area\textsuperscript{32}. This is found mainly along the boundary at the northern part of the Highway Access Route (plantation) and along the south western boundary between the Station/Interchange Area and the area of allotments and Bramblefields LNR (semi natural woodland).

- **Dense/continuous scrub** (46% of Study Area) located in the Station/Interchange Area, the sidings north-east of this and Bramblefields LNR.

- **Ephemeral/short perennial** (10% of Study Area) associated with the various vehicle access tracks and railway lines.

- **Poor semi-improved neutral grassland** (4% of Study Area) at the southern end of the Station/Interchange Area.

- **Scattered trees/Scattered scrub** (6% of Study Area) located sporadically around the survey area.

- **Species poor hedgerow with trees** (3% of Study Area) around the boundaries.

- **Tall ruderal habitats** (5% of Study Area) located on the edges of other habitats particularly along the Highways and Busway Access Routes.

- **Bare ground and buildings** (14% of Study Area).

- **Other** which includes arable at the allotments to the south west of the Station/Interchange Area, the ditch with running water located along the length of the Highways Access Route, ponds within the Bramblefields LNR and an area within the Station/Interchange Area which temporarily holds standing water (10% of Study Area).

6.37 Dense scrub, dominated by tall birch scrub, limits the extent of the open mosaic habitat, which is a priority conservation habitat (NERC Act 2006) and UK BAP habitat. The combination of certain individual habitats (bare ground, ephemeral/short perennial, scattered scrub and semi-improved neutral grassland) creates the open mosaic habitat\textsuperscript{33}.

\textsuperscript{32} Study Area = the Site (excluding Nuffield Road), allotments, private part of Bramblefields LNR and the sidings area to the north of the Station/Interchange Area

\textsuperscript{33} UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008 (Updated Dec 2011 defines the criteria (each criteria must be met) for Open Mosaic Habitat. These include an area of at least 0.25 ha in size, known history of disturbance at the site or evidence that soil has been removed or severely modified by previous use(s) of the site, contains some vegetation consisting of early successional communities of stress tolerant plants, unvegetated, loose bare substrate and pools, and a spatial variation forming a mosaic of one or more of the early successional communities plus bare substrate.
6.38 The combination of the habitats present indicates that the Site is of some biodiversity value and of district importance providing breeding and foraging habitat for a range of species and supporting assemblages of invertebrates and plants.

6.39 Target notes (‘TN’) indicating the location of sites/features of interest for protected species or habitats were added to maps in the field. Appendix 10 provides a description of the various features.

Protected Species

6.40 The Phase 1 Habitat Survey and literature search indicated potential for various protected species such as Great Crested Newts, reptiles, breeding birds, bats and Water Voles to be present in the area and its surroundings. In addition, the habitats were considered suitable to support notable assemblages of invertebrates and scarce plants. Whilst the ecological features present could be considered quite isolated, because of their location, these could act as linkage to the wider environment and provide commuting routes and safe-havens for wildlife.

6.41 As a result of the Phase 1 Habitat Survey, Species Specific Surveys for flora, Great Crested Newt, reptile, breeding bird, Water Vole, bat and invertebrate were undertaken during the summer of 2012 (April – September). Additional botanical/Phase 1 habitat, reptile, bat and invertebrate surveys were undertaken during the summer of 2013 (April – September).

6.42 Appendix 10 and 11 provides details of the findings of species investigated including for:

- Amphibian species where there was limited value due to the lack of waterbodies on the Highways Access and Busway Access Routes, and the Station/Interchange Area although these had the potential to act as terrestrial foraging and hibernation habitat. The Bramblefields LNR waterbodies do provide suitable habitat for breeding and foraging amphibians and have the potential to support Great Crested Newts.

- Great Crested Newt for which the surveys did not detect any presence although Common Frog and Smooth Newt were seen in the Bramblefields LNR ponds. No amphibians were found in the ditch alongside the Highways Access Route.

- Reptiles where there are suitable foraging and shelter habitats for species such as Grass Snake and Common Lizard.

- Breeding Birds where the variety of habitats provides suitable nesting opportunities for many garden, woodland and scrubland bird species. These include species listed on the UK
BAP Principal Species of Conservation Importance and Birds of Conservation Concern (‘BoCC’) Red List (in recognition of their population decline by over 50% and consequently of conservation concern). A total of 32 species were recorded during the surveys. Sixteen species were considered to be breeding. A further seven species were either probably or possibly nesting. Nine species were recorded that were not breeding but used the area for feeding, breeding adjacent to it or were flying over. Three species (Dunnock, Song Thrush and Starling) which are UK BAP listed species and Species of Principal Importance (Section 41 NERC Act 2006) were considered to be breeding. In addition, Green Woodpecker was considered to be breeding and is listed on the BoCC Amber List. None of the breeding species occurred in nationally significant numbers and none of the species found breeding are considered rare. The breeding bird assemblage is considered to be of local importance (Fuller criteria (1980)).

- Water Voles where no evidence was found during the Species Specific Surveys.
- Bats where although a range of features providing potentially suitable foraging habitat and commuting routes exist, no evidence of roosting bats was found and the trees and buildings were considered to be of low to negligible value.
- Invertebrates where none of the species observed during the Species Specific Surveys were considered to be of conservation significance (scarce or rare) although the area was considered to be of local district value as it was found to support common or widespread butterfly and beetle species that can be found in a range of habitats across the Cambridge area.
- Flora which were considered to be of local importance although no plant species were considered very rare. Flora of county significance included Hoary Mullein, Wood Sage, Echinate Bramble, Long-stalked Crane’s Bill and Heath Speedwell. Surveys located the presence of three species of plant (Entire-leaved Cotoneaster, Japanese Knotweed and Japanese Rose) listed on Schedule 9 Part 2 of the Wildlife & countryside Act 1981 (as amended) outside the area of the Development Site. No signs of Jersey Cudweed, which had historically been recorded in the area, were found.
- Badgers where no evidence was found and their presence is considered unlikely as conditions are very limited for sett digging and foraging.
- Dormouse where no evidence was found and their presence is considered unlikely as there are no suitable habitats.
6.43 The presence of some protected species, such as reptiles and breeding birds, indicate that the Development proposals for the Site need to address legal constraints pertaining to wildlife legislation and presence of invertebrate assemblages of county importance indicate that the Site is of biodiversity value.

**Predicted Future Baseline**

6.44 In the absence of the Development and lack of habitat management habitats will progressively change through natural succession of vegetation communities.

6.45 Over time the habitat within the Station/Interchange Area would become more uniform, with competing tall, dense birch scrub becoming increasingly dominant shading and drying out the other habitats present making it less favourable to amphibians and reptiles. It would limit and start to change, potentially decrease, the biodiversity and species assemblage present. This has already started to be seen with the decline of certain groups of invertebrates such as butterflies, whose diversity was reportedly much greater in 2002 when this area had a reported open character, compared to 2012 when the birch scrub had started to dominate.

6.46 However, there would be opportunities for other species to use the habitat as it developed over time. It could be expected that more woodland species of flora would take up residence as the birch scrub matured. This appears to have already started to occur with the loss of the Jersey Cudweed from the Study Area as the developing vegetation has shaded out locations where it occurred.

6.47 A different assemblage of birds could use the habitat as the vegetation developed over time and more woodland species could be expected to take up residence as the birch scrub matured. There would be an opportunity for bats to use the habitat as a foraging area as the habitat became more sheltered and mature. It could be expected that some bats may start to roost at the Site as trees aged and started to develop suitable roost sites.

6.48 The management of the ditch alongside the Highways Access Route would not be expected to change and as there are currently no suitable features for Water Voles it would be expected that the future predicted baseline for this species would remain the same.
Assessment of Potential Impacts

6.49 The Ecological Impacts Table 6.2 includes a summary of the Development’s impacts for each area and species evaluated together with the mitigation and enhancement measurements proposed, and the Development’s residual impact. The Landscape/Ecology Mitigation Concept Plans (Technical Appendix 30) which accompany this application, provide further details.

6.50 This section deals first with the general construction and operational impacts of the Development and is followed by details of each ecological receptor including baseline conditions, assessment and evaluation of significance, and the mitigation proposed.
### Table 6.2 – Summary of Ecological Impacts

<table>
<thead>
<tr>
<th>Feature/area</th>
<th>Impact Description</th>
<th>Characteristics</th>
<th>Mitigation</th>
<th>Enhancement</th>
<th>Residual Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station/Interchange area</td>
<td>Removal of vegetation and habitat</td>
<td>Certain negative effect</td>
<td>Appointment of Ecological Clerk of Works to monitor construction &amp; ensure compliance with all relevant requirements, method statements &amp; plans.</td>
<td>Provision of hibernacula, bat &amp; bird (swift) nest boxes</td>
<td>Short term negative effects become beneficial in long term</td>
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<tr>
<td></td>
<td>Fragmentation of existing habitats and connectivity with wider area</td>
<td></td>
<td>Removal of existing vegetation limited to the minimum needed for safe implementation of the works</td>
<td>Provision of sustainable drainage features e.g. swales designed to increase biodiversity value</td>
<td>Loss of vegetation and fragmentation offset through landscape planting and creation of new habitats along boundaries and in Station/Interchange Area and Nuffield Road</td>
</tr>
<tr>
<td></td>
<td>Littering, vandalism, erosion during construction and operational phase</td>
<td></td>
<td>Restoration of all temporary working areas on completion of construction works to replace existing habitat</td>
<td>Creation of wetland habitat area/pond</td>
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<td></td>
<td>Disturbance e.g. noise/vibration/light/vehicles &amp; pedestrians</td>
<td></td>
<td>Retention and enhancement of vegetation on boundary with Bramblefields LNR</td>
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<td></td>
<td>Increased risk of direct mortality for reptiles in particular</td>
<td></td>
<td>Protection of existing vegetation, where retained, and ecological resources during construction</td>
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<td></td>
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<tr>
<td></td>
<td>See other construction and operational impacts below</td>
<td></td>
<td>Landscape planting of native species along boundary and in car park area to assist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feature/area</td>
<td>Impact Description</td>
<td>Characteristics</td>
<td>Mitigation</td>
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<td>Residual Impact</td>
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<td></td>
<td>connectivity across the site and provide linkages to wider environment</td>
<td></td>
<td>Improvement of grassland area at southern end of site through wildflower planting</td>
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<td></td>
<td></td>
<td></td>
<td>Creation of new reptile/invertebrate habitat areas including through provision of bunds, beetle banks and south facing areas</td>
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<td></td>
<td></td>
<td></td>
<td>Creation of green roof on Station/Interchange building and cycle storage area where possible</td>
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<td></td>
<td>Contribution to Production of Management Plan for Station/Interchange area</td>
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<td></td>
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<td></td>
<td>Translocation of plants of county value as appropriate</td>
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<td></td>
<td>Provision of features to guide reptiles towards the grassland area to the south of the station</td>
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<td></td>
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<td></td>
<td>Preparation of an Ecological</td>
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<td>Feature/area</td>
<td>Impact Description</td>
<td>Characteristics</td>
<td>Mitigation</td>
<td>Enhancement</td>
<td>Residual Impact</td>
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</tbody>
</table>
| Highways Access Route | Littering, vandalism during construction and increased usage in operational phase.  
Disturbance e.g. noise/light/vehicles & pedestrians | Unlikely negative effect | Retention of linear perimeter features, including hedgerows, where possible  
Management of vegetation and hedgerow to open up selected areas. | Provision of kingfisher nest boxes in bank alongside existing engineered channel  
Management of vegetation and hedgerow to open up selected areas. | Unlikely negative effects become beneficial in long term |
| Nuffield Road Allotment access | Littering, vandalism during construction and operational phase  
Disturbance e.g. noise/vibration/light & pedestrians | Certain negative effect | Control of contractors with clear definition of duties and responsibilities  
Landscape planting of native species  
Creation of new habitat areas through provision of bunds, beetle banks and new habitat areas | Short term negative effects become beneficial | |
| Bramblefields LNR | Proposed construction of new and improved pedestrian/cycle access routes would result in -  
Noise/visual disturbance during construction and operational phases  
 Likely increased vandalism as result of higher footfall  
Increased risk of direct | Probable negative effect | Retention and enhancement of existing buffer vegetation alongside  
Station/Interchange area, including provision of refugia  
Deterring of high volume pedestrian access across the central east-west route to create a disturbance suppressed central refuge  
Provision of additional land | Creation of new wetland/pond area or enlargement of existing pond through re-alignment of existing path to provide additional habitat for reptiles and amphibians  
Control of invasive weed species in existing pond | Impacts unlikely to affect designation  
Maintained biodiversity value  
Short term negative effects become beneficial in long term & offset through mitigation & enhancement measures |
<table>
<thead>
<tr>
<th>Feature/area</th>
<th>Impact Description</th>
<th>Characteristics</th>
<th>Mitigation</th>
<th>Enhancement</th>
<th>Residual Impact</th>
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</thead>
<tbody>
<tr>
<td>mortality for reptiles in particular</td>
<td>Increased potential for conflict between public and nature conservation interests, including dog fouling</td>
<td></td>
<td>to extend LNR boundary</td>
<td>Enhancement of grassland areas and of woodland through thinning &amp; understory planting</td>
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<tr>
<td></td>
<td>See other construction and operational impacts below</td>
<td></td>
<td>Creation of grass verges, beetle banks &amp; hedgerow</td>
<td>Provision of new information boards</td>
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<td></td>
<td>+fence alongside new access into Station/Interchange area</td>
<td>Contribution to production of new Ecological Management Plan for LNR</td>
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<td>Provision of safe crossing points for reptiles.</td>
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<td>Ecological Clerk of Works to provide watching brief during construction</td>
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<tr>
<td>Open Mosaic</td>
<td>Deterioration and loss of habitat</td>
<td>Certain negative effect</td>
<td>Retention of existing habitat where possible</td>
<td></td>
<td>Short term negative effects become beneficial in longer term</td>
</tr>
<tr>
<td>Habitats</td>
<td>Fragmentation of existing habitat and loss of connectivity</td>
<td></td>
<td>Translocation of existing habitat and/or plants of county significance</td>
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<td></td>
<td>Increased hard surface area</td>
<td></td>
<td>Creation of new habitats including green roofs and beetle banks</td>
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<td></td>
<td>Preparation of an Ecological Management Plan (EMP)</td>
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<tr>
<td>Construction</td>
<td>Range of effects including:</td>
<td>Certain negative effect</td>
<td>Containment of works through erection of fencing of construction areas</td>
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<td>Short term negative effects only</td>
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<tr>
<td></td>
<td>- Loss of habitat/vegetation</td>
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<td>- Fragmentation and loss of</td>
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<td>Feature/area</td>
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<td>connectivity</td>
<td>- Light, visual &amp; noise/vibration disturbance</td>
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<td>Vegetation removal limited to that necessary for safe construction</td>
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<td></td>
<td>- Damage from accidental or uncontrolled movement of construction vehicles or personnel</td>
<td></td>
<td>Vegetation removal outside of bird nesting season</td>
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<tr>
<td></td>
<td>- Littering/vandalism</td>
<td></td>
<td>Removal of invasive spp</td>
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<td></td>
<td>- Accidental spillage of materials or pollution</td>
<td></td>
<td>Clear definition of contractors duties and responsibilities together with restriction &amp; control of working hours</td>
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<td></td>
<td>- Dust or emissions from construction vehicles</td>
<td></td>
<td>Implementation of pollution prevention measures &amp; compliance with best practice</td>
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<td></td>
<td>- Direct mortality of fauna e.g. falling into excavations</td>
<td></td>
<td>Strict controls on dust and other emissions from construction vehicles</td>
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<td></td>
<td>Production of Construction Environmental Management Plan</td>
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<td>Re-instatement of construction compound areas</td>
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<td>Feature/area</td>
<td>Impact Description</td>
<td>Characteristics</td>
<td>Mitigation</td>
<td>Enhancement</td>
<td>Residual Impact</td>
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<tr>
<td>Operation</td>
<td>Range of effects including: - Light, visual &amp; noise/vibration disturbance - Littering, vandalism - Direct mortality of fauna</td>
<td>Unlikely negative effects</td>
<td>Prevention of animals falling into excavations Provision of an ECoW to oversee ecological aspects of construction. Retention and enhancement of existing boundary vegetation Minimisation of light spill from night lighting Contribution to production of Management Plan for Station/Interchange area Measures described above to avoid direct mortality</td>
<td></td>
<td>Ecological Management Plan will ensure beneficial effect</td>
</tr>
<tr>
<td>Operation</td>
<td>Production of Ecological Management Plan (EMP) to maintain mitigation and enhancement features in their best condition.</td>
<td>Certain positive effects</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Species Specific</td>
<td>Impact Description</td>
<td>Characteristics</td>
<td>Mitigation Description</td>
<td>Enhancement</td>
<td>Residual Impact</td>
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<tr>
<td>Reptiles</td>
<td>Loss of reptile habitat</td>
<td>Probable negative effect</td>
<td>Compliance with species protection legislation and implementation of best practice measures including erection and maintenance of reptile barrier prior to vegetation clearance</td>
<td>Enhancement of existing Bramblefields habitat through creation of new wetland area or enlargement of existing pond in public area</td>
<td>Loss of Station/Interchange area habitat offset through translocation to an appropriate receptor site and enhancement of Bramblefields LNR</td>
</tr>
<tr>
<td></td>
<td>Disturbance</td>
<td></td>
<td>Implementation of translocation exercise to move individual reptiles to appropriate receptor site</td>
<td>Control of invasive weed (Crassula helmsii) in LNR existing pond and provision of new aquatic planting</td>
<td>Ecological Management Plan (EMP) will ensure the correct habitats are created and the beneficial effect is maintained in the long term</td>
</tr>
<tr>
<td></td>
<td>Mortality</td>
<td></td>
<td>Prior to the translocation surveys undertaken to establish size of the reptile population and ensure suitably sized receptor sites selected.</td>
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</tbody>
</table>

Retention and enhancement of existing vegetation on boundary between Station/Interchange area and Bramblefields

Creation of hibernaculae (along boundary) within Station/Interchange area

Creation of new habitat areas for reptiles on the area of
<table>
<thead>
<tr>
<th>Breeding Birds</th>
<th>Disturbance from construction activity</th>
<th>Probable negative effect</th>
<th>Compliance with legislation</th>
<th>Introduction of range of nest boxes.</th>
<th>Loss of habitat offset through retention and strengthening of boundary features and provision of new habitat areas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Disruption to breeding if vegetation cleared during breeding season</td>
<td>Probable negative effect</td>
<td>Compliant with legislation</td>
<td>Vegetation clearance carried out outside of breeding season</td>
<td>Ecological Management Plan (EMP) will ensure the correct habitats are created and the beneficial effect is maintained in the long term</td>
</tr>
<tr>
<td></td>
<td>Loss of potential nesting and feeding areas</td>
<td>Probable negative effect</td>
<td>Retention and strengthening of boundary vegetation between Station/Interchange area and Bramblefields</td>
<td>Retention of perimeter vegetation, where possible</td>
<td>Retention and strengthening of boundary features and provision of new habitat areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Probable negative effect</td>
<td>Creation of new grassland habitat to provide new habitat and feeding areas</td>
<td>Creation of new tree &amp; hedge</td>
<td>Ecological Management Plan (EMP) will ensure the correct habitats are created and the beneficial effect is maintained in the long term</td>
</tr>
</tbody>
</table>
| Invertebrates | Loss of invertebrate habitat | Probable negative effect | Retention, where possible, of scrub and tall ruderal habitat on boundaries.  

Reuse of railway sleepers and loose aggregates and ballast material  

Creation of new habitats e.g. hedgerows, species rich grassland, green roofs, beetle banks  

Provision of bee tube boxes  

Planting of native flower-rich grassland  

Preparation of an Ecological Management Plan (EMP) | Prior to construction undertake invertebrate survey with results feeding into design of new habitat areas and the EMP | Loss of habitat offset through creation of new areas e.g. green roof, beetle banks and planting of native species rich grasslands  

Ecological Management Plan (EMP) will ensure the correct habitats are created and the beneficial effect is maintained in the long term |

| Flora | Loss of vegetation | Certain negative effect | Clearance of vegetation limited to that essential for construction  

Retention of existing boundary vegetation where possible | Contouring of new and existing sustainable drainage features to allow plant recolonisation | Loss of habitat offset through protection/translocation of plants of county significance and use of species rich flora in newly created areas. |
| Prior to construction survey for plants of county importance. Identified plants either to remain in situ with effective protection during construction or translocated to designated area.  
Creation of new habitat areas containing species rich flora  
Preparation of an Ecological Management Plan (EMP). | Short term negative effects become beneficial in longer term  
Ecological Management Plan (EMP) will ensure the correct habitats are created and the beneficial effect is maintained in the long term |
Construction and Operational Impacts

6.51 There are two phases of the Development that have the potential to affect the ecological value of the Site – the construction and operation/management. The construction of the Development will result in the loss of vegetation. It is unlikely that much of the existing vegetation within the Station/Interchange Area would be able to be retained and hence the most significant construction impacts would be losses of vegetation and the fragmentation of existing habitats and connectivity with the wider area.

6.52 Additionally, construction activities would give rise to effects of temporary disturbance of wildlife in the area. These could give rise to both temporary negative effects on local ecological resources, including Bramblefields LNR, which will be expected to cease following construction works and, without appropriate mitigation, effects that would be more long lasting following completion of construction. Such effects include:

- Disturbance as a result of construction noise and vibration and operational noise and vibration from vehicles using the Station/Interchange
- Visual disturbance as a result of the presence and movement of people and vehicles, and from lighting during construction and operation, including on Bramblefields LNR
- Damage to, or loss of value, to ecological resources through the accidental or uncontrolled movements of construction personnel or vehicles, or littering
- Effects of the accidental spillage of materials or pollution of watercourses from construction vehicles or storage compounds
- Dust or emissions from construction vehicles affecting areas of vegetation or water bodies that would otherwise not be adversely affected by the Development.
- Direct mortality of fauna

6.53 Construction activities, without mitigation, are considered to have the potential to give rise to certain negative effects on ecological resources based on loss of habitat, disturbance and direct mortality. Operational activities, following implementation of mitigation, are unlikely to give rise to negative effects based on fragmentation and direct mortality and have the potential to add beneficial value.

6.54 The following measures are documented within the CEMP and will be implemented to mitigate impacts that may arise during construction activities:
• Control of contractors with clear definition of duties and responsibilities, including restriction and control of working hours
• Appointment of an Ecological Clerk of Works (‘ECoW’) to monitor construction and ensure compliance with all relevant requirements, Method Statements and plans
• Erection of effective fencing of construction areas to prevent loss or damage to ecological resources and to prevent animals falling into excavations as appropriate
• Contractor compliance with Environment Agency good practice in respect of implementation of pollution prevention measures, including regular checking of construction vehicles for oil/fuel/hydraulic oil leaks and will be fitted with spillage contingency kits.
• Strict control of dust and other emissions from construction vehicles
• Vegetation removal, in particular trees and scrub, outside of the breeding bird season (March to August inclusive). Where this is not possible, all potential nesting habitat that will be disturbed will be checked before removal to ensure that no nesting birds will be affected. If any nesting species are identified appropriate measures will be agreed and implemented in accordance with good practice and guidance from Natural England.
• Removal of existing vegetation will be limited to the minimum needed for safe implementation of the works.
• All invasive species recorded within the Station/Interchange Area or within its close proximity will be removed by qualified specialists following Environment Agency guidelines.
• Restoration of all temporary working areas on completion of construction works to replace existing habitat.

Valued Ecological Receptors Scoped In

6.55 The following receptors have been scoped in to the assessment because they were either present at a level that was considered to be of conservation significance and/or protected or listed on various schedules of the WCA 1981 (as amended).

• Bramblefields LNR
• Habitats - open mosaic habitat (a NERC 2006 priority habitat listed on section 41)
• Reptiles - a population of common lizard and grass snake (WCA protected species) found present.
• Breeding Birds - assemblage of some conservation value present also nesting birds are protected under WCA 1981 (as amended)
- Invertebrates - assemblage of some conservation value present
- Flora - some individual species are considered to be of county importance, also some non-native alien species present.

Other Valued Ecological Receptors Scoped Out
6.56 The following receptors have been scoped out of the assessment because they were either not present or only present at a level that was not considered to be of conservation significance.
- Great Crested Newt - none present
- Bats - no roosting sites present
- Water Vole - none present.

Bramblefields LNR

Baseline Condition
6.57 Bramblefields LNR (Figure 6.8) is owned by CCiC and was designated in 2003. It lies within a residential area, surrounded on three sides by housing and a primary school. Allotments and railway sidings border it to the north. The site is divided into two with a public area and fenced private section (outside the Site). The 2.08ha site comprises various habitats including scattered scrub, two ponds and semi-improved neutral grassland. The site is bordered by broad-leaved semi-natural woodland and individual trees. The site is typical of successional scrub/grassland mosaic habitat and forms part of an important wildlife corridor.

6.58 Bramblefields LNR is an important refuge for breeding and wintering birds and is particularly suitable for all stages of reptiles’ life-cycle. It was a receptor site for a reptile translocation in 2010-11 with its habitat managed for reptiles. The Species Specific Survey observed Common Lizards present on the private part of the LNR and considered it likely that they use this area for breeding.
6.59 The ponds are located adjacent to poor semi-improved grassland. The pond at Target Note 8 (see Appendix 10) that was constructed as part of the reptile translocation has steep banks minimising the extent of shallow margins. The pond at Target Note 9 is slightly larger. At the time of the survey there was little sign of submerged or emergent aquatic vegetation. This pond has recently been cleared of surrounding vegetation and opened up.

6.60 Habitat within and on the boundaries of the LNR provides valuable habitat for breeding birds, including Dunnock and Starling which were observed during the Species Specific Surveys. Song Thrush, which was observed nearby on the Station/Interchange Area, is the subject of a Cambridgeshire Species Action Plan. Dense scrub is the most dominant habitat within the red line boundary comprising 34% of this area, poor semi-improved grassland comprises 23%.

6.61 The public area of the site is used by local residents and dog walkers. The tarmac path through it is part of a recognised cycle route. This part of the LNR suffers from disturbance and vandalism caused through uncontrolled access and the creation of informal paths.


**Predicted Future Baseline**

6.63 Bramblefields LNR would be expected to stay in the same condition and may lose some of its biodiversity value unless it is managed to take account of the habitats and species for which the site was designated. To ensure the translocated Common Lizard population is maintained the site has to be managed.

**Assessment and evaluation of the effects of the Development.**

6.64 Policy 4/6 of the CCiC Local Plan 2006 gives protection to sites of local conservation importance, including Bramblefields LNR. This states “Where development is permitted proposals should include measures to minimise harm, to secure suitable mitigation and/or compensatory measures, and where possible enhance the nature conservation value of the site affected through habitat creation and management.”

6.65 The improvement of the existing access route around the south of the LNR will not result in loss of land to the LNR. Improvements will not include the installation of lighting. There will be a small loss of poor semi-improved grassland (1%) for construction of the wetland/pond area and
there is the potential for noise and visual disturbance during construction of this, the new access alongside the allotments (outside the LNR designation) and the Station/Interchange Area. In addition there is an increased risk of direct mortality, especially of reptiles. Noise levels at Bramblefields LNR during operation are predicted not to increase significantly (see Chapter 11).

6.66 There are a number of informal pathways across the public part of Bramblefields LNR which creates disturbance. It is already at risk and danger of vandalism which may increase with the construction of the new access through to Station/Interchange Area and higher footfall through the LNR. This may have the potential to increase conflict between public and nature conservation interests. There is also currently a problem with dog fouling which could also potentially increase.

6.67 There is the potential, without mitigation, for the Development to have a probable negative effect on Bramblefields LNR.

**Mitigation**

6.68 The design and implementation of mitigation and enhancement measures with respect to Bramblefields LNR will be agreed with the LPA.

6.69 These include for mitigation:

- Retention and enhancement of existing buffer vegetation to maintain habitat value, reduce disturbance and provide screening from Station/Interchange Area.
- Deterring of high volume pedestrian access across the central east – west route of the public part of Bramblefields LNR to create a 'disturbance suppressed' central refuge
- Creation of grass verges, beetle banks and hedgerow planting adjacent to the fencing alongside the allotments to provide screening and buffer zones to Bramblefields LNR. This land to be designated as part of the Bramblefields LNR
- Creation of drainage channels under the access route alongside the allotments to provide safe passage for reptiles and prevent direct mortality
- Provision of additional refugia within the Bramblefields LNR and within Station/Interchange buffer zone.
- Watching brief during construction works in Bramblefields LNR.

6.70 And for enhancement:
- Increasing the overall biodiversity value through provision of additional under-storey planting and species rich/wildflower grassland, as appropriate, together with selective thinning of existing trees/scrub.

- Establishment of new wetland habitat/ephemeral pond or enlargement of existing pond through re-alignment of existing path to provide additional habitat for reptiles and amphibians.

- Control of invasive weed (Crassula helmsii) in existing pond and provision of new aquatic planting to increase habitat value.

- Provision of new interpretation boards and litter bins.

- Contribution to an updated 10 year habitat Management Plan in collaboration with the City Council ecologist as with good management there is the potential to increase the value of the LNR for a greater diversity of species.

### Habitats

#### Baseline Condition

- There is a variety of habitats present across the Phase 1 survey area including grassland, scrub, sparsely vegetated bare ground and woodland. The combination of bare ground, ephemeral short perennial, scattered scrub and semi-improved neutral grassland create an open mosaic habitat of conservation importance. The current condition of the open mosaic habitat within the Site is considered to be of diminishing quality. As a result of ecological succession that ‘openness’ is limited to areas of stock piled ballast, which are largely devoid of vegetation

- access tracks along which regular vehicle movements take place as part of the Site maintenance operations

- old branch lines where encroachment by scrub is shading out ground vegetation

6.71 Within the Site the presence of mature trees is limited and the dominant habitats are dense scrub covering 40% of this area and open mosaic habitat (35%). Within the Study Area the dominant habitat is also dense continuous scrub covering nearly half the area (46%) whilst open mosaic habitat covers under a third (31%). The allotments make up a large part of the remainder along with scattered trees, species poor hedgerows, tall ruderal and hard surface.

6.72 The Site is exposed to periodic disturbance events during various siding operations.
6.73 If the Station/Interchange Area and Railway Sidings are taken together as one area then dense scrub remains dominant accounting for 60% of habitat with open mosaic habitat covering 36%.

**Predicted future baseline**
6.74 Habitats within the Station/Interchange Area are likely to continue to change as a result of ecological succession and no agreed habitat management plan to restrict the encroachment of scrub. This will lead to loss of open habitat. In addition, as the Site is an operational railway without appropriate sympathetic management the open mosaic habitat within the Site would likely be lost.

**Assessment and evaluation of significance**
6.75 Open mosaic habitat is a priority conservation habitat (NERC Act 2006) and a UK BAP priority habitat. Supplementary Planning Documents, produced by SCDC and CCiC, provide details on how development should protect and enhance biodiversity.

6.76 Construction of the Station/Interchange Area will lead to removal of vegetation, mainly dense scrub and open mosaic, and a certain negative effect as a result of loss and deterioration of habitat, potentially resulting in fragmentation of existing habitats and loss of connectivity with the wider environment.

6.77 The main habitat losses occur within the Station/Interchange Area and include dense scrub (36%) and open mosaic habitat (30%). There will be an increase of 31% of hard surface within the Site overall. The largest increase being in the Station/Interchange Area where hard surface will cover 43% of its area.

**Mitigation**
6.78 The loss of vegetation and habitat will be offset through landscape planting and creation of new habitats. The species of plants, trees and shrubs considered for planting will be those that best represent the habitat and landscape character of the area as defined in the Landscape Chapter 9 and The Cambridgeshire Landscape Guidelines (1991). Such planting will provide suitable feeding, breeding and hibernating opportunities for various wildlife. It would also provide biodiversity valuable and species-rich features providing ecological enhancement.

6.79 Landscaping will include:
- Retention and enhancement of existing woodland and scrub along the south west boundary of the Station/Interchange Area to form a buffer zone. The existing screening will be enhanced and strengthened, where possible.
- Maintaining linear perimeter features, where possible, including the hedgerows along the Highway Access Route.
- Retaining, where feasible, the small number of mature trees located along the edge of the Site to provide habitat for invertebrates and birds.
- Boundary planting to assist habitat connectivity across the Site and link it to other habitats beyond the Site boundary and provide commuting routes for a range of wildlife including reptiles, birds and bats.
- Translocation of plants of county value as appropriate.

6.80 New habitat creation may include:
- Creation of new habitat areas for reptiles, invertebrates and birds within the Station/Interchange Area and the Nuffield Road Access. This will include provision of south-facing areas and/or bunds/beetle banks.
- Creation of new wetland/pond area in north-west corner of Station/Interchange Area to increase the biodiversity of the Site.
- Enhancement of the southern end of the Station/Interchange Area by improvement of the poor grassland area through creation of species rich meadow grassland.
- New native hedgerow planting to the perimeter of the car park and across alternate bays to provide habitat connectivity across the Site.
- Creation of green roof on Station/Interchange building and cycle storage areas, where possible, to help offset loss of open mosaic habitat.
- Provision of swales, as part of the sustainable drainage system, planted with native wetland species and designed/profiled to provide habitat for invertebrates, birds and mammals.

6.81 The design and implementation of mitigation and enhancement measures with regards to various habitats will be set out in the Ecological Management Plan (see Appendix 14 for draft template) and agreed with the LPA. Specific mitigation measures to offset the loss of open mosaic habitat include:
- Retention of existing habitat where possible
- Translocation of plants of county significance
- Creation of new habitat including green roofs and beetle banks.

6.82 Habitat gains include native hedgerow and trees (13%) and species rich meadow grassland within the Station/Interchange Area (6%) and Nuffield Road Access (51% of that area). Loss of open mosaic habitat is offset through the creation of new invertebrate/reptile habitat areas in the Station/Interchange Area and along the Nuffield Road Allotment Access, and through providing green roofs to the station building and, where possible, the cycle storage areas. Therefore elements of the open mosaic habitat would be retained and created as part of the habitat creation/mitigation. In addition, enhancements to Bramblefields LNR will be undertaken and contributions made to the management plans for both the LNR and Station/Interchange Area.

Protected Species

6.83 A number of different species that are afforded protection under European and UK national legislation have been identified as being present or may be encouraged to be present within and immediately adjacent to the Site. Some species may be using habitats within the Site for breeding, feeding and shelter. Species that were found to be present during the surveys include:
- Reptiles;
- Breeding Birds;
- Invertebrates
- Plants;

6.84 And those which may be encouraged:
- Amphibians;
- Bats;
- Water Voles.

6.85 The following deals with those species which were present on Site during the surveys – Reptiles, Breeding Birds, Invertebrates and Flora. This is followed by those species which may be encouraged to be present – Amphibians, Bats and Water Voles.

6.86 All reasonable measures will be taken to ensure compliance with legislation and that the Development will not have an adverse impact on protected species.
Reptiles

Baseline conditions

6.87 The Phase 1 Habitat Survey considered the areas of long grass or dense scattered scrub found particularly along the Busway Access Route and amongst the mosaic of habitats within the Station/Interchange Area to have potential to support reptile species as these provided suitable foraging and shelter habitat. Hibernation sites, including rubble and log piles, were also present within the Station/Interchange Area. The secured section of the Bramblefields LNR was found to be particularly suitable for all stages of reptiles’ life-cycle because it was being managed as a reptile translocation area (Aspect Ecology 2010). A reptile translocation took place to introduce Common Lizards into the Bramblefields LNR in 2010.

6.88 The surveys indicated Common Lizards and Grass Snakes to be present at various locations across the Phase 1 survey area, with observations concentrated amongst the relatively undisturbed locations along the Busway Access Route and adjacent to Bramblefields LNR along the western boundary of the Station/Interchange Area. There was evidence for Grass Snake to suggest that these reptiles are breeding nearby. The populations of each were considered to be low/medium and their presence across the county would suggest that these populations were of district importance.

Assessment and evaluation of significance

6.89 All native British reptiles are protected under the Wildlife and Countryside Act 1981 (as amended). It is illegal to intentionally kill or injure any native British reptile species. Common Lizard and Grass Snake (as well as other reptiles) are listed as being of Principal Importance for the Conservation of biodiversity in England, in Section 41 of the NERC Act 2006.

6.90 The distribution results of the reptile survey suggest that the reptiles were currently located on the Station/Interchange Area close to the Bramblefields LNR and may be starting to disperse from the Bramblefields LNR translocation site, along suitable habitat corridors such as the Busway Access Route (see Appendix 11).

6.91 Most of the habitat within the Site, however, comprising dense scrub and large areas of open ground used to stockpile railway ballast was not suitable to support reptiles. There were no suitable breeding sites and no ponds, which would limit suitability for feeding within the
Station/Interchange Area. This area together with the Busway Access Route may be used primarily for dispersal into the wider countryside.

6.92 Construction activities will have a probable negative impact through loss of habitat (scattered scrub, semi-improved grassland, tall ruderal). Construction activities will also likely cause some short-term disturbance and there is a limited risk that reptiles within the construction area could be harmed. With the implementation of mitigation measures operational activities are unlikely to have a negative effect on reptile populations.

Mitigation

6.93 The presence of reptiles requires that certain measures are implemented to ensure legal compliance. Best practice measures will be implemented to ensure animal welfare issues are addressed to minimise the risk that reptiles are harmed prior to and during any site inspection and construction works.

6.94 The design and implementation of mitigation and enhancement measures for reptiles will be set out in the Ecological Management Plan ('EMP').

6.95 These include for mitigation:

- Translocation of reptiles from the proposed Station/Interchange Area to a suitable receptor site. Prior to the translocation surveys will be undertaken to establish the size of the reptile population and to ensure that suitably sized receptor sites are selected. The relocation of reptiles will involve the erection and maintenance of an effective temporary reptile barrier fence to prevent reptiles accessing the Site once any vegetation clearance and ground works commence.

- Retention of existing vegetation along the Station/Interchange and Bramblefields LNR boundary to act as a buffer zone separating the area of most value for reptiles from the construction site. This buffer zone could be used initially as a receptor site for reptiles caught within the Site.

- Provision of refugia and additional native species planting within the buffer zone between the Station/Interchange Area and Bramblefields LNR. This area will be managed for the benefit of reptiles, birds and other wildlife and act as a feeding, breeding, resting and commuting area linking with other habitats nearby.
- Construction of channels under the new access path alongside the allotments to enable reptiles to cross between the LNR and allotments. Once the new access and Station/Interchange Area are operational the situation should be monitored and further remedial considered if necessary.
- Creation of new habitat areas for reptiles on the area of land between the Bramblefields LNR and allotments which will enable the Bramblefields LNR to be extended and managed.

6.96 And for enhancement measures:
- The creation of a new wetland/pond area within the public part of Bramblefields LNR and/or the extension of the existing pond there will enhance the Bramblefields LNR for reptiles.
- Control of the invasive weed (Crassula helmsii) and provision of new aquatic planting.

6.97 The loss of reptile habitat is offset through translocation to an appropriate receptor site and enhancement of the Bramblefields LNR. The details for relocation of reptiles and creation of new habitat areas will be provided in an EMP that clearly describes the measures necessary to minimise harm to reptiles. Areas for relocation will be agreed with LPA.

Breeding Birds

Baseline conditions

6.98 The presence of a variety of habitats provides suitable nesting habitat for garden, woodland and scrubland bird species.

6.99 Sixteen species (Wood Pigeon, Collared Dove, Wren, Dunnock, Robin, Blackbird, Song Thrush, Garden Warbler, Blackcap, Chiffchaff, Willow Warbler, Blue Tit, Great Tit, Chaffinch, Greenfinch, Goldfinch) were considered to be breeding and a further seven species (Tawny Owl, Green Woodpecker, Great Spotted Woodpecker, Long-tailed Tit, Magpie, Carrion Crows (black forms), Starling) were either probably or possibly nesting on the Site. Through the assemblage of breeding bird species present the Site was considered to be of local importance for its nesting birds and of conservation value for the UKBAP species recorded (Dunnock, Song Thrush, Starling). None of the breeding species occurred in nationally significant numbers or are considered rare.

6.100 The proximity of residential areas, with the associated presence of cats, would be likely to suppress the numbers and types of breeding birds present on the Site.
**Assessment and evaluation of significance**

6.101 The presence of nesting birds and UKBAP species is of material consideration for this Development. All birds, their nests and eggs are protected by law under the Wildlife & Countryside Act 1981.

6.102 Construction activities will have a probable negative impact as there will be a loss of breeding habitat (dense and scattered scrub, hedgerows, scattered trees and buildings). Construction activities will also likely cause some short-term disturbance. With the implementation of mitigation measures operational activities are unlikely to have a negative effect on bird populations.

**Mitigation**

6.103 The design and implementation of mitigation and enhancement measures for breeding birds will be set out in the EMP and agreed with the LPA.

6.104 These include for mitigation measures:

- Compliance with legislation with the timings of construction activities e.g. vegetation clearance and removal of bird breeding habitat, undertaken outside the breeding season (March to September inclusive). If this is not possible all vegetation and buildings that are cleared during the breeding season checked for nesting birds by an experienced ornithologist acting as an Ecological Clerk Of Works.
- Retention and enhancement of the area of broad-leaved woodland and scattered scrub along the south western boundary of the Station/Interchange, where possible
- Retention of breeding habitat around the perimeter of the Station/Interchange Area, where possible
- Creation of new habitat in the Station/Interchange Area (13% of area will be native hedgerow and trees, 6% species rich grassland) to replace habitat that is lost. These areas will be designed to meet the breeding and foraging needs of birds and other wildlife and act as links with other habitats nearby.

6.105 And, where possible, for enhancement:

- The incorporation of bird boxes, including swift boxes/bricks on buildings, around the Site.
6.106 The loss of habitat is partially offset through retention and strengthening of boundary features and provision of new habitat areas. These measures have the potential to support a wider breeding assemblage of breeding birds.

Invertebrates

Baseline Conditions

6.107 The habitats in the Study Area were moderately varied, with all successional stages from bare ground to mature trees and scrub, and with only a small wetland component. There were a number of broad invertebrate habitat types, namely trees and shrubs, open dry vegetation, wetland, transitional mosaic and railway sleepers.

6.108 Therefore potential invertebrate habitats (grassland, scrub and early succession matrix habitats) exist on Site. These were considered, based on habitat and food plants, to have the potential to support a wide range of invertebrate species. The presence of an open mosaic habitat on previously developed land (comprising: bare ground, ephemeral short perennial, scattered scrub and semi-improved neutral grassland) was also recognised as being of value to invertebrate communities.

6.109 In the Study Area as whole a total of 1097 species of invertebrates were recorded during the 2013 invertebrate survey (see Appendix B for details). Nineteen invertebrate species were Red Data Book, 66 were Nationally Scarce, 46 were considered to be of only occasional occurrence in the County, and 161 were considered to be reasonably frequent but not common. Six of the invertebrate species are listed as UKBAP species and Species of Principal Importance.

6.110 In the Chesterton Sidings area a total of 997 species of invertebrates were recorded. Nineteen invertebrate species were Red Data Book, 61 were Nationally Scarce, 42 were considered to be of only occasional occurrence in the County, and 150 were considered to be reasonably frequent but not common. Six of the invertebrate species are listed as UKBAP species and Species of Principal Importance.

Assessment and evaluation of significance

6.111 An evaluation of the invertebrate assemblage within the Study Area, including areas outside the actual Development Site; such as the Bramblefields LNR and Busway on the former St Ives Branch Line was carried out. The analysis carried out used the Natural England ISIS computer
package, County Wildlife Site (CWS) criteria and a simple measure of the proportion of rare species against the total abundance of invertebrates. In addition, professional judgement was used to take account of the changing conservation criteria of many invertebrate species.

6.112 The evaluation indicated that the Study Area as a whole was assessed as being of County value. Inside the Development Site the invertebrate value of the Chesterton Sidings area was considered to be of County importance. Outside the Development Site the invertebrate value of the Bramblefields LNR was considered to be of District importance, while the former St Ives Branch Line was considered to be of County importance.

6.113 The main invertebrate interest within the Study Area as a whole was heavily concentrated in the fauna of open mosaic habitats, from bare ground to open-structured grassland. There was also significant interest in the fauna associated with scrub-herb transitions and mosaics, some secondary interest in the fauna of trees and shrubs, a small component of uncommon wetland species in the Bramblefields LNR and a small but interesting fauna associated with wooden sleepers.

6.114 The area of open mosaic habitat within the Development Site was limited. Scrub invasion had greatly reduced the area of open habitats, and these areas were considered likely to have declined considerably from their peak of interest. Consequently the importance of the open mosaic habitat dependant invertebrate assemblage was also considered to be declining. However, recent management of the scrub (de-vegetation) within the Study Area was likely to have temporarily improved conditions for invertebrates, but regeneration of woody vegetation has been rapid and improvement likely to be temporary and transitory. Therefore without continued and targeted management the importance of the invertebrate assemblage would likely diminish as the open mosaic habitats reduced.

6.115 UK BAP and Section 41 of the NERC Act 2006 lists invertebrates that are Species of Principal Importance for conservation of biodiversity in England. Six UKBAP/Species of Principal Importance (Large Garden Bumblebee: Bombus ruderatus, a Solitary Wasp: Cerceris quinquefasciata, Small Heath butterfly: Coenonympha pamphilus, Buff Ermine moth: Spilosoma luteum, Cinnabar moth: Tyria jacobaeae and The Sallow moth: Xanthia icteritia) were recorded within the Development site. These invertebrates are of material consideration in relation to planning policy.
6.116 Construction activities will have a probable negative impact as 11% of open mosaic habitat will be lost from the Study Area; 30% of open mosaic habitat within the Station/Interchange Area will be lost. However, with the implementation of mitigation measures operational activities are likely to offset the negative effect of the habitat loss on invertebrates.

**Mitigation**

6.117 Although the Development Site was considered to be of County importance for invertebrates it should be possible to retain many of the current invertebrate species found on Site and by undertaking mitigation to maintain the variety of habitats preferred by the invertebrates and potentially increase the range of species using the Site.

6.118 The design and implementation of mitigation and enhancement measures for invertebrates will be set out in the EMP and agreed with the LPA.

6.119 These include for mitigation:

- retaining as much of the scrub and tall ruderal habitat along the western boundary and within the Development Site where possible, in order to preserve a significant scrub edge habitat on Site for many of the invertebrates recorded;
- creation of new habitats to maintain overall representative diversity of invertebrate assemblage e.g. ephemeral short perennial, sparsely vegetated gravelly/ballast substrates, hedgerows, species rich grassland, green roofs, beetle banks, log piles and use/retention of railway sleepers;
- creation of new habitats to maintain populations of UKBAP species and Species of Principal Importance, namely Large Garden Bumblebee, a Solitary Wasp *Cerceris quinquefasciata*, Small Heath butterfly, Buff Ermine moth, Cinnabar moth, and The Sallow moth;
- provision of boxes of bee tubes to create more nesting opportunities for solitary bees;
- planting native flower-rich grassland as close as possible to retained scrub edge on the proposed Station/Interchange Area to provide habitat suitable for many of the larger invertebrates recorded;
- long-term management to develop and maintain good habitat structure through the production of an Ecological Management Plan (EMP).

6.120 And for enhancement:
- undertaking an invertebrate survey prior to construction with results informing the production of the EMP.
- create and enhance the habitats in Bramblefields LNR to increase the ecological value for invertebrates

6.121 Mitigation measures need to take account of the changing conditions on Site e.g. following clearance and before construction commences. To ensure that these are taken into account further invertebrate and flora surveys could be undertaken. Data gathered would inform the EMP and the detailed design of habitat areas ensuring enhancement of the Site with a beneficial effect for invertebrates.

**Flora**

**Baseline Conditions**

6.122 Two hundred and fifty six (256) species of plant were found during the Phase 1 Habitat Survey. This number of plants is considered to be a low to average number of plants for an area of this size. The majority of the plant species recorded were common and widespread species and no legally protected or BAP species were recorded.

6.123 Schedule 8 of the Wildlife and Countryside Act 1981 (as amended) makes it an offence to pick or damage a nationally scarce plant. This lists Jersey Cudweed which had reportedly been previously found at the Study Area (survey carried out in 2002 by Cambridge Flora group). After the thorough search of the whole sidings area in 2012 and 2013 it was considered that this species was no longer present.

6.124 Notable native plant species identified during the 2012 and 2013 botany survey that are significant in Cambridgeshire due to their scarcity in the county include: Hoary Mullein, Wood Sage, Echinate Bramble, Long-stalked Crane’s-bill and Heath Speedwell. In addition, five non-native introduced plant species were also of note. These were Sheep Thistle, Eurasian Smoketree, Yunnan Cotoneaster, Sachalin Willow, and Narrow-leaved Ragwort.

**Assessment and evaluation of significance**

6.125 Section 41 of the NERC Act 2006 lists plants that are Species of Principal Importance for conservation of biodiversity in England. These plants are of material consideration in relation to planning policy. The Wildlife and Countryside Act 1981 (as amended), lists plants under Schedule
9, Section 14 that are considered alien invasive species. Plants such as Japanese Knotweed are classed as ‘controlled waste’ under the Environmental Protection Act 1990 and as such must be disposed of safely at a licensed landfill site according to the Environmental Protection Act (Duty of Care) Regulations 1991. Therefore to comply with these regulations, Schedule 9 alien invasive species will be treated in accordance with best practice.

6.126 Overall the Site was considered to be of district importance for its plant species on the basis that there were some notable species and none of the plants were considered very rare.

6.127 Whilst some of the species on the Site will have arrived in association with the railway (in old or new ballast or with people, goods and vehicles on the Site) other dispersal vectors would also have played a role. Bird and wind dispersal would have played an important dispersal role. The birches, willows and alders for instance will all have been blown in on the wind, as will the Southern Marsh Orchid. The Cotoneasters (all non-native), Honeysuckles and Brambles will have come with birds. Some plants such as the Sheep Thistle and Narrow-leaved Ragwort may have arrived by windblown seed or arrived with the imported ballast and then been self/wind-dispersed around the Site.

6.128 A likely reason for the absence of the Jersey Cudweed was the encroachment of other plant species into areas that were previously bare ground and through ecological succession this species has been out competed and shaded out of its former locations.

6.129 Construction of the Station/Interchange Area will lead to removal of vegetation and without mitigation a certain negative effect as a result of loss and deterioration of the variety of flora present on the Site. 43% of hard surface will be created within the Station/Interchange Area leaving 55% of landscaped habitat. Forty-four (44%) of this will be available for native wild plants to be retained, translocated and/or introduced, the remaining 11% will be amenity ground cover and grassland. Therefore the landscaping/habitat creation plan will have a certain positive effect as a result. The production of an EMP will help ensure the long term presence of a wide variety of plant species with the Site.

**Mitigation**

6.130 The Cambridgeshire Landscape Guidelines (1991) will inform the choice of species of plants for landscape planting and habitat enhancement/creation areas to ensure that these best represent
the habitat and landscape character of the area. Such planting should provide biodiversity value and species-rich features offering feeding, breeding and hibernating opportunities for wildlife.

6.131 The design and implementation of mitigation and enhancement measures for flora will be set out in the EMP and agreed with the LPA.

6.132 These include for mitigation:

- Limiting vegetation clearance to that which is essential for the safe construction of the Development in order to maintain plant biodiversity;
- Retention and enhancement of existing vegetation on boundaries, where possible, including a buffer zone between the Station/Interchange Area and Bramblefields LNR;
- Creation of new habitat areas containing species rich flora;
- Undertaking a survey prior to construction to locate any plants of county significance e.g. Hoary Mullein, Wood Sage, and Long-stalked Crane’s bill. If these species were in danger of being lost as a result of the construction works, then they will be translocated to designated area, agreed with the LPA, or used on the green roofs. Should Jersey Cudweed re-appear on Site this could also be moved to a safe destination.

6.133 And for enhancement:

- Contouring of new and existing sustainable drainage features to allow plant recolonisation.

Amphibians

General Enhancements

6.134 Appendices 10 and 11 provide results of the surveys. The water bodies surveyed did not appear to provide optimal habitat to support a Great Crested Newt population. The Station/Interchange Area, Highways and Busway Access Routes were of limited value for amphibian species due to the relative lack of water bodies and predominantly industrial land use. However, these areas do have the potential to act as a terrestrial foraging and hibernation habitat for amphibians. The key areas which were identified as suitable for amphibians were the ponds (TN8 and 9) in the Bramblefields LNR. There are suitable commuting routes that amphibians could use to gain access to the Station/Interchange Area and Busway Access Route.
6.135 The implementation of reptile mitigation measures and enhancements to Bramblefields LNR, e.g. creation of new wetland area and/or enlargement of pond and provision of aquatic planting, will benefit amphibians.

6.136 The use of standard construction practices outlined in the CEMP will minimise any short term disturbance and certain measures may be necessary e.g. installation of one-way fencing, to ensure legal compliance is maintained during Site preparation and construction works to avoid killing amphibians.

Bats

*General Enhancements*

6.137 Overall the Phase 1 survey area was considered to be of low to negligible value for roosting bats and was likely to be of low value for foraging bats. Other more suitable foraging habitat exists in the wider vicinity particularly along the River Cam and surrounding fields. There were no signs of bats during the surveys (see Appendices 10 and 11).

6.138 The Development will provide opportunities to enhance the area for bats as the area of broad-leaved woodland and scattered scrub along the south western boundary of the Station/Interchange Area will not be affected by any clearance. This area will be enhanced to improve habitat connectivity across the Site linking it to other habitats and thus providing commuting routes for a range of wildlife, including bats. This will include installation of 10 bat boxes of different designs to provide new roosting opportunities.

6.139 In addition, lighting will comply with guidance provided in the Bat Conservation Trust ‘Bats and Lighting in the UK’ (BCT 2009) (see chapter 10) with excessive light spill from artificial night lighting being kept to a minimum through appropriate design.

6.140 During construction vigilance for bats will be maintained.

Water Voles

*General Enhancements*

6.141 Whilst the survey of the water bodies indicated that Water Voles were currently absent from the Site, they are reportedly known to be present in the vicinity and there is potential to enhance
habitat for them along the Highways Access Route through opening up of the vegetation alongside the ditch and through the creation of swales as part of a sustainable drainage system.

Residual Impacts

6.142 Measures have been proposed to redress the impacts of this Development so that residual short term effects become negligible and could be locally beneficial in the longer term. These include:

- Mitigating the removal of existing vegetation through provision of linear and other habitat areas. Once new planting becomes established the effects would be reduced.
- Enhancing the existing vegetation along the Station/Interchange Area and Bramblefields LNR boundary to maximise its value for a range of wildlife.
- Providing replacement nesting and foraging sites for birds by use of shrubby species, enhancement of scrub and grassland areas, and installation of nest boxes.
- Compensating for loss of reptile habitat through implementing reptile translocation exercise and provision of new habitats e.g. wetland areas, hibernaculae.
- Provision of landscape planting and new habitat areas designed to provide and support range of invertebrates.

Conclusions

6.143 The ecological resources have been assessed through a combination of review of existing available information and surveys. This has enabled an understanding of the baseline ecology of the Site and the wider area.

6.144 The majority of the habitats that will be affected by the Development are located within the Station/Interchange Area and comprise scrub, ephemeral short perennial and bare ground. Without mitigation, habitat (scrub, semi-improved grassland) and species (reptiles, breeding birds, invertebrates) within Bramblefields LNR will also be affected.

6.145 The Development will result in a loss of existing habitat, mainly dense scrub and open mosaic habitat. The largest losses occur within the Station/Interchange Area. Vegetation will be retained, where possible and where not required for construction purposes, in order to minimise impacts. Loss of habitat is mitigated and offset through the creation of new habitat and enhancement of Bramblefields LNR. New habitat areas include the reptile/invertebrate habitat areas in the Station/Interchange Area and at Nuffield Road, provision of green roofs, species rich
grassland, native hedgerow and trees, and creation of wetland/pond areas. Although habitat will be lost the habitat created/retained and the production of EMPs for the Station/Interchange Area and Bramblefields LNR will ensure that these habitats are managed in a way that is beneficial to biodiversity and remain permanent. Therefore providing a link between habitats in the wider sidings area.

6.146 The effects of the Development on ecological resources have been evaluated and a range of mitigation measures proposed in order to minimise certain and probable negative effects (refer to paragraph 6.22 for probability levels). In addition, measures have been proposed to maintain and enhance the biodiversity value of the Site as a result of the Development. The ecological mitigation and enhancement measures have been designed to ensure legal compliance and help minimise certain and probable negative effects of the Development in order to maintain its conservation value and importance locally. These include:

- Maintaining and enhancing Bramblefields LNR,
- Translocation of reptiles and plants of county significance to suitable receptor areas,
- Maintaining the value of the Site for its breeding and foraging habitat, and the range of species and assemblages of invertebrates and plants it supports,
- Creating new habitat areas for reptiles, invertebrates and birds which will be designed, through agreement with the LPA, to offset areas of habitat loss,
- Enhancing the Site to encourage species not currently present,
- Contributing to production of Ecological Management Plans for the Station/Interchange Area and for Bramblefields LNR.

6.147 Measures also aim to maintain the overall ecological value of the area through:

- Retaining, where possible, suitable habitat and features of ecological value,
- Restoration of all temporary working areas on completion of construction works to replace existing habitat,
- Maintaining a network of corridors that link habitats across the Site and provide connectivity to the wider environment.

6.148 It is considered that the Development post mitigation is unlikely to have any negative effects and that the successful application of mitigation measures will ensure minimal loss of biodiversity and overtime should enhance the value of the Site. The EMPs will aim to ensure the long term sustainability of the mitigation and enhancement measures of this Development.
7. GROUND CONDITIONS

Introduction

7.1 This chapter considers the potential effects that construction and operation of the Development will have on the ground conditions underlying the Site. This includes the potential effects of any existing contamination on or adjacent to the Development and the potential for creating additional sources of contamination during construction and operation.

Policy Guidance

Legislative Context

7.2 Part 2A of the Environmental Protection Act 1990 (as amended) establishes a legal framework for dealing with land contamination in England. It provides a means of dealing with unacceptable risks posed by land contamination to human health and the environment. Government objectives with respect to land contamination policy and the Part 2A regime are set out in the Department for Environment Food and Rural Affairs (Defra) Contaminated Land Statutory Guidance 2012\(^\text{34}\) as:

- to identify and remove unacceptable risks to human health and the environment;
- to seek to ensure that contaminated land is made suitable for its current use; and
- to ensure that the burdens faced by individuals, companies and society as a whole are proportionate, manageable and compatible with the principles of sustainable development.

7.3 Human health risks are considered in terms of whether significant harm is occurring, whether there is a possibility of significant harm (‘POSH’) or a significant possibility of significant harm (‘SPOSH’).

7.4 The risks to controlled waters are considered in terms of significant pollution of controlled waters (‘SPCoW’) and significant possibility of significant pollution of controlled waters (‘SPoSPCoW’), although the latter only where the substances are continuing to enter or are likely to do so again.

7.5 A precautionary approach to assessing the risks posed by contamination is recommended, including consideration of the benefits and costs of taking action to remove/reduce such risks.

\(^{34}\) Department of Food and Rural Affairs, 2012: Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance.
7.6 The underlying approach to identifying and dealing with land contamination risk in planning and the overall policy objective of safeguarding human health and the environment are in most respects similar to the Part 2A regime. A wider range of contamination and receptors is relevant to planning but the approach to remediation is essentially the same, i.e. unacceptable risk in planning terms includes the risks addressed by Part 2A of Environmental Protection Act ('EPA') 1990.

7.7 Protection of groundwater from new developments is regulated in the UK by the updated Groundwater Regulations 2009\(^\text{35}\) which predominantly control the acceptability of discharge of certain chemical species into groundwater from new activities, especially where the activities are not covered by other regimes. The Water Framework Directive 2000\(^\text{36}\) aims to provide a comprehensive and holistic water policy for Europe by establishing a consistent legal framework for the protection, improvement and sustainable use of water. In addition, the Water Resources Act 1991 as amended by the Water Act 2003\(^\text{37}\) aims to improve the management of water resources and protection to the environment by changing the way that water abstraction and impoundment is regulated.

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\(^{35}\) The Groundwater (England and Wales) Regulations 2009, SI 2009 2902  
\(^{37}\) Water Act 2003
Exposure of Construction Workers to Land Contamination

7.8 Risks to construction workers or other occupational groups that may have direct exposure to land contamination, such as people employed to carry out environmental monitoring on such sites are not explicitly addressed by the contaminated land regime, as implemented through Part 2A or planning. The risks to human receptors are managed through health and safety legislation, such as the Control of Substances Hazardous to Health (COSHH) Regulations. This requires the employer to carry out an assessment of the risks associated with exposure to hazardous substances and then to avoid or if this is not reasonably practicable, to adequately control such exposures.

Assessment Methodology

Scope of Assessment

7.9 Government good practice guide for environmental impact assessment states that the following potential environmental effects should be considered with respect to soil:

- physical effects of the development, for example changes in topography, soil compaction, soil erosion, ground stability, etc;
- effects on geology as a valuable resource, for example, sterilisation of mineral resources, loss or damage to regionally important geological sites, geological SSSI etc;
- effects on soils as a valuable resource, for example, loss or damage to soils with good agricultural quality;
- effects associated with ground contamination that may already exist on a site, for example introducing/changing pathways and receptors;
- effects associated with the potential for polluting substances used (during construction/operation) to cause new land contamination issues on a site, for example introducing/changing the source of contamination; and
- effects associated with reuse of soils and waste disposal of soils, for example, reuse of site-sourced materials on or off a site, disposal of site-sourced materials off-site, importation of materials to the site, etc.

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38 Control of Substances Hazardous to Health Regulations 2002 (as amended) SI 2002/2677
It is anticipated that the Development would not have implications for topography, soil erosion or ground stability, geology or soils. The Development does not lie within any regionally important geological sites or geological SSSIs.

Effects associated with existing ground contamination and introduction of polluting substances above are assessed within this chapter. Those effects associated with the reuse and disposal of soils are considered through design and mitigation.

**Methodology**

The assessment of impacts has been carried out in this chapter through the following two stages as described below.

**Stage 1 – Risk Assessment**

Land contamination risk assessment is based on guidance in Contaminated Land Report (CLR) 11 published by Defra and the Environment Agency in 2004 and the Government’s Good Practice Guide to Environmental Impact Assessment. These documents provide a technical framework for the application of a risk management process as follows:

- develop a preliminary Conceptual Site Model (CSM) by desk study review of available documentary information. This was carried out at Scoping Stage to identify the potential sources of contamination and associated contaminants from past and current potentially contaminative activities on and adjacent to the Site with identification of receptors to such contamination, in this case, human health, controlled waters (all groundwater and most surface water), and property (buildings and infrastructure) which have been scoped in and pathways between the two. Where all three (source-receptor-pathway) are present or are likely to be present, they are termed a potential contaminant linkage (PCL); and
- qualitative risk assessment - undertake a ground investigation informed by the CSM to identify evidence of a PCL existing and if so, the potential risk posed. Potential risks are determined and assessed based on the likelihood and consequence using the principles given in the National House Building Council (NHBC) and Environment Agency report R&D66. This provides guidance on development and application of the consequence and

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41 Government’s Good Practice Guide to Environmental Impact Assessment
probability matrix (as presented in Table 7.1) to risk assessment and broad definitions of consequence.

Table 7.1 – Risk Matrix: Estimation of the Level of Risk by Comparison of Consequence and Probability

<table>
<thead>
<tr>
<th>Probability</th>
<th>Consequence</th>
<th>Severe</th>
<th>Medium</th>
<th>Mild</th>
<th>Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Likelihood</td>
<td></td>
<td>(Very High Risk)</td>
<td>(High Risk)</td>
<td>(Moderate Risk)</td>
<td>(Moderate/Low Risk)</td>
</tr>
<tr>
<td>Likely</td>
<td></td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(High Risk)</td>
<td>(Moderate Risk)</td>
<td>(Moderate/Low Risk)</td>
<td>(Low Risk)</td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Likelihood</td>
<td></td>
<td>(Moderate Risk)</td>
<td>(Moderate/Low Risk)</td>
<td>(Low Risk)</td>
<td>(Very Low Risk)</td>
</tr>
<tr>
<td>Unlikely</td>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Moderate/Low Risk)</td>
<td>(Low Risk)</td>
<td>(Very Low Risk)</td>
<td>(Very Low Risk)</td>
</tr>
</tbody>
</table>

Definitions of probability, consequence and the classified risks are provided in Appendix 15.

7.3 Three CSMs and qualitative risk assessments are developed comprising a baseline model based on the current ground conditions, followed by predictions for the construction phase and operational phase CSMs.
Stage 2: Impact Assessment

7.4 The impact assessment is undertaken by comparing the existing baseline conditions with the conditions likely to arise during the construction and operation phases and assessing the change of risk and the impacts that are likely to occur. Where significant changes in risks are expected to occur, mitigation measures are recommended to either remove or reduce the potential environmental impacts. This CSM comparison approach allows the changes in contaminated land status during construction and operation of the Site to be identified as beneficial, neutral or adverse effects and consideration of whether they are major, moderate or minor. Table 7.2 shows the significance criteria with respect to land contamination and an explanation of these criteria.

Table 7.2 - Magnitude of Change Criteria (Ground Conditions)

<table>
<thead>
<tr>
<th>Impact Significance Criteria</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major adverse</td>
<td>An increase in contamination or stability risk from the existing baseline conditions of 4 or 5 risk levels in the risk matrix (Table 7.1), e.g. land that has a very low contamination risk in the baseline becomes a high or very high risk. Land that does not meet the statutory definition of Contaminated Land in the existing baseline becomes capable of being determined under Part 2A.</td>
</tr>
<tr>
<td>Moderate adverse</td>
<td>An increase in contamination or stability risk from the existing baseline conditions of 2 or 3 risk levels in the risk matrix, e.g. land that has a low contamination risk in the baseline becomes a moderate or high risk. Land that does not meet the statutory definition of Contaminated Land in the existing baseline becomes capable of being determined under Part 2A.</td>
</tr>
<tr>
<td>Minor adverse</td>
<td>An increase in contamination or stability risk from the existing baseline conditions of 1 to 2 risk level in the risk matrix, e.g. land that has a low contamination risk in the baseline becomes a moderate/low risk.</td>
</tr>
<tr>
<td>Neutral</td>
<td>No change in contaminated land or ground stability risks from existing baseline conditions.</td>
</tr>
<tr>
<td>Minor beneficial</td>
<td>A reduction in contamination or stability risk from the baseline conditions of 1 to 2 risk levels in the risk matrix, e.g. land that has a low/medium contamination risk in the baseline becomes a low risk.</td>
</tr>
<tr>
<td>Level</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Moderate</td>
<td>A reduction in contamination or stability risk from the existing baseline conditions of 2 or 3 risk levels in the risk matrix, e.g. land that has a high contamination risk in the baseline becomes a moderate/low or low risk. Land that meets the statutory definition of Contaminated Land in the existing baseline is no longer capable of being determined under Part 2A.</td>
</tr>
<tr>
<td>Major</td>
<td>A reduction in contamination or stability risk from the existing baseline conditions of 4 or 5 risk levels in the risk matrix, e.g. land that has a very high contamination risk in the baseline becomes a low or very low risk. Land that meets the statutory definition of Contaminated Land in the existing baseline is no longer capable of being determined under Part 2A.</td>
</tr>
</tbody>
</table>
Sources of Data

7.5 Baseline information used to compile this assessment was obtained as part of the Land Contamination and Geology chapter of the Scoping Report for the Development through a desk based review of readily available historical maps and the British Geological Society (BGS)\textsuperscript{43} and Environment Agency\textsuperscript{44} websites.

7.6 A ground investigation, primarily to address single option development to GRIP4, included investigation of issues scoped in to the EIA\textsuperscript{45} (namely the potential exposure of humans, controlled waters and property receptors to contamination resulting from the long history of the Site as railway infrastructure) has been partially completed. Ground investigation was carried out in September 2012, January 2013 and was completed in Spring 2013. Rather than targeting individual potential sources of contamination, the ground investigation covers the area of the Development as a whole.

7.7 Three cable percussive boreholes and ten window sample boreholes have been drilled and 21 trial pits have been excavated at the Site to date. Locations of the exploratory holes to date are presented as 5110967-GEO-001 Rev4 and the exploratory hole logs are presented in Appendix 15.

7.8 Environmental samples were taken from the exploratory holes and scheduled for a range of analyses to:

\begin{itemize}
  \item provide initial characterisation of the soils for reuse through human health and controlled waters Generic Qualitative Risk Assessments (‘GQRA’). This compares detected contaminant concentrations in soil with a set of generic assessment criteria (‘GAC’) to assess potential risks to human health and detected contaminant concentrations in soil-leachate/water samples with Drinking Waters Standards (‘DWS’) to assess potential risks to the groundwater receptor and Environmental Quality Standards (‘EQS’) to assess potential risks to the surface water receptors; and
  \item assess whether material that is not re-useable on site (and therefore a waste) would be classified as hazardous or non-hazardous through the use of the Atkins CAT-WASTE\textsuperscript{SOIL} database.
\end{itemize}

\textsuperscript{43} http://mapapps2.bgs.ac.uk/geoindex/home.html
\textsuperscript{44} http://maps.environment-agency.gov.uk/wiyby
\textsuperscript{45} Chesterton Station Interchange Scoping Report, August 2012, Carter Jonas/Atkins
7.9 The laboratory analytical results are presented in Appendix 15.

Geology

7.10 The BGS Map Sheet No. 188\(^{46}\) shows Superficial Deposits underlying the majority of the Site comprise River Terrace Deposits (sand and gravel), although no Superficial Deposits are shown under the north part of the Site. Bedrock is the Gault Formation (mudstone) and the Lower Chalk. Alluvium associated with the River Cam is located 225m to the south and east of the Site. Made Ground is also likely to be present associated with railway operations and infrastructure and past earthworks.

7.11 The ground investigation carried out in September 2012 and January 2013 has indicated the following geological sequence beneath the Site:

- Made Ground encountered from ground level, up to 5m thick and described as soft to stiff, sandy and gravelly clay, silty, gravelly sand with ash and clayey sandy gravel;
- Alluvium, encountered from 0.9 and 4.4m below ground level (bgl), 0.4 to 1.1m thick and described as soft, sandy clay and gravelly sand;
- River Terrace Deposits, encountered from 0.25 and 5.5mbgl, 0.4 to 2.05m thick and described as clayey sand and gravel; and
- Gault Formation, encountered from 1.15 to 5mbgl, at least 13m thick and described as clay, locally fissured.

\(^{46}\) British Geological Survey Map Sheet Number 188, Cambridge
7.12 There is a BGS Recorded Mineral Site located on the Site\textsuperscript{47}. This is an aggregates depot (understood to receive materials by rail) and the commodity is listed as crushed rock.

\textit{Hydrogeology}

7.13 The River Terrace Deposits are classified as a Secondary A Aquifer and the overlying soils are of high and intermediate leaching potential\textsuperscript{47}. The Gault Formation is classified as Unproductive Strata. The Site does not lie within a Source Protection Zone (‘SPZ’)\textsuperscript{47}.

7.14 Perched water was encountered in Made Ground during excavation/drilling and groundwater was encountered during the ground investigation at depths of 0.04 and 1.81mbgl. Groundwater monitoring in January 2013 recorded depths of 0.16 to 1.9mbgl.

\textit{Hydrology}

7.15 There are a number of surface water features on the Site and within 250m of the Site. A feature named as First Public Drain is located alongside the Cowley Road which forms part of the Site and there is also a pond on the Site approximately 20m to the west of the western Site boundary. Two further ponds are located off-site, approximately 20m to the east of the eastern Site boundary and 125m to the northeast of the existing sidings. The River Cam lies approximately 175m to the south of the Site at its nearest point. The Site does not lie in an area at risk of flooding but the immediate surrounding area is at risk from flooding and extreme flooding from rivers.

\textit{Existing Potential Contamination}

7.16 Numerous existing potential sources of contamination from current or historical land use within 250m of the Development were identified in the Land Contamination and Geology chapter of the Scoping Report. Those located on site or within 50m of the Site are discussed below.

7.17 The current railway sidings/aggregates depot/freight depot/ballast stockpiles/stockpiles and associated infrastructure on site, present since the early 1900s, are considered to be the principal source of potential contamination on the Site. Spillages and leakages of fuels, oils and solvents could have occurred during the historical and present day use of the sidings. Material could have been imported to the Site to adjust levels or be used in embankments.

\textsuperscript{47} Landmark Envirocheck Report 39120158_1_1, 2012
7.18 Much of the area to the immediate north and northwest of the Site is occupied by light industrial units. The Envirocheck report lists 107 contemporary trades within 250m of the Site and some of those present within 50m of the Site, located in the light industrial area, which are potential sources from which contamination may have migrated on to the Site are listed below:

- garage services;
- car body repairers;
- scientific instrument manufacturers;
- concrete and mortar suppliers;
- food product manufacturer;
- x-ray services; and
- Cleanaway waste disposal accepting aqueous effluent waste, asbestos wastes, interceptor pit wastes, oily waste, special wastes (this is a registered waste transfer, treatment and disposal site).

7.19 Historical maps contained within the Envirocheck Report suggest that there were drains, sand and gravel pits and wells formerly present on site or immediately adjacent to the Site which may have been infilled with waste materials. These could be a source of contamination and gas, depending on the material used for infilling.

**Existing Potential Receptors and Pathways**

7.20 The Site itself is developed with railway sidings, ballast stockpiles, aggregates depot and disused infrastructure and is surrounded by residential and industrial properties. Aggregate works and light industrial and commercial units are to the north, caravan park to the east, housing to the south and west and business park/industrial units to the northwest.

7.21 Potential on-site human receptors to potential contamination are considered to include employees who use the existing infrastructure and members of the public or trespassers who may be able to access the Site. Potential off-site human receptors to potential contamination are considered to include occupants of adjacent residential properties and staff accessing and working in the adjacent commercial and industrial properties. Potential pathways include dermal contact with and ingestion of contaminants in soil, soil-derived dust, entrained in surface water run-off and in shallow groundwater and inhalation of contaminant in soil-derived dust and as gas/vapours.
7.22 Controlled water receptors to potential contamination include groundwater in the Secondary A Aquifer and surface water bodies on site (First Public Drain and pond) and within 250m of the Site (River Cam and two further ponds). Potential pathways include leaching of contaminants followed by vertical and horizontal migration in groundwater and discharge in migrating groundwater and surface water run-off from inadequate site drainage systems.

7.23 Property (Buildings/Infrastructure) receptors to potential contamination include services and infrastructure already present on site and adjacent residential, commercial and industrial properties. Potential pathways include direct contact of foundations and services with contaminants in soil and shallow groundwater and gas migration along preferential pathways and through the River Terrace Deposits and accumulation in enclosed spaces/buildings. The accumulation of gas in enclosed spaces/buildings in certain concentrations has the potential to create explosive and asphyxiating atmospheres.

**Baseline Conceptual Site Model**

7.24 Visual evidence of contamination in the form of ash and clinker was recorded in the Made Ground from the majority of exploratory holes. An oily sheen was observed in the Made Ground from WS01, between 1.5 and 2.85mbgl, in the Made Ground from WS02 between 1.3 and 5.0mbgl and on the standing water within the inspection pit of WS07. Boreholes WS01 and WS02 are located on the eastern side of the Site within the existing operational railway infrastructure. Borehole WS07 is located in the northern part of the aggregates depot, just to the south of the First Public Drain.

7.25 A slight organic type odour was noted during groundwater sampling with dark colouration. However, no non aqueous phase liquids (‘NAPL’) such as oils were encountered.

7.26 Slight petroleum hydrocarbon type odours were noted in the Made Ground from WS01 (1.5-2.85mbgl), WS02 (0.0 to at least 1.3mbgl but top of natural material not proven due to zero drilling recovery), WS05 (0.0-1.6mbgl), WS06 (0.0-0.2mbgl), WS08 (0.0-0.9mbgl), WS09 (0.0-1.5mbgl), WS10 (0.0-0.8mbgl), WS11 (0.0-2.5mbgl) and WS12 (0.0-2.5mbgl).

7.27 Results of the human health GQRA indicate that in the 64 soil samples analysed, two contaminants exceeded the commercial land-use GAC. There was an exceedance for benzo(a)pyrene in the sample from WS02 at a depth of 1.6mbgl, recorded at a concentration of
14.4mg/kg compared with a screening value of 14.3mg/kg. The concentration of benzo(a)pyrene in the sample from WS02 at a depth of 0.6mbgl was below the commercial land-use GAC. There were exceedances for both benzo(a)pyrene and dibenzo(a,h)anthracene at 0.3mbgl in SM07. In addition, chrysotile asbestos was detected at in TP07 at 1mbgl.

7.28 The controlled waters GQRA has been carried out using the results of the soil-leachate laboratory analysis. This gives an indication of the concentrations at which contaminants may leach from the soil into the groundwater at the Site. The GQRA shows that concentrations of arsenic, cadmium, iron, mercury, total cyanide and total petroleum hydrocarbons (TPH) aliphatic C16 - C21, C21 – C35 and TPH aromatic C21 to C35 were elevated above the DWS which are protective of groundwater receptor. These contaminants were also detected above the DWS in the groundwater samples. A number of polycyclic aromatic hydrocarbons (PAHs) were also identified in groundwater samples.

7.29 Concentrations of total cyanide, cadmium, chromium, copper, iron and mercury were elevated above the EQS which are protective of surface water receptor.

7.30 Screening of the laboratory analytical results using Atkins’ online waste classification tool CAT-WASTESOIL indicates that none of the samples analysed would be classified as hazardous waste, apart from TP07 at 1mbgl where chrysotile asbestos was detected.

7.31 Methane and hydrogen sulphide were below the instrument detection limit and carbon monoxide (44ppm) was only detected in WS06. Carbon dioxide concentrations ranged from 0.2 to 5.4% (steady) and were above 5% in one borehole only (WS11). Ground gas monitoring is ongoing.

7.32 The baseline Conceptual Site Model (CSM) is presented in Table 7.3.
<table>
<thead>
<tr>
<th>Source</th>
<th>Receptor</th>
<th>Pathway</th>
<th>Probability</th>
<th>Consequence</th>
<th>Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contaminants present within soil and groundwater associated with current and historical railway infrastructure, aggregates depot, off-site industries, and infilled pits and ponds on-site.</td>
<td>Humans - site occupants - maintenance workers</td>
<td>Ingestion of contaminants in soil/water</td>
<td>Unlikely</td>
<td>Mild</td>
<td>Very Low Risk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inhalation of contaminants in soil derived dust</td>
<td>Low likelihood</td>
<td>Mild</td>
<td>Low Risk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dermal contact with contaminants in soil and soil-derived dust/water</td>
<td>Low likelihood</td>
<td>Mild</td>
<td>Low Risk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inhalation of gas/vapours</td>
<td>Unlikely</td>
<td>Medium</td>
<td>Low Risk</td>
</tr>
<tr>
<td>Controled water - Groundwater within superficial Secondary A Aquifer - On-site surface waters (First Public Drain, pond) - Off-site surface waters (River</td>
<td></td>
<td>Leaching and migration of contaminants (free and dissolved phase) from soils in the unsaturated zone into the groundwater in the aquifer</td>
<td>Likely</td>
<td>Mild</td>
<td>Moderate/Low Risk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lateral migration of contaminants to surface water in base flow</td>
<td>Low likelihood</td>
<td>Mild</td>
<td>Low Risk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Migration via preferential pathways such as</td>
<td>Low likelihood</td>
<td>Mild</td>
<td>Low Risk</td>
</tr>
<tr>
<td>Entrainment of containments in surface water run-off to surface water</td>
<td>Likely</td>
<td>Mild</td>
<td>Moderate/Low Risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct contact of foundations and services with contaminants in soil and contaminated groundwater</td>
<td>Likely</td>
<td>Mild</td>
<td>Moderate/Low Risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Migration to and build up of explosive gases within properties</td>
<td>Unlikely</td>
<td>Medium</td>
<td>Low Risk</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Potential Impacts

7.33 This impact assessment, as described in the Assessment Methodology section above, is undertaken by comparing the existing baseline conditions (assessed using the baseline CSM) with the conditions likely to arise during the construction and operation phases and assessing the change of risk and impacts that are likely to occur.

Construction Phase

Changes to the Baseline during the Construction Phase

7.34 The construction phase of the proposed works will potentially introduce new sources of contamination, such as fuels, used during this phase and construction workers become a new receptor. Construction activities may also introduce new pathways for migration of potential existing contamination such as excavation into existing contaminated material and introduction of new foundations and service routes. Potential changes include:

- potential for mobilising contaminants by excavation and stockpiling material. This would increase the risk to controlled water receptors through leaching and run-off. Earthworks could provide opportunity for run-off to contain suspended solids if not managed properly;
- potential for newly constructed below ground structures to create preferential pathways for the migration of existing contamination;
- potential for exposure of human receptors by generation of potentially contaminated dust released by the construction works;
- potential for exposure of construction workers to existing potential contamination because of direct contact (dermal contact/ingestion) with these materials;
- potential for release of potentially polluting substances used during the construction phase, for example, spillages of oil or fuel from equipment or vehicles, particularly in construction compounds; and
- potential that waste generated is classified as hazardous, requiring removal from the Site. According to Schedule 3 of the EIA Regulations, the characteristics of development must be considered having regard, in particular, to the production of waste.

7.35 It is assumed that material excavated during the construction phase of works would be re-used on the Site if it can be demonstrated that the material is suitable for use, otherwise it would be disposed off-site at an appropriately licensed facility.
7.36 Table 1.4 within Appendix 15 presents the construction phase CSM and qualitative risk assessment. This also shows the types of mitigation measures that would be applied and the residual risk following mitigation.

**Construction Phase Impact Assessment**

7.37 The construction phase impact assessment is undertaken by comparing the land contamination risks at the baseline to those during construction. The construction phase impact assessment is summarised in Table 1.5 within Appendix 15. The table shows that assuming mitigation measures (discussed in the Mitigation Measures section of this Chapter and presented within the table) are applied, there is considered to be a neutral impact during the construction phase.

**Operational Phase**

*Changes to the Baseline during the Operational Phase*

7.38 Train operation will continue to pose a spill risk associated with site activities.

7.39 The new building, platforms, other structures and below ground services could create additional potential pathways for the migration of potential contamination which were not present at the baseline.
7.40 Construction workers will no longer be present and operational phase human receptors will be the same as the baseline with the addition of members of the public using the facilities. Controlled waters receptors (groundwater and surface water) will be the same as the baseline.

7.41 Property receptors will include the new infrastructure but other property receptors will remain the same as the baseline.

7.42 Construction phase equipment and the associated spill risk will no longer be present. Material that is suitable for use will, where possible, have been re-used and waste material removed. There is potential to result in a slight improvement because mitigation during construction should have reduced potential historical contamination present by removal (or rendering it suitable). Therefore, the potential risk from contamination should decrease.

7.43 Table 1.6 within Appendix 15 presents the operational phase CSM and qualitative risk assessment. This also shows what mitigation measures would be applied and the residual risk following mitigation.

**Operational Phase Impact Assessment**

7.44 The operational phase impact assessment is undertaken by comparing the land contamination risks at the baseline to those during operation. The operation phase impact assessment is summarised in Table 1.7 within Appendix 15. This table shows that assuming mitigation measures (discussed in the Mitigation Measures section of this Chapter and presented within the table) are applied there is considered to be a neutral to moderate beneficial impact during the operational phase.

**Mitigation Measures**

**Construction Phase Mitigation Measures**

7.45 Appendix 15 includes the mitigation measures required to reduce the risks associated with each identified PCL during construction. The CEMP provides the mitigation measures, some of which are as follows:

- incorporation of appropriate design measures to ensure minimal disturbance of areas of contaminated ground that are identified in the desk study and ground investigation to prevent or minimise exposure and creation of preferential pathways;
- good management of soil stockpiles;
material removed off-site to be placed in covered vehicles to prevent generation of contaminants in soil-derived dust;

- all vehicles to pass though a wheel wash to prevent uncontrolled transport of contaminated material off the Site;

- all plant and equipment to be inspected for leaks prior to use to prevent accidental release of contaminants to soil, groundwater and surface water;

- vehicle and plant cleaning and refuelling to be restricted to suitably protected areas;

- appropriate storage of fuel, oils, wastewater and chemical storage, located away from surface waters and stored in accordance with the Environment Agency Pollution Prevention Guidance (PPG) notes PPG2\(^{48}\) and PPG6\(^{49}\);

- excavation and removal of contaminated material not suitable for re-use from site (see materials management section);

- working methods during construction to ensure that surface water cannot run-off from the works and stockpiles into the numerous adjacent surface watercourses;

- working methods during construction to ensure that cross contamination does not occur;

- implementation of appropriate dust control measures;

- minimising water run-off from dust suppression and wheel wash and directing through interceptor tanks and consented discharge to sewer; and

- health and safety risk assessments for the protection of construction workers when working in contaminated areas, method statements and appropriate personal protective equipment (PPE).

7.46 The CEMP for the Development would detail the full range of mitigation measures to be implemented.

**Operational Phase Mitigation Measures**

7.47 Mitigation measures implemented during the design and construction phase should reduce or remove the potential for impacts during the operational phase as follows:

- design of the scheme to incorporate measures to ensure that surface water run-off cannot directly enter surface waters located on-site and off-site;

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\(^{48}\) Pollution Prevention Guidelines, Above Ground Oil Storage Tanks: PPG2, Environment Agency, August 2011

\(^{49}\) Pollution Prevention Guidelines, Working at Construction and Demolition Sites: PPG6, Environment Agency
- soil analysis within potentially contaminated areas to inform appropriate choice of construction material; and
- excavation and removal of contaminated material not suitable for re-use from site.

7.48 It is assumed that the Development would be operated in accordance with current best practice and that in the event of spillages or leakages associated with operation, the appropriate measures would be implemented to resolve the issue.

**Residual Impacts**

7.49 No adverse residual effects have been identified from the construction and operation phase assuming that the mitigation measures identified are applied.

**Cumulative Effects**

7.50 There are not expected to be any significant cumulative effects between land contamination and other technical disciplines or other committed development.

**Conclusions**

7.51 The risks to the identified receptors under baseline conditions are considered to range from very low to moderate/low.

7.52 It is anticipated that there would be a neutral impact from the construction of the Development, assuming mitigation measures are implemented. It is expected that there would be a neutral to moderate beneficial impact from the operation of the Development.

7.53 Neutral impacts during operation are considered likely because although contaminated material would have been removed from site during construction, the operation of the Development would introduce increased sources of potential contamination which could impact on receptors, so some level of risk would remain.

7.54 Beneficial impacts during operation are associated with leaching of contaminants to groundwater and direct contact of property receptors to contaminants because of removal of potential contamination from historical activities and are associated with entrainment of contaminants in surface water run-off to surface waters from improvements in site drainage which would ensure that run-off cannot directly enter the surface water receptors on and off-site.
7.55 Gas monitoring is being undertaken at the Site on completion of the ground investigation to establish the level of potential gases at the Site and confirm, or otherwise, the low risk from gas that has been assumed in the baseline, construction and operational CSMs for the Site.
8. HERITAGE

Introduction

8.1 This chapter provides an assessment of the archaeological resources (i.e. below ground remains including Scheduled Ancient Monuments and Battlefields) and heritage assets (i.e. above ground remains including listed buildings, registered historic parks and gardens and conservation areas) on and close to the Site.

8.2 The assessment describes the baseline condition with regard to statutorily listed buildings, registered historic parks and gardens, conservation areas and any local designations such as locally listed buildings, as well as archaeological and historic landscape resources. A desk-based assessment of the archaeology resources, including visits to the Site, archaeological evaluation, background geological and topographic conditions, and full details of archaeological resources, are included in the Desk Based Assessment (April 2015) (‘DBA’) and Archaeological Watching Brief Report (April 2015) (‘AWBR’).

8.3 This chapter summarises the baseline evidence contained within the DBA and AWBR and considers the significance of the archaeological and heritage resources, the scale of any impacts assessed and the use of any mitigation measures needed to reduce identified adverse impacts.

Assessment Methodology

Policy

8.4 Section 12 of the NPPF states that local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets’ importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum, the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.

8.5 Local planning authorities should identify and assess the particular significance of any heritage asset that may be affected by a proposal taking account of the available evidence and any
necessary expertise. They should take this assessment into account when considering the impact of a proposal on a heritage asset, to avoid or minimise conflict between the heritage asset’s conservation and any aspect of the proposal.

8.6 In determining planning applications, local planning authorities should take account of:

- The desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation;
- The positive contribution that conservation of heritage assets can make to sustainable communities including the economic viability;
- The desirability of new development making a positive contribution to local character and distinctiveness.

8.7 When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset’s conservation. The more important an asset, the greater the weight should be. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. As heritage assets are irreplaceable, any harm or loss should require clear and convincing justification. Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated heritage assets of the highest significance, notably scheduled monuments, protected wreck sites, battlefields, grade I or II* listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional.

8.8 Where a proposed development will lead to substantial harm to or loss of significance of a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or loss is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply:

- The nature of the heritage asset prevents all reasonable uses of the site; and
- No viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conversion; and
- Conservation by grant funding or some form of charitable or public ownership is demonstrably not possible; and
- The harm or loss is outweighed by the benefit of bringing the site back into use.
8.9 Where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against public benefits of the proposal, including securing its optimum viable use.

8.10 Local planning authorities should make information about the significance of the historic environment gathered as part of plan-making or development management publicly accessible. They should also require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible (e.g. HER).

**Archaeology**

8.11 A variety of methods have been used to identify archaeological resources, as set out below:

- **Historic Environment Record** containing a database of all recorded archaeological sites, Listed Buildings, findspots, and archaeological events (evaluations, excavations etc) within the County as well as other designations such as Conservation Area and Scheduled Monuments
- **Cartographic Evidence** of all historic manuscript maps and Ordnance Survey (OS) maps held at Cambridgeshire Record Office. The maps available for study range from the mid 19th Century to the present day
- **Aerial Photographs** using data from English Heritage’s National Monument Record (NMR) and the Cambridge University Collection of Aerial Photography (CUCAP) to ensure correct plotting of archaeological, industrial and geomorphological information.
- **Walkover Survey** to identify buildings, earthworks and structures that may have a heritage value as well as to identify zones of potential destruction.
- **Archaeological Fieldwork** – archaeological evaluations, excavations and watching briefs of the Site Area
- **Industrial Archaeology** – the railway and its associated features and buildings
- **Geotechnical Data** – Borehole data and test pit evaluation

8.12 A brief for the DBA was issued to Cambridgeshire County Council’s Historic Environment Team and carried out in accordance with the Institute of Field Archaeologists’ Standard and Guidance for Archaeological Desk-Based Assessment (IFA 2001).
8.13 The archaeological interest of the assets lies within the potential to expertly investigate the buried remains at some point in the future and that this investigation would make a valuable contribution to the understanding of past human activity. Therefore the loss or partial loss of these physical remains would adversely affect the asset’s importance.

8.14 The criteria for establishing the importance of archaeology are set out in Table 8.1.

Table 8.1 - Establishing the importance of archaeology

<table>
<thead>
<tr>
<th>Importance</th>
<th>Criteria</th>
</tr>
</thead>
</table>
| High       | Scheduled Ancient Monuments  
Archaeological sites of schedulable quality and importance  
Registered Historic Parks and Gardens  
Registered Battlefields |
| Medium     | Undesignated archaeological sites of demonstrable regional importance  
County Council designated sites |
| Low        | Sites with specific and substantial importance to local interest groups  
Sites whose importance is limited by poor preservation and poor survival of contextual associations |
| Negligible | Sites with no surviving heritage component  
Buried remains possessing no archaeological interest |

8.15 For the purposes of this assessment a four point magnitude scale has been adopted (Table 8.2).

Table 8.2 - Establishing the magnitude of change

<table>
<thead>
<tr>
<th>Magnitude of Change</th>
<th>Description of Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>The development would result in a total loss of the fabric that possesses the archaeological or historic interest of the asset</td>
</tr>
<tr>
<td>Magnitude of Change</td>
<td>High Importance</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>High</td>
<td>Major</td>
</tr>
<tr>
<td>Medium</td>
<td>Major</td>
</tr>
<tr>
<td>Low</td>
<td>Minor to Moderate</td>
</tr>
<tr>
<td>Negligible</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

8.16 For the purposes of this assessment a matrix has been developed that relates to the importance of the heritage asset with the magnitude of change (Table 8.3).

8.17 In terms of scoping criteria, it was agreed with the local archaeological planning authorities that the archaeological potential of the Site and subsequently the scope of any further archaeological investigation should be initially defined by the DBA.

8.18 The results of the DBA confirmed the potential for significant archaeology of prehistoric, Roman and Saxon date in the area. A Brief was then prepared by the local archaeological planning authority (and supplemented by a Specification prepared by OA East) to define the requirement for further archaeological works on the Site. This required the monitoring of boreholes being undertaken as part of the Ground Investigation (‘GI’) works. Following this, a programme of evaluation trenching was proposed. However, due to access and health and safety concerns it
was decided (in consultation with the local archaeological planning authority) that evaluation trenches were not necessary. Instead a series of smaller test pits measuring 2m x 1.5m spread across the Site would be excavated.

8.19 Accordingly, an archaeological working brief and test pit evaluation was conducted on the Site. Machine excavation was carried out under constant archaeological supervision with a tracked 360-type excavator using a toothless bucket. The test pits were located across the Site to provide an even spread as possible within the Site constraints (buried and overhead services, aggregate piles and unworkable/unsafe ground condition).

8.20 The Site survey was carried out by a suitably qualified archaeological consultant using a Leica 1200 GPS system. All archaeological features were recorded using pro-forma sheets. Trench locations, plans and sections were recorded at appropriate scales and colour and monochrome photographs were taken of all relevant features and deposits.

8.21 In terms of the ‘Limitations to Assessment’, it should be noted that only a very small sample of the Site has been subject to archaeological evaluation and thus it cannot be determined with absolute certainty that no archaeology survives, either beneath the made-ground or in areas where truncation has not been so severe.

**Heritage Assets**

8.22 The process of assessing the effects on a heritage asset should involve the following:

- establishing the importance (or sensitivity) of the asset and its setting;
- making an assessment of magnitude of change, based on the location of development in relation to the heritage asset feature.

8.23 The assessment of effects includes consideration of two types of effect: direct and indirect. These are set out below:

- **Direct Effects** – a direct effect upon heritage assets would involve physical alteration or destruction as a result of the constructional and/or operational phases of the Development;
- **Indirect Effects** – an indirect effect on a heritage asset involves an alteration to its setting, or an effect on a view that materially affects its significance.
8.24 There is no formally adopted set of criteria which enables the attribution of a scale of sensitivity to a heritage asset (receptor). Accordingly, the assessment of the sensitivity of heritage assets will be classified into the following categories: High, Medium, Low, and Negligible in accordance with their significance (i.e. national significance, regional significance, local significance, no significance).

8.25 Sensitivity will also depend on factors such as the condition of the site and the perceived heritage value/importance of the asset. Table 8.4 sets out the criteria for assessing sensitivity:

Table 8.4: Criteria for Assessing Sensitivity of Receptors

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Listed Buildings and their settings</td>
</tr>
<tr>
<td></td>
<td>Conservation Areas and their settings</td>
</tr>
<tr>
<td>Medium</td>
<td>Locally Listed Buildings</td>
</tr>
<tr>
<td>Low</td>
<td>Non-designated historic buildings and their</td>
</tr>
<tr>
<td></td>
<td>structures</td>
</tr>
<tr>
<td></td>
<td>Non-designated historic landscape features</td>
</tr>
<tr>
<td>Negligible</td>
<td>No heritage importance</td>
</tr>
</tbody>
</table>

8.26 The significance of an effect is assessed by taking into account the sensitivity of the receptor and the potential magnitude of the change upon it. Magnitude of change is a function of the nature, scale and type of disturbance, or damage to the heritage asset. Criteria for assessing the magnitude of predicted change are given in Table 8.5.

Table 8.5 – Criteria for Assessing Magnitude of Change on Receptors

<table>
<thead>
<tr>
<th>Magnitude of Change</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (Adverse)</td>
<td>Total loss or major/substantial alteration to key elements/features/characteristics that make up the special interest of the asset such that post-development of the baseline character or composition or setting will be fundamentally changed</td>
</tr>
<tr>
<td>Medium (Adverse)</td>
<td>Partial loss or alteration to one or more key elements/features/or characteristics that make</td>
</tr>
<tr>
<td>Level</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>Low (Adverse)</strong></td>
<td>Minor shift away from the baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material: the underlying character/composition/attributes/setting will be similar to the baseline</td>
</tr>
<tr>
<td><strong>Negligible</strong></td>
<td>Very little change from baseline conditions. Change is not material, barely distinguishable or indistinguishable, or no change i.e. no direct effect on heritage assets, no observable change in setting or ambience of the setting</td>
</tr>
</tbody>
</table>
| **Low (Beneficial)** | Land use change resulting in slightly improved conditions for the protection of archaeological remains or understanding/appreciation of a historic building or place  

Minor decrease in visual or noise intrusion on the setting of a building, archaeological site or monument  

Minor improvement of the wider landscape setting of a building, archaeological site or monument |
| **Medium (Beneficial)** | Land use change resulting in moderately improved conditions for the protection of archaeological remain, or understanding/appreciation of a historic building or place, including through interpretation measures (heritage trails etc)  

Removal of harmful alterations to better reveal up the special interest of the asset, such that post-development the baseline character or composition or setting will be partially changed |
the significance of a building or structure, with no loss of significant fabric

Moderate reduction or removal of visual or noise intrusion on the setting of a building, archaeological site or monument

Moderate improvement of the wider landscape setting of a building, archaeological site or monument

Moderate improvement of the cultural heritage amenity, access or use of a building, archaeological site or monument

High (Beneficial)

Major enhancement of a building or archaeological site, its cultural heritage amenity and access or use

Arrest of physical damage or decay to a building or structure

8.27 The sensitivity of the heritage asset (receptor), combined with the magnitude of change, defines the significance of the effect. The assessment matrix is set out in Table 1.1.

8.28 The survey methodology used is set out in Table 8.6.

Table 8.6 - Survey Methodology

<table>
<thead>
<tr>
<th>Heritage Asset/Receptor Type</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed Buildings</td>
<td>Site Visits</td>
</tr>
<tr>
<td></td>
<td>List Descriptions</td>
</tr>
<tr>
<td></td>
<td>Published Sources</td>
</tr>
<tr>
<td>Conservation Areas</td>
<td>Site Visits</td>
</tr>
<tr>
<td></td>
<td>Published Sources (character appraisals)</td>
</tr>
<tr>
<td>Locally Listed Buildings</td>
<td>Site Visits</td>
</tr>
</tbody>
</table>
8.29 Site visits were undertaken on 31st May 2012 and 24th January 2013. During the May visit the weather was generally good, with good visibility. The assets were all viewed from public land and where assets could not be visually assessed from nearby, largely as a result of tree cover or because they were on private land, the assessment was made from the nearest available position. The January visit was undertaken to assess the situation in winter when the screening effect created by trees and other vegetation is reduced. The weather conditions during this visit were variable following snowfall on the two days before.

Baseline Conditions

Archaeology

8.30 The following archaeological summary is taken from the Desk-Based Assessment (Clover 2012), Appendix 16.

- **Palaeolithic to Neolithic (700,000 BC to 2000 BC)** - a number of flint artefacts (such as had axes, flakes, blades and arrowheads) have been found in the vicinity of the Site. These include at the Milton Road gravel pits (HER 05224), on Milton Road (MCB 19188 and HER 15219) and just across the river on Ditton Meadows (HER 05450 and HER 15451).

- **Bronze Age (2000 BC to 700 BC)** - there is evidence for Bronze Age activity all around the Site. Two Late Bronze Age hoards were found in 1927 and 1931 within 200m of each other at Brown's gravel pit (HER 05452) close to the Site. A Bronze spearhead was dredged up in 1930 from the river to the south of the Site (HER 05228) and a Bronze Age pit was recorded during excavation on the Site of the former Yorkshire Grey Public House in 2001 (HER 13018).

- **Iron Age (700 BC to AD 43)** – Evidence for Iron Age activity in the area around the Site comes mainly from pottery finds. Several Belgic urns (one of which contained a cremation burial) were found at a gravel pit to the south-east of the Site (HER 05539). Iron Age pits have also been recorded at Brown's gravel pit (HER 05452A) 0.6km to the west of Site. Belgic pottery is also recorded at being found in Stourbridge Common before 1929 (HER 04699).

- **Iron Age (700 BC to AD 43)** – Evidence for Iron Age activity in the area around the Site comes mainly from pottery finds. Several Belgic urns (one of which contained a cremation
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- **Roman (AD 43 to AD 410)** – The Site lies 3km north-east of the Roman centre of Cambridge and 1.5km east of the Roman Road of Akeman Street/Mere Way. Between Akeman Street and the Railway sidings is the Site of a Roman villa, now under Kings Hedges School. It would therefore be expected, especially given the Site’s proximity to the River Cam, that Roman settlement existed in the vicinity of the Site. Pottery of probably Roman date was found in a gravel quarry in the late 19th or early 20th century near the Site (HER 05539A). More pottery has also been found in Stourbridge Common, near the railway bridge, in 1914 (HER 05227). An evaluation in 2006 at the Old Paper Mill on Ditton Walk (HER 17486) revealed a dense series of pits and ditches indicating possible Roman and Saxon occupation.

- **Anglo-Saxon (AD 410 to 1066)** – there is only a small amount of evidence relating to the Anglo-Saxon period in the vicinity of Site. An evaluation at the Former Yorkshire Grey Public House on Chesterton High Street in 2001 revealed Saxo-Norman property boundaries, land divisions, domestic pitting and the establishment of the front street (HER 13018). The earlier and later medieval periods were also seen on the Site.

- **Medieval (1066 to 1500)** – The Site is situated between two medieval settlements – Chesterton and Fen Ditton. In Chesterton itself, pottery of a medieval date has been recovered from archaeological works at the Former Yorkshire Grey Public House (HER 13018) and from along the High Street (MCB 19703).

8.31 There is evidence still standing of medieval buildings in Fen Ditton, namely, the Church of St Mary the Virgin (HER 00325), the Old Rectory (HER 05293) and a 16th century barn (HER 05530), all of which are Grade II* Listed Buildings. A medieval shaft well has also been found in the grounds of a pub (HER 05307). Earthworks of medieval house platforms (HER 05535) have been recorded to the north of Fen Ditton, showing evidence for the shrinkage of the original medieval village. Additionally, evidence for two medieval wharfs (HER 05305 and 05303) has been recorded in the River Cam.

8.32 There is no evidence of medieval settlement on the Site itself and is likely to have been fields during this period. This is reinforced by the discovery of ridge and furrow (MCB 15918) at an evaluation in the adjacent Science Park in 1999.
8.33 During the GI watching brief, a total of 30 GI holes were monitored. The GI holes consisted of 20 Trial Pits, 9 Window Samples and 1 Cable Percussive Borehole. The Trial Pits consisted of small hand-dug holes excavated to a depth of around 1.2m. The Window Samples were made up of a hand-dug hole down to 1.2m followed by a small borehole rig drilling deeper. The Cable Percussive Borehole consisted of a large rig drilling down from a 1.2m deep hand-dug hole.

8.34 All 20 Trial Pits revealed modern made-ground throughout. This was made up of layers of gravel mixed with ash and clinker with modern debris including pieces of plastic and broken brick throughout. Natural clays were encountered in four of the Trial Pits.

8.35 The 9 Window Samples also revealed modern made-ground to varying depths across the Site.

8.36 A single Borehole (BH2), located in the centre of the Site revealed modern made ground to a depth of 1.7m which was sitting directly upon blue clay natural.

8.37 A total of fourteen archaeology test pits were machine excavated across the Site. Full details by trench/context appear in Appendix 17, in accordance with their reference numbers given in brackets below e.g. (21).

8.38 Test Pit 1 – Located in the centre of the Site, Test Pit 1 measured 1.5m wide, 2m long and 0.35m deep, after which ground water filled the base of the trench rapidly. The test pit contained two layers. A dark grey sandy silt (21) was sealed by (20), a very dark greyish brown top soil mixture of silt, ash and clinker. Wooden rail sleepers were visible in the east side of the pit at a depth of 0.16m and a width of 0.8m.

8.39 Test Pit 2 – Located in the centre of the Site, Test Pit 2 measured 1.5m wide and 2m long. Excavation stopped at a depth of 1m because of incoming water. The test pit contained four layers, all of which were made ground. At the base was a dark green grey sandy clay (19), which extended deeper than the trench. It was sealed by a dark blue grey sand silt layer (18) measuring 0.4m thick, which in turn was sealed by a mixture of dark brown grey sand and silt (17) measuring 0.34m thick. A layer of reddish hardcore completed the sequence.
8.40 Test Pit 3 – Located in the centre of the Site, close to the western boundary, Test Pit 3 measured 1.5m wide, 2m long and 0.3m deep. The shallow depth was due to a high water table. Two layers of made ground were visible. A dark brownish grey layer of sand and silt (27), measuring at least 0.1m thick was sealed by a very dark greyish brown top soil mixture of silt, ash and clinker (26).

8.41 Test Pit 4 – Located in the centre of the Site, Test Pit 4 measured 1.5m wide and 2m long. Excavation stopped at a depth of 0.82m because of incoming water. The test pit contained four layers of made ground. At the base was a redeposited dark yellow brown clayey sand (25) measuring at least 0.34m thick. It was sealed by a dark blueish grey sandy silt (24), measuring 0.2m thick. This was sealed by layer (23), a mid greyish brown silty sand measuring 0.08m thick. A layer of reddish hardcore (22) completed the sequence.

8.42 Test Pit 5 – Located in the centre of the Site, Test Pit 5 measured 1.5m wide and 2.1m long. Excavation stopped at a depth of 0.8m because of incoming water. It contained two layers of made ground. At the base was a very dark grey sandy silt (29), measuring at least 0.6m thick. This was sealed by a very dark greyish brown top soil measuring 0.2m thick, which contained tree roots (28).

8.43 Test Pit 7 – Located in the south of the Site, towards the western boundary, Test Pit 7 measured 1.5m wide, 2m long and 1.2m deep (Plate 1). Natural geology, comprising river terrace gravel, was encountered at the base. The test pit contained four layers of made ground. Above the natural was a dark grey silty sand with patches of redeposited clay (13), which measured 0.2m thick. Sealing it was layer (12), a reddish brown silty sand measuring 0.5m thick with frequent inclusions of small stones and gravel. This was sealed by a very dark blueish grey silty sand (10), measuring 0.3m thick, with frequent inclusions of gravel and clinker. The sequence was completed by topsoil layer, a dark greyish brown sandy silt measuring 0.2m thick.

8.44 Test Pit 8 – Located in the south of the Site, Test Pit 8 measured 1.5m wide, 2.4m long and 1.2m deep (Plate 2). As with Test Pit 7, it contained natural gravel in the base. Sealing the natural was layer (35), a mid brown sandy silt measuring 0.3m thick and layer (34), a yellowish brown silt measuring 0.3m thick. These two layers may represent an intact subsoil which pre-dates the use of the site for railway sidings. Layer (34) was sealed by a dark greyish brown silt (33) measuring 0.2m thick with occasional charcoal inclusions. This was sealed by a layer of redeposited chalk.
measuring 0.15m thick (32), which had presumably been used as levelling material. Above the chalk was a layer of very dark greyish brown silty sand with frequent inclusions of ash and clinker (31), measuring 0.15m thick. The sequence was completed by topsoil layer (30), a dark greyish brown sandy silt measuring 0.1m thick.

8.45 Test Pit 9 – Located in the south of the Site, towards the eastern boundary, Test Pit 9 measured 1.5m wide and 2m long. Excavation stopped at a depth of 1m because of incoming water. The test pit contained three layers and a possible cut feature of modern date. At the base was layer (40), a yellowish brown clayey silt measuring 0.4m thick. Truncating layer (40) was a possible cut (38) for a shallow feature. It appeared to be sub-circular in shape and measured at least 1m wide and approximately 0.3m deep. It was filled by (39), a very compact dark brown silty clay with small inclusions of clinker. The possible feature was sealed by layer (37), a very dark greyish brown mixture of silt, ash and clinker, measuring 0.5m thick. The sequence was completed by (36), a thin layer of dark brown topsoil measuring 0.1m thick.

8.46 Test Pit 10 – Located in the south of the Site, Test Pit 10 measured 1.5m wide, 2m long and 1.2m deep (Plate 3). The base of the trench was natural river terrace gravels, which accounted for the bottom 0.3m of the trench. The natural gravel was sealed by layer (44), a reddish brown clayey silt, possibly the remnants of a subsoil, measuring 0.25m thick. This was sealed by a dark brown clayey silt (43) measuring 0.25m thick, with inclusions of modern brick. Layer (43) was sealed by a very dark greyish brown mixture of silt, ash and clinker (42), measuring 0.2m thick, equivalent to layer (31) in Test Pit 8 and layer (37) in Test Pit 9. The sequence was completed by (41), a thin layer of dark brown topsoil measuring 0.1m thick.

8.47 Test Pit 11 - Located in the south of the Site, Test Pit 11 measured 1.5m wide and 2m long (Plate 4). Excavation stopped at a depth of 1m because of incoming water. The test pit contained four layers, all of which were modern made ground containing high levels of ash and clinker. Layer (50) was a dark greyish brown silty clay measuring at least 0.3m thick, with inclusions of modern brick. It was sealed by a very dark greyish brown clayey silt (49) measuring 0.35m thick. This was sealed by another layer of dark greyish brown silty clay (48), which measured 0.25m thick. The sequence was completed by (47), a thin layer of dark brown topsoil measuring 0.1m thick.
8.48 **Test Pit 12** – Located in the south of the Site, Test Pit 12 measured 1.5m wide, 2m long and 1.2m deep. It contained an almost identical sequence to Test Pit 11; four layers of modern made ground with high levels of ash and clinker. At the base of the trench, layer (54) was a dark greyish brown silty clay measuring at least 0.5m thick, with inclusions of modern brick and 19th century pottery. It was sealed by a very dark greyish brown clayey silt (53) measuring 0.35m thick. This was sealed by a mid greyish brown silty clay (52), which measured 0.25m thick. The sequence was completed by (51), a thin layer of dark brown topsoil measuring 0.08m thick.

8.49 **Test Pit 14** – Located in the north of the Site, Test Pit 14 measured 1.5m wide and 2m long. Excavation stopped at a depth of only 0.45m because of incoming water. The only recorded layer was a dark greyish brown sandy silt (8) containing gravel and medium angular stones.

8.50 **Test Pit 15** – Located in the north of the Site, Test Pit 15 measured 1.5m wide and 2m long. Excavation stopped at a depth of 0.8m because of incoming water. Two layers were recorded in the test pit. The lower of the two was a mid greyish brown silty clay (7) measuring 0.3m thick. It was sealed by a dark greyish brown sandy silt (6) measuring 0.5m thick, with occasional small inclusions of modern brick.

8.51 **Test Pit 16** – Located in the far north of the Site close to the entrance, Test Pit 16 measured 1.5m wide, 2m long and 1m deep. Excavation stopped at a depth of 1m because of the presence of a ceramic drain pipe identified in the west facing section. The test pit contained three layers of made ground. Layer (3) was a dark grey silty clay measuring 0.1m thick. It was sealed by a mixed layer of dark yellowish brown redeposited gravel (2) measuring 0.6m thick. The sequence was completed by a layer of reddish brown hardcore and surfacing material (1) measuring 0.3m thick.

8.52 The Site is thought to have been fields from the Medieval period up until the mid 19th Century when the railway and its sidings were built. Archaeological remains from the Medieval period up until the mid 19th Century are therefore not expected to be present on the Site.

8.53 No archaeological features were identified during ground investigation, monitoring or archaeology test pits. In addition, made ground was recorded, to a depth of over 1m below the current ground surface across the Site. The very limited sample of the Site would suggest that either no archaeological remains are present or that any archaeological remains, even if they had been present, have been truncated by later activity on site.
8.54 The only find recovered from both the GI works and the test pit evaluation was the base of a 19th Century glazed stoneware jar.

**Heritage Assets**

8.55 In relation to historic built environment designations there are no Conservation Areas, listed buildings, Registered Parks and Gardens, Registered Battlefields, or World Heritage Sites within the Site.

8.56 A study area comprising a 1km radius around the Site has been formed to assess heritage assets that may be affected by the Development. There are 4 Grade II* listed buildings and structures and 19 Grade II listed buildings and structures, two conservation areas, and 5 locally listed buildings within the study area.

8.57 Table 8.7 includes brief descriptions of the listed buildings, including a summary of their special interest.

**Table 8.7 Description of Statutorily Listed Buildings**

<table>
<thead>
<tr>
<th>Name, Location and Grade</th>
<th>Asset and Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Street, Chesterton</td>
<td>Early C19. Grey gault brick, with a pilaster at either end of the range. 2 storeys, 4 windows to range on street front, sashes with glazing bars. Hipped slate roof.</td>
</tr>
<tr>
<td>II</td>
<td></td>
</tr>
<tr>
<td>Green Dragon Inn, 5 and 7-11 Water Street, Chesterton</td>
<td>C16; 2 storeys; timber-framed and plastered; tile roof; projecting upper storey; reconditioned C18, all windows being hung or sliding sashes with glazing bars; door to Inn (No 5) flanked by C18 bay windows, Carriageway the full height of the ground floor between Nos 7 to 11. No 5 has an original central chimney stack, the others are rebuilt. Some interior features.</td>
</tr>
<tr>
<td>II</td>
<td></td>
</tr>
<tr>
<td>20 and 22 Church Street, Fen Ditton</td>
<td>Two houses, late C16 or early C17. Timber framed and plastered with slate and tile roofs.</td>
</tr>
<tr>
<td><strong>II</strong></td>
<td><strong>Two storeys, each building with separate alignment to curve of street. Continuous jetties, No. 20 with curved jetty brackets. Three first floor, and three ground floor windows include horizontal sliding sashes. One boarded door, and one half-glazed door. Plastered plinth. Large local brick rear stack and side stack to south gable. Interior has a stud partition to north and cased arched brace below tie beam.</strong></td>
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<tr>
<td>---</td>
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</tr>
<tr>
<td><strong>Riverside Cottage, 7 Green End, Fen Ditton</strong></td>
<td><strong>Cottage. Early C14 with C16, C18 and c.1920 additions and alterations. Timber-framed and plastered, painted brick. Long straw thatch and plain tile roofs. Local brick ridge stack. One storey and attic. Aisled hall of two bays has further two bays to east and demolished bay or cross-wing to south; the arcade plates and unjowled posts survive with evidence of passing braces and one truncated brace in north-west post. Late C16 inserted floors and stack. Single storey extension to west, late C18 or early C19, replaces one bay or cross-wing to the aisled hall. (The brace to north-west post suggests a continuation of the arcade as an internal wall to an enclosed part of the aisle or cross-wing). North elevation; tall gabled facade dormer window with horizontal sliding sashes, two ground floor casement windows and boarded door. Interior details include two inglenook hearths with chamfered mantel beams, and cased and exposed main timbers of aisled hall. Chamfered floor joists to hall.</strong></td>
</tr>
<tr>
<td><strong>Grassey Cottage, 21 Green End, Fen Ditton</strong></td>
<td><strong>Cottage C17. Timber-framed with gault brick casing to front elevation. Weather boarded</strong></td>
</tr>
<tr>
<td><strong>II</strong></td>
<td><strong>Green End, Fen Ditton</strong></td>
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<tr>
<td>---</td>
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</tr>
<tr>
<td><strong>III</strong></td>
<td><strong>19 and 21 High Street, Fen Ditton</strong></td>
</tr>
<tr>
<td><strong>II</strong></td>
<td><strong>The Rectory, 16 High Street, Fen Ditton</strong></td>
</tr>
<tr>
<td>Ditton Hall, High Street, Fen Ditton</td>
<td>Ditton Hall, High Street, Fen Ditton House. c.1635 possibly built for Thomas Willys incorporating the main range of an early C15 building with upper hall. Red brick, timber-frame, and C19 gault brick. Plain tile roofs. Two storeys with attics, irregular U-plan includes surviving wing and stair turret of a symmetrical planned house partly demolished c.1820. (Reconstruction R.C.H.M. Relhan C.A.S. water colours). Garden facade of three 'bays'; three Dutch gables, two with flat tops flanking central round-headed gable, ogee-moulded brick string at first floor and attic floor, plinth. Three first floor and two ground floor C19 hung sash windows and three two-light attic casement windows with original brick labels. Central late C19 closed porch with glazed garden doors and shaped parapet masks one bay of original three bay loggia with brick pilasters, elliptical arches with brick keys. Main entrance resited in south facade. Interior detailed in R.C.H.M. report, includes fine C17 staircase of six flights, panelling and chimney pieces, the wall frames and open trusses of the C15 upper hall with traces of later painted decoration.</td>
</tr>
<tr>
<td>The Old Rectory, 1 Church Street, Fen Ditton</td>
<td>The Old Rectory, 1 Church Street, Fen Ditton House, formerly the rectory. C16 and C17 with early C18 rebuilding and late C19 additions. Timber framed, C18 red brick and C19 gault brick painted. Plain tile roofs. Central range</td>
</tr>
<tr>
<td>16 Church Street, Fen Ditton</td>
<td>House, dated 1828 on brick in south gable. Painted gault brick. Two storeys attics and cellars, three 'bays'. Parapet with three sunken panels. Three first floor recessed twelve-paned hung sash windows and two similar ground floor windows. Central hung sash window, replaces original door. Brick in south gable incised with date '1828'. Included for group value.</td>
</tr>
<tr>
<td>4, 6, and 8 Four Original Wrought Iron Garden Gates, 4, 6, 8 Church Street, Fen Ditton</td>
<td>Almshouses, rebuilt in 1877 for Thomas Bailey and recently converted to three dwellings. Gault brick with red brick dressings. Pantile roofs. Three ridge stacks each with pair of</td>
</tr>
<tr>
<td>Location</td>
<td>Description</td>
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</tr>
<tr>
<td><strong>Wall to East of 16 (The Rectory) High Street, Fen Ditton</strong></td>
<td>Boundary wall. C18. Red brick with plinth and gault brick half round copings. Included for group value with The Rectory.</td>
</tr>
<tr>
<td><strong>Garden and Boundary Wall to Ditton Hall, High Street, Fen Ditton</strong></td>
<td>Walls, various C19 dates. Stone with brick rubble, C19 local brick, saw tooth brick cornices with tiled copings and brick buttresses. Walls flank the gardens of Ditton Hall and extend to the barn at the north-west.</td>
</tr>
<tr>
<td><strong>Wall to West of 16, 20 and 22 High Street, Fen Ditton</strong></td>
<td>Boundary wall to street. Late C17. Local red and yellow brick with plinth and brick copings of half round gault brick. Bricks originally coursed in chequer pattern, upper courses relaid. Included for group value with The Rectory.</td>
</tr>
<tr>
<td><strong>King’s Head Public House, 50 High Street, Fen Ditton</strong></td>
<td>Inn. C17. Timber-framed and plastered. Corrugated iron roof hipped with gable to north. Two storeys with one storey range to rear. Three first floor horizontal sliding sash windows with glazing bars. Two, four-panelled doors and three ground floor windows with glazing bars. One gault brick ridge stack and one side stack to right hand gable</td>
</tr>
<tr>
<td>Location</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
</tr>
<tr>
<td>Roebuck House, 22 Ferry Lane, Chesterton</td>
<td>C18; timber-framed and plastered; tile roof; 2 storeys with attics; 5 windows; doorway with remains of modillioned cornice. Entrance gateway in wall to Ferry Lane has reset oak head circa 1500. It is 4-centred and moulded and has 2 sub-arches, parts missing, with foliated spandrels. Internally there are a number of original features including panelled doors and ceiling beams.</td>
</tr>
<tr>
<td>Barn to North West of Ditton Hall, High Street, Fen Ditton</td>
<td>Barn, late C15 or early C16. Timber framed and weather boarded raised above ground level on limestone rubble and Barnack limestone foundations. Plain tile roofs. Two stores, jettied to north with late gabled porch entrance to east. Three 'bays' with upper and lower rooms of two bays and single bayed room to south. Restored, and original diamond mullioned windows with shutter grooves at both floors. Walls of plank and muntin construction at ground floor with rebated planks at first floor. Crown post roof.</td>
</tr>
<tr>
<td>Location</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
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</tr>
<tr>
<td>The barn may have been a merchants' trading</td>
<td>The barn may have been a merchants' trading hall and warehouse and was originally unheated.</td>
</tr>
<tr>
<td>hall and warehouse and was originally unheated.</td>
<td></td>
</tr>
<tr>
<td>Parish Church of St Mary Virgin, Church Street, Fen Ditton</td>
<td>Parish Church. North aisle c.1300 and chancel. Nave arcades, clerestoreys, south aisle and south porch C15. Church restored in 1881 by J.L. Pearson (1817-97), and in 1888-9. West tower rebuilt reproducing early C13 details. Walls of flint and limestone, some reused medieval stone with Barnack limestone and clunch dressings. Roofs of lead. South elevation. Aisles extended westward to face of tower. Tower of three stages with plain parapet and moulded plinth with small, lead covered, spirlet. Two-light belfry window with quatrefoil in two-centred arch. South aisle and porch with plain parapets and grotesque gargoyles. Porch centrally positioned, partly rebuilt with tall C19, two-centre arched opening with attached shafts and moulded capitals and bases, doorway has moulded jambs and two-centred inner and square outer arch with quatrefoils in spandrels. Aisle bays with</td>
</tr>
</tbody>
</table>
8.58 Table 8.8 includes summary descriptions of the designated conservation areas, including a summary of their special interest and analysis of their setting and context.

### Table 8.8 – Description and Analysis of Conservation Areas

<table>
<thead>
<tr>
<th>Name</th>
<th>Description and Analysis of Character, Appearance and Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fen Ditton Conservation Area</td>
<td>Fen Ditton is an essentially linear village which has resulted in a very narrow, serpentine form with an almost complete absence of backland development, the only exceptions being a few modern houses. The village has an unmistakably rural feel with its grass verges, large trees and its bucolic riverside setting. The riverside spaces are all open areas of grassland interspersed with very few buildings and some houseboats. This creates a very definite edge to the village and approaching from the west, the Church of St Mary the Virgin and the Old Rectory rise magnificently above the water meadows from behind a canopy of mature trees. The high proportion of good quality buildings and spaces means that the street scene and townscape is of exceptional quality even though the scale is modest. In particular, the rhythm of the gables and varying eaves lines and the canopies of large trees overhanging High Street are very picturesque. The grouping of the church, Old Rectory and the grass island containing the war memorial, together with the enclosing trees and buildings and surrounding spaces, forms the focal point of the village. It is the only reasonably sized public space within the village itself and lies at</td>
</tr>
</tbody>
</table>
the junction of the two ‘arms’ of the village – Church Street / Green End and High Street / High Ditch Road.

The village has two distinct character areas - Green End (the site of the original settlement) which stretched along the river between The Biggin and the church, and the expanded Medieval village which runs from High Ditch Road to the church.

Green End was, until the C20, separated from the main village by open fields and comprised a much lower density of development strung along

_Meadows panorama_

Green End Lane with intervening spaces between buildings. There may have been more houses along the road during the Medieval period, but of the surviving historic buildings only one dates from before the C17 and most buildings are C20 infill development.

In the expanded Medieval village which stretches between the church and High Ditch Road, the oldest buildings are farmhouses around which later (mostly C19) development has in filled the street, creating the attractive rhythm of gables and juxtaposition of scales that characterises this part of the village.

<table>
<thead>
<tr>
<th>Ferry Lane Conservation Area</th>
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</thead>
<tbody>
<tr>
<td>The special character of the Ferry Lane Conservation Area is derived from its position adjacent to the River Cam around which the area developed. The early historic buildings which are grouped around the waterfront highlight the significance of waterborne transport to the area with large houses built in</td>
</tr>
</tbody>
</table>
the vicinity and the Green Dragon Inn serving users of the ferry crossing point remembered in the name Ferry Lane.

The area includes four Grade II Listed Buildings and one Building of Local Interest. The earliest Listed Buildings are Nos. 5-11 (odds) Water Street, which includes the Green Dragon Inn; all date from the 16th century. No. 17 Water Street and Roebuck House are 18th century whilst Ferry Corner dates from the early 19th century. There are no Tree Preservation Orders (TPOs) within the Conservation Area boundary.

The Water Lane area's physical character derives from its relationship with the River Cam which has moulded the form of the area's development. The area is essentially a spur off the High Street, providing access to one of formerly numerous ferry crossing points in the parish. The irregular plots of Water Street and Ferry Lane back onto the later, more evenly spaced development along the High Street and Thrift's Walk to the west.

Formerly focused around river-based trade and industry with many people employed in boat-building along Water Street in the 19th century, the area is today predominantly residential, particularly around the river where only the Green Dragon Inn is in commercial use. Along the High Street, most properties are also residential, but a few have commercial ground floor uses.
The area remains strongly linked to the River Cam, which, despite modern development along its banks, is still visually connected to the Conservation Area by the open former ferry crossing point, now the Green Dragon's pub garden. The trees lining the river and those within Stourbridge Common on the other side provide a verdant backdrop to the Conservation Area which has an open character despite the relative lack of greenery within its boundary.

Excellent views along the river, across to Stourbridge Common and into the Conservation Area are afforded by the foot/cycle bridge at the southern edge of the area.

Signs of human activity from the Bronze Age onwards have been found in the parish, among them cinerary (cremation) urns from an Iron Age burial ground north-east of the village where there are also 16 traces of early Anglo-Saxon burials.

On the north-western border of the parish is a much decayed earthwork of uncertain date, called by the 13th century Hardburgh, later Arborough or Arbury Camp. Very few finds have, however, been found within the Ferry Lane Conservation Area itself, although a Saxon scramasax (dagger) was dredged from the River Cam near the Pike and Eel public
Further east of the Conservation Area, is the site of a Cromwellian fortification earthwork known as 'Mount Ararat'. It was described as a raised enclosure in the shape of an irregular rhomboid, covering approx 1 acre and was probably sited to control access along the River Cam.

**Stourbridge Common Conservation Area**

The Riverside and Stourbridge Common section of the Central Conservation Area comprises the River Cam flowing east from Victoria Bridge, north-eastwards to the City boundary. The river runs parallel to the former causeway and main road to Newmarket, lying to the south, with its terraced streets mostly of two or sometimes three storey gault brick houses.

Between the two are commons and open fields, except for an area north-eastwards from Elizabeth Bridge, where the terraced housing comes close to the river.

The River Cam is a slow moving river, populated by ducks, swans and rowers; a towpath with dog walkers, joggers, cyclists and strollers; riverside pubs, boathouses, moorings and fishermen, whilst beyond are grazing cattle and horses. Then further beyond are streets of ‘villas’ and terraced houses. This is quintessential ‘Town’ Cambridge as opposed to ‘Gown’ Cambridge, although this area of the river is heavily used for University rowing.
A backcloth of trees surrounds the open commons to the south, softening and at times hiding the built-up area beyond. Mature trees criss-cross the commons and riverside willows follow the stream. North-eastwards, the landscape becomes rural as Fen Ditton is approached through the Green Belt, yet much of it is well within the urban bounds of a City. It forms part of a green wedge, which penetrates to the heart of Cambridge – further westwards forming Jesus Green and eventually The Backs, before passing yet further beyond the City via Coe Fen and Sheep’s Green to Grantchester Meadows. Not only, then, is the Riverside and Stourbridge Common area an important landscape feature, but also a significant linear wildlife corridor, linking the City Centre with its countryside. There are no views of rolling countryside, despite the slight rise of the land towards Fen Ditton. It provides a pleasant setting for Ditton Meadows. It is on the fen edge with buildings confined to river terraces beyond the water meadows.

According to the Cambridgeshire HER, there are 39 recorded sites/monuments in the Riverside and Stourbridge Common area and one Scheduled Monument, the Old Cheddar’s Lane Pumping Station (SAM CB65).

There is little evidence that Riverside and Stourbridge Common was ever part of any settlement core. There was a mediæval village
at Chesterton and another at Fen Ditton but little in this area. Development along the main road to Newmarket has its origins in the 19th century expansion of Cambridge along the river.

There is little prehistoric evidence for this area. Stray finds of pottery are known from Stourbridge Common, and pottery and a possible Bronze Age cremation from Midsummer Common. Major Iron Age settlements are known at Castle Hill and Greenhouse Farm, and the Conservation Area lies between them. The area also lies outside the perimeter of the Roman town and no major roads are known that would have attracted activity and cemeteries. A significant cemetery was discovered on Jesus Lane and although outside the area, does indicate that there was activity adjacent.

It is certainly likely the riverside area was exploited given the extensive use of this waterway by the Romans. There are indications of Middle Saxon (650-900AD) activity along Barnwell Road including burials. This would predate the use for churchyard burials and indicates a nearby settlement. The perimeter of the mediaeval town was defined as the Kings Ditch, and though the Riverside and Stourbridge Common area lies beyond this, mediaeval Cambridge did spill over the ditch and also the open space around the town has other uses.
The nunnery of St Radegund lay immediately to the west of Victoria Avenue and its precinct probably reached this ‘modern’ road. The nunnery was founded in the 12th century and in 1496 was closed and became Jesus College. The precinct of Barnwell Priory, which is described above, probably followed Newmarket Road, Elizabeth Way, Riverside and Butt Lane. The priory was dissolved in 1538, and heavily robbed of stone to build, amongst other things, the ‘new’ chapel at Corpus Christi College. The only surviving structure is the Cellarers Chequer on Abbey Road (listed building), but it is believed that the priory possessed a full complement of monastic structures.

The Leper Chapel on Newmarket Road dates from around 1150 and is the last survivor of the Hospital of St Mary Magdalene. Its history and survival is described above. It is one of the best examples of a Norman chapel surviving in this country. This area, along the Newmarket Road was likely to have been marked in the mediaeval period with religious houses and other peripheral activity alongside, with open spaces in between.

A further indication of the peripheral nature of the Riverside and Stourbridge Common area in the mediaeval period is the report of plague pits dating from the 14th century on Midsummer Common. This was not
uncommon when the pressures of mass deaths arising from plague often led town authorities to undertake large scale burials on open spaces outside the traditional churchyards.

8.59 Table 8.9 includes brief descriptions of the locally listed buildings.

Table 8.9 Locally listed buildings

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Old Maltings</td>
<td>Ditton Walk, Cambridge</td>
</tr>
<tr>
<td>Nos. 2 and 4 Ferry Lane</td>
<td>Ferry Lane, Chesterton</td>
</tr>
<tr>
<td>241</td>
<td>Milton Road, Cambridge</td>
</tr>
<tr>
<td>The Golden Hind Public House</td>
<td>Milton Road, Cambridge</td>
</tr>
</tbody>
</table>

Potential Impacts

Archaeology

8.60 The Site is considered unlikely to have any surviving archaeological resource and therefore Development is unlikely to result in an adverse impact upon below ground remains.

8.61 The GI holes suggest that the Site is covered by modern make-up varying between 0.8m and 2m in thickness. No preserved archaeological deposits or layers were observed, the modern made-ground was seen to overlie directly upon the clay natural. The main area where natural geology was encountered (at about 1.2m below ground level) was to the south of the Site around. These levels tie in with those found during the test pit evaluation.

8.62 The archaeology test pits exposed a larger sample area than the GI works but provided a similar picture of extensive made ground, over 1.2m deep in places. No archaeological features or deposits which pre-date the use of the Site as railway sidings were identified. There was one area where natural gravel was encountered – in the south of the Site around Test Pits 7, 8 and 10. Here, the natural gravel was at approximately 1.2m below modern ground level. Test Pits 8 and 10 also contained layers near the base which may have been the remnants of subsoil, which could pre-date use of the Site as railway sidings. This would be the most likely area for the survival of archaeology although no features were discovered. It was impossible to say at what depth
natural geology may have occurred in the north and centre of the Site because of the high water
table, both in the areas of Test Pits 1-4 and 14-15. In the far south of the Site made ground
measured at least 1.2m deep in Test Pits 11 and 12.

_Heritage Assets_
8.63 The Site’s existing heavy industrial use (arising from the aggregates storage and freight sidings),
the environmental quality of neighbouring uses (i.e. Waste Water Treatment Works and industrial
estate to the north), the distance between the site and statutorily designated heritage assets
(together with the types of existing uses and development on land in between), existing
landscape features on and around the Site, and the extent of Development, all contribute in the
assessment of potential impacts.

_Construction_
8.64 The effects of construction activity on listed buildings and their settings and on conservation
areas and locally listed buildings will be indirect and temporary. There will be no direct physical
effects on any of these built heritage assets but there is potential for construction activity to have
an effect on views to and from listed and locally listed buildings and conservation areas. For
instance, views may be affected by the presence of construction equipment (such as cranes and
other machinery) in the short to medium term.

8.65 The effects arising are likely to be Negligible to Minor Adverse.

_Operation_
8.66 Effects arising from operational activity are considered to be indirect and permanent. Views are
most likely to be affected from the east i.e. views out of the Fen Ditton conservation area and
listed buildings on the western side of the village. The view is likely to be medium-long distance,
and when considered in the context of intervening development e.g. the travellers’ site on Fen
Road, and the scale of Development proposed the effects arising are considered to be Negligible
to Minor Adverse.

8.67 For the factors given in the preceding paragraph, the effects arising from the Development on
the setting of the identified listed buildings is considered to be Negligible.
Mitigation Measures

Archaeology

8.68 No mitigation measures are proposed for archaeology, on the basis that the Development is considered unlikely to have a significant adverse impact upon below ground remains. However a programme of monitoring and recording will be undertaken in conjunction with the construction phase groundwork for the Development, to identify and record any archaeological assets surviving within the Site. This will be carried out in accordance with a written scheme of investigation and shall include provision for publication to a level commensurate with the results of the surveys.

Heritage Assets

8.69 No mitigation measures are proposed for heritage assets, on the basis that the Development is considered unlikely to have a significant adverse impact.

Residual Impacts

Archaeology

8.70 No residual impacts are identified for archaeology.

Heritage Assets

8.71 No residual impacts are identified for heritage assets.
9. LANDSCAPE AND VISUAL IMPACT

Introduction

Scope

9.1 The Landscape and Visual Impact Assessment (‘LVIA’) reviews the landscape planning policy context for the area, describes the landscape of the Site and its wider context, describes the Development, and identifies the potential impacts of the proposal upon landscape character and visual amenity.

9.2 The LVIA is organised into the following sections

- **Methodology**: an outline of method of assessment with reference to established guidance;
- **Planning and Policy Framework**: a review of National, Regional and Local Planning Policy;
- **Baseline Conditions**: a review of landscape character assessments and identification of the key landscape features and characteristics, visual context and landscape and visual sensitivity;
- **Development and Mitigation**: a description of the aspects of the proposed development which have potential to cause landscape/visual effects and measures which have been incorporated into the design to mitigate these effects;
- **Assessment of Landscape Effects**: an assessment of the significance of effects arising from the proposed development on landscape features, characteristics and designated areas within the study area;
- **Assessment of Visual Effects**: an assessment of the significance of effects arising from the Development on the visual amenity, receptors and viewpoints within the study area;
- **Summary**: a summary of the assessment results and concluding discussion on the acceptability of the Development in terms of landscape and visual effects.

Methodology

9.3 The landscape and visual assessment is based on the approach advocated by the Guidelines for Landscape and Visual Impact Assessment 3\textsuperscript{50}. These guidelines are not prescriptive and the assessment has been tailored to the specific requirements of the proposals.

\textsuperscript{50} Landscape Institute and Institute of Environmental Assessment and Management, Third Edition, 2013
**Study Area**

9.4 The Site is the area where direct effects of the project under review may occur, i.e. where the items and works described in the Development Proposals section. The ‘study area’ is the area extending beyond the Site, where effects of the project may contribute indirectly to cumulative effects of multiple projects or other human activities.

9.5 Given the nature and scale of the proposal a nominal study area extending to approximately 1km from the Site has been adopted, which is illustrated in the following Figures. This reflects the maximum distance over which the Development is likely to be visible within the landscape, due to intervening development, vegetation or other topographical features.