

## 12 Landscape and Visual including Lighting

### 12.1 Introduction

- 12.1.1 This chapter provides a landscape and visual baseline report and impact assessment of the proposed East MRT development and the Thames Valley Park Park & Ride (TVP P&R).
- 12.1.2 The Landscape and Visual Impact Assessment (LVIA) identifies and assesses the negative and positive effects and significance of change arising from the proposed development on the landscape as an environmental resource in its own right and on people's views and visual amenity.
- 12.1.3 The Landscape Institute / Institute of Environmental Management and Assessment 'Guidelines for Landscape and Visual Impact Assessment', (3rd Edition, 2013) notes in paragraph 1.17, page 9, in reference to the European Union Directive 2011/92/EU:
- "The Directive is clear that the emphasis is on the identification of likely significant environmental effects. This should embrace all types of effect and includes, for example, those that are positive/beneficial and negative/adverse, direct and indirect, and long and short term, as well as cumulative effects. Identifying significant effects stresses the need for an approach that is in proportion to the scale of the project that is being assessed and the nature of its likely effects. Judgement needs to be exercised at all stages in terms of the scale of investigation that is appropriate and proportional. This does not mean that effects should be ignored or their importance minimised but that the assessment should be tailored to the particular circumstances in each case."*
- 12.1.4 The LVIA has been carried out by chartered landscape architects at Peter Brett Associates LLP, a registered practice with the Landscape Institute and a corporate member of the Institute of Environmental Management and Assessment (IEMA).

### 12.2 Policy Context

- 12.2.1 **Figure 12.1, Appendix 12-6** illustrates the landscape planning designations applicable to the site and surrounding area. Landscape planning policies which are relevant to the Combined Site in whole or in part are summarised below.

#### National Planning Policy Framework

- 12.2.2 National planning policy is set out in the National Planning Policy Framework (NPPF), March 2012. The overarching objective is to help achieve sustainable development.
- 12.2.3 Twelve core planning principles are set out in paragraph 17 of the NPPF. Those principles which are of relevance to the planning application, and to landscape and visual issues, include the following:
- "...seek to secure high quality design and a good standard of amenity for all existing and future occupants of land and buildings;
  - Take account of the different roles and character of different areas, promoting the vitality of our main urban areas...;
  - Contribute to conserving and enhancing the natural environment and reducing pollution. Allocations for development should prefer land of lesser environmental value, where consistent with other policies in this Framework...;

- *Promote mixed use developments, and encourage multiple benefits from the use of land in urban and rural areas, recognising that some open land can perform many functions (such as for wildlife recreation, flood risk mitigation, carbon storage, or food production); and*
- *Actively manage patterns of growth to make the fullest possible use of public transport, walking and cycling, and focus significant development in locations which are or can be made sustainable...*

12.2.4 Section 7 of the NPPF sets out requirements for good design of the built environment, with references made to inclusive and high quality design for all development, including public and private spaces.

### National Planning Practice Guidance, 2014

12.2.1 The UK Government's National Planning Practice Guidance (NPPG) (March, 2014) for England presents specific guidance on light pollution in Paragraphs 001 – 006 of ID 31. **Table 12-1** sets out how these paragraphs are relevant to the impact assessment of the development, and how each has been considered.

Table 12-1: Review of National Planning Policy Guidance ID31

| NPPG ID 31 Paragraph                                                                                                                                                            | Relevance to the development                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Paragraph 1:<br>When is light pollution relevant to planning?<br>(Reference ID: 31-001-20140306)                                                                                | There is potential for light from the proposed development to be obtrusive to people and wildlife or detract from the enjoyment of the night sky. Therefore, obtrusive light from the proposed development has been considered further within this assessment.          |
| Paragraph 2:<br>What factors should be considered when assessing whether a development proposal might have implications for light pollution?<br>(Reference ID: 31-002-20140306) | This assessment considers where, when and how the light shines as the development has the potential to adversely affect the use or enjoyment of nearby buildings or open spaces.<br><br>The assessment considers the impact of artificial light on sensitive receptors. |
| Paragraph 3:<br>What factors are relevant when considering where light shines?<br>(Reference ID: 31-003-20140306)                                                               | This assessment considers the potential for light intrusion affecting receptors outside the site boundary which can lead to annoyance to people, compromise existing dark landscapes and affect natural systems.                                                        |
| Paragraph 4:<br>What factors are relevant when considering when light shines?<br>(Reference ID: 31-004-20140306)                                                                | This assessment considers the potential effects of when lighting is required for the proposed development. This can minimise obtrusive light that can affect wildlife and enjoyment of the night sky.                                                                   |
| Paragraph 5:<br>What factors are relevant when considering how much the light shines?<br>(Reference ID: 31-005-20140306)                                                        | This assessment considers the minimum requirements to construct and operate the proposed development safely and securely.                                                                                                                                               |

| NPPG ID 31 Paragraph                                                                                                                | Relevance to the development                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                     | <p>The Environmental Zone of the site is established to allow for an appropriate level of lighting for the ambient lighting conditions, where possible.</p> <p>Due to the type of development, attention should be given to particular groups (e.g. the safety of pedestrians and cyclists).</p> |
| <p>Paragraph 6:<br/>What factors are relevant when considering possible ecological impact?<br/>(Reference ID: 31-007-20140306).</p> | <p>This assessment specifically considers the effects obtrusive lighting may have on wildlife.</p>                                                                                                                                                                                               |

## Development Plan

### Reading Borough Council

#### Core Strategy (adopted January 2008, altered January 2015), Reading Borough Council

- 12.2.2 **Policy CS7: Design and the Public Realm** states that all development “must be of high design quality that maintains and enhances the character and appearance of the area of Reading in which it is located”. Reference is made in this policy to landscape design, the requirement to positively contribute to character and quality of the public realm, to create safe and accessible environments, and for development to be visually attractive as a “result of good high quality built forms and spaces, the inclusion of public art and appropriate materials and landscaping”.
- 12.2.3 **Policy CS8: Waterspaces** requires development in the vicinity of waterways, which is deemed to be acceptable, to provide “appropriate, attractive uses and buildings that enhance the relationship of buildings, spaces and routes and creates a high quality public realm” as well as positive contribution to the appearance, landscape and character of waterways.
- 12.2.4 Policy CS28: Loss of Open Space states that “Development proposals that will result in the loss of open space or jeopardise its use or enjoyment by the public will not be permitted.” The policy notes that in exceptional circumstances, development will be permitted where improvements are made to recreational facilities on the remaining open space, and which outweigh the loss of open space. The policy seeks to protect the quality of existing open space.
- 12.2.5 Policy CS34: Pollution and Water Resources Development details that development will only be permitted where: “it will not be damaging to the environment through air, land, noise or light pollution”. Proposals for development that are sensitive to the effects of air, noise or light pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.
- 12.2.6 Part of the site lies within a designated **Major Landscape Feature**, and is therefore subject to **Policy CS37: Major Landscape Features and Open Space**. This policy states that planning permission will not be granted for development which would “*detract from the character or appearance of areas designated as a Major Landscape Feature*”. The policy seeks to maintain and enhance the visual amenity and natural beauty of the Borough’s open space and

landscape areas, and to resist development which results in the loss of existing landscape features or which detracts from character or appearance.

- 12.2.7 **Policy CS38: Trees, Hedges and Woodlands** protects trees, groups of trees, hedges and woodlands from damage or removal. The policy seeks to increase the extent of vegetation cover in the Borough, and to retain and improve the quality of waterside vegetation with reference to its contributions to ecology and landscape character.

**Reading Central Area Action Plan (adopted January 2009)**

- 12.2.8 **Policy RC14d: Public Realm – King’s Meadow and Coal Woodland** is identified as an Important Area of Public Open Space, which will be protected from development. The policy states: “...*Proposals adjacent to these areas will ensure that access is maintained and, where appropriate, enhanced*”. In addition, the policy requires new development within the central area to include imaginative uses of open space and the public realm, new trees and other planting. Development adjacent or in proximity to waterways is required to “*retain and not impede existing or continuous public access to and along the waterways*”.

**Sites and Detailed Policies Document (adopted October 2012, altered January 2015), Reading Borough Council**

- 12.2.9 **Policy DM4: Safeguarding Amenity** states that “Development will not cause a significant detrimental impact to the living environment of existing or new residential properties, in terms of...: Artificial lighting...”.
- 12.2.10 Policy DM17: Green Network includes reference to Local Wildlife Sites (LWS) and requires new development to demonstrate how landscaping is arranged to maintain or link into the existing Green Network.
- 12.2.11 Policy DM18: Trees requires new development to improve the level of tree coverage in the Borough, and as well as providing for new tree planting it makes reference to the retention of existing trees.
- 12.2.12 Policy SA16: **Public and Strategic Open Space** protects public recreational open space areas, which are designated as Important Areas of Public and Strategic Open Space, from development.

**Managing Development Delivery (MDD) Local Plan (adopted February 2014)**

- 12.2.13 **Policy CC03: Green Infrastructure, Trees and Landscaping** refers to the need for development proposals to “...*protect and enhance the Borough’s Green Infrastructure networks, including the need to mitigate potential impacts of new development...*”. In addition, the policy requires a development scheme to integrate with adjoining public open space, and to protect and retain existing trees, hedges and other landscape features. Development schemes need to incorporate “high quality, ideally, native planting and landscaping as an integral part of the scheme”.
- 12.2.14 Landscape character, its condition and features that contribute to the landscape, is protected by **Policy TB21: Landscape Character**. The policy requires proposals to demonstrate how they have addressed landscape quality, strategy, sensitivity and key issues identified in the Council’s Landscape Character Assessment.

**LED street lighting project**

- 12.2.15 RBC has received £6.9m from the Department of Transport’s Challenge Fund towards a programme to upgrade the street lighting in the borough to use energy efficient LED lighting. From April 2016 to March 2018 they replaced 11,329 non-LED street lights, 2,533 old or

incompatible columns and 2,578 sign lights. They will also replace 890 powered bollards with solar bollards.

### **Local Transport Plan 3**

12.2.16 RBC's Local Transport Plan 3 (LTP3) covers the period of 2011 – 2026. Within LTP3 it is detailed that the Council seeks to enhance the security of the public realm through lighting, design and other measures.

### **Wokingham Borough Council**

#### **Core Strategy (adopted January 2010), Wokingham Borough Council**

12.2.17 In **Policy CP1: Sustainable Development**, development proposals are required to “1) Maintain or enhance the high quality of the environment...”; “2) minimise the emission of pollutants into the wider environment” and to “...10) Provide attractive, functional, accessible, safe, secure and adaptable schemes.”

#### **Sustainable Design and Construction: Supplementary Planning Document (SPD) (May 2010)**

12.2.18 The SPD contains ‘Sustainability Issue 9: Air, Noise and Light Pollution and Land Affected by Contamination’ which states:

“Where significant impacts from pollution to or from the proposed development is likely or probable, an assessment of existing levels of pollution will be required to be submitted alongside the planning application”.

12.2.19 The existing levels of light pollution are to be addressed through this lighting assessment for the proposed development.

12.2.20 Measures to reduce light pollution are discussed within the SPD including:

- *provision of lighting only where necessary;*
- *directing light downward, minimising the upward spread of light beyond horizontal;*
- *ensuring the main beam angle of lights - directed towards a potential observer - is below 70 degrees;*
- *uniform lighting, avoiding bright and dark spots which interfere with visibility and can cause glare; and*
- *ensuring lighting systems are energy efficient, by considering energy demand and automated controls.*

### **Managing Development Delivery Local Plan**

12.2.21 The Managing Development Delivery (MDD) local plan was adopted in 2014. There are no specific policies relating to lighting.

12.2.22 Appendix 3 of the MDD Local Plan refers to strategic transport projects indicated on Figure 24 of the Local Transport Plan, which includes a proposed highway scheme connecting west into Reading Borough from Thames Valley Park and the proposed Park & Ride facility. Supporting text to Policy SAL09 of the MDD Local Plan (Paragraphs 4.68-4.69) requires development

proposals to have regard to the 'Cross Town Link' proposals from Thames Valley Park being pursued by RBC.

### **Local Transport Plan 3**

12.2.23 WBC's Local Transport Plan 3 (WBC LTP3) covers the period of 2011 – 2026 providing details on how the Council intend to improve transport and accessibility over the next fifteen years.

12.2.24 Policy HW9 Street lighting of WBC LTP3 states;

- *"The Council will consider changes to street lighting provision to make them more environmentally friendly without jeopardising the safety of residents"*

12.2.25 The Council will seek to obtain funding to replace outdated lanterns in the Borough with more cost-efficient and environmentally friendly replacements and use the savings to generate funding for replacing old lighting columns. The Council will also work to continue to insist that all new development has remotely monitored street lighting. This enables street lights to achieve energy savings and still provide appropriate levels of lighting.

### **Part-Night Lighting**

12.2.26 WBC has rolled out a "Part-night Lighting" scheme where in which certain street lights are switched off between 0:30am and 5:30am. As part of this scheme, the Council is also upgrading older street lights to use more energy efficient equipment and white lighting (LED's).

### **Lighting Guidance**

12.2.27 Relevant guidance on obtrusive light, ecology and British Standards has been set out below and is considered as part of the Lighting Assessment.

#### **Obtrusive Light**

12.2.28 Guidance on obtrusive light is set out within the following guidance documents:

- Commission Internationale De L'Eclairage (CIE) 150:2003;
- CIE 126-1997. Guidelines for Minimising Sky Glow;
- The Institution of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light, 2011; and
- ILP Professional Lighting Guide 04: Guidance on Undertaking Environmental Lighting Impact Assessments, 2013.

#### **Ecological**

12.2.29 Guidance on obtrusive light in relation to bats as issued by the Bat Conservation Trust is listed below:

- Bat Conservation Trust – Bats and Lighting in the UK (May, 2009);
- Statement on the Impact and Design of Artificial Light on Bats (May, 2011);
- Landscape and Urban Design for Bats and Biodiversity (2012); and
- Artificial Lighting and Wildlife Interim Guidance: Recommendations to Help Minimise the Impact of Artificial Lighting (2014).

## British Standards

- 12.2.30 BS EN 5489-1:2013 Code of Practice for the design of road lighting – Part 1: Lighting of roads and public amenity areas: Lighting of roads and public amenity areas - defines lighting classes for road lighting aimed at the visual needs of road users, and it considers environmental aspects of road lighting.
- 12.2.31 Two standards have been used for the lighting design of the proposed development: British Standard EN 5489-1:2013 class C3, for the road junction and car park aspect of the development, and British Standard EN 5489-1:2013 class P5 for the MRT footway and cycleway lighting.

## 12.3 Consultation

- 12.3.1 A Scoping Report was submitted to Reading Borough Council and Wokingham Borough Council in 2016, which included an outline of the proposed scope and methodology for the LVIA. Comments received in the Scoping Opinion regarding landscape and visual issues are summarised in **Table 1-1** of **Appendix 12-1**, LVIA Methodology, including how the LVIA responds to those comments.
- 12.3.2 In addition to the Scoping Report, agreement to the proposed locations of viewpoints for the visual impact assessment was sought from officers at Reading Borough Council and Wokingham Borough Council in April 2017.
- 12.3.3 A response confirming no comment and that the viewpoint locations looked ok, was received on 2nd May 2017 from Reading Borough Council. To date, no response has been received from Wokingham Borough Council.
- 12.3.4 Details of other consultations are set out in **Chapter 5**.

## 12.4 Methodology

- 12.4.1 The PBA methodology used for undertaking the LVIA is set out in detail at **Appendix 12-1**. It is based on the Landscape Institute / Institute of Environmental Management and Assessment “Guidelines for Landscape and Visual Impact Assessment” (3rd Edition, 2013) (GLVIA3), combined with our professional experience and judgement.
- 12.4.2 The assessment of landscape and visual effects aims to be as objective as possible, however, as explained in GLVIA3:

*“Professional judgement is a very important part of LVIA. While there is some scope for quantitative measurement of some relatively objective matters, for example the number of trees lost to construction... much of the assessment must rely on qualitative judgements, for example about what effect the introduction of a new development or land use change may have on visual amenity, or about the significance of change in the character of the landscape and whether it is positive or negative.”*

(Paragraph 2.23, page 21, GLVIA3)

- 12.4.3 The LVIA has been based on the proposals described in **Chapter 3** of this ES and the application plans, including those in **Appendix 3**.
- 12.4.4 The assessment of effects makes comparison with the baseline year **2016**, during which time the site surveys were carried out. Baseline conditions for the site are unlikely to change materially up to 2021. However, it is noted that the vegetation along the Network Rail corridor has been cleared since the 2016 baseline period. This does not alter the reporting of the site's

baseline vegetation, but being adjacent to the site is noticeable in views from the Thames Path and results in greater existing visibility of the existing railway infrastructure elements.

12.4.5 This chapter considers effects of the proposed development on:

- landscape character, within which the site is located;
- landscape elements (the ‘fabric’ or features, which contribute to character);
- views available to people and their visual amenity, from publicly accessible viewpoints; and
- those sensitive to varying levels of light intrusion, glare and sky glow such as;
  - o Existing residents;
  - o Motorist, cyclists & pedestrians;
  - o The railway;
  - o Heritage; and
  - o Wildlife.

### Study Area

12.4.6 The spatial scope of this LVIA was determined through desktop study combined with visits to the site and surrounding area, to determine the site's existing visual envelope and the extent to which the proposed development is likely to be visible from within the surrounding area. Professional experience of other assessments and site appraisals for this type of development indicates that landscape or visual effects would not be significant beyond 0.5km from the Combined Site boundary.

12.4.7 The spatial scope, together with a review of potential visual receptors, guided the selection of representative viewpoints that are included within the visual impact assessment. As a result of the EIA Scoping Opinion, additional viewpoints were added to the assessment, in order to consider the visual effects of the TVP P&R. The locations of representative viewpoints for the visual impact assessment are set out in **Section 2 of Appendix 12.1, LVIA Methodology** and shown on **Figure 12.2, Appendix 12.6**.

12.4.8 Areas identified with the potential to experience visual effects but which were considered unlikely to experience significant visual effects, were scoped out of the visual impact assessment. These are also detailed in **Section 2 of Appendix 12.1, LVIA Methodology**.

### Site Appraisal

12.4.9 Following the background data review and a preliminary desktop study, site visits were made in March 2016 and May 2017, by a Chartered Member of the Landscape Institute (CMLI). The purpose of the visits was to undertake the landscape and visual appraisal in relation to the proposed development, and the identification of key views, assessment of landscape value and of local landscape character. The visits also enabled confirmation of selected

representative viewpoints as a basis on which to undertake the visual impact assessment, and the assessment of predicted landscape and visual effects.

12.4.10 The baseline site appraisal was undertaken during late winter, in March 2016. During summer months, visual effects of the proposals will be reduced as a result of intervening trees being in full leaf and therefore the late winter visit demonstrates the worst case visual effects.

## 12.5 Baseline Conditions

12.5.1 The Combined Site is located to the south of the River Thames and to the north of the Great Western Main Line Railway. The western end of the Combined Site is located south of a retail superstore and car park; and the eastern end lies to the west of the Thames Valley Business Park.

12.5.2 The Combined Site is described in detail in **Chapter 2** of this ES. **Figure 12.1 Landscape Planning Context** and **Figure 12.2 Landscape Character**, both in **Appendix 12.6**, should be referred to when reading this section.

### Landscape Character

12.5.3 Published sources describing relevant landscape character, are:

- Natural England, National Character Area Profile: 115 Thames Valley;
- Wokingham District Landscape Character Assessment, 2004;
- Berkshire Landscape Character Assessment, October 2003; and
- Townscape and Visual Assessment, Appendix 1 of Reading Tall Building Strategy, 2008.

12.5.4 **Figure 12.2, Appendix 12.6**, illustrates the landscape character areas which are applicable to the Combined Site and surrounding area.

### National Landscape Character

12.5.5 The Combined Site lies within National Character Area 115: Thames Valley. Key characteristics, of relevance to the Combined Site and locality, include:

- Flat and low-lying land;
- The River Thames and its tributaries, streams, lakes, canals and open waterbodies (the result of restored gravel workings);
- Densely populated and developed, but with pockets of woodland, open grassland, parkland, wetlands and meadows which provide escape and tranquillity and include a variety of habitats;
- An urban character;
- Important for recreation by residents and visitors; and
- The Thames Path National Trail runs the length of the NCA, and a variety of activities are enjoyed on the river and other waterbodies.

## Regional / Local Landscape Character

- 12.5.6 The part of the Combined Site which lies to the east of the River Kennet, is situated within landscape character area **B2: Thames River Valley with Open Water, Wokingham District Landscape Character Assessment, 2004**. Key characteristics (page 111 of the Landscape Character Assessment) of relevance to the Combined Site and surrounding area, include:
- *“Small area of river landscape focussed on the presence of the River Thames – a broad navigable river defining the district boundary;*
  - *Broad and flat alluvial floodplain landscape with localised pockets of terrace deposits;*
  - *Transitional landscape with considerable urban influences due to the neighbouring urban areas and the presence of gas towers, roads and a railway line;*
  - *Strong influence of modern and older commercial and industrial buildings...;*
  - *Immediate river channel with reinforced banks...; and*
  - *Considerable evidence of recreational use including the Thames Path National Trail and water sports with associated facilities including a new watersports building.”*
- 12.5.7 Landscape quality of **B2: Thames River Valley with Open Water** is identified (page 115 of the Landscape Character Assessment) as being of *“moderate quality as a result of its strong character and moderate condition”*. The landscape is considered to be in *“moderate condition”* with opportunities to make improvements to the value of habitats and repair of buildings and infrastructure. The associated landscape strategy objective is to conserve the positive characteristics, including the river channel form; and opportunities to *“enhance character and condition to ensure the area remains as an attractive recreational landscape.”*
- 12.5.8 In addition, landscape sensitivity of **B2: Thames River Valley with Open Water** is identified as being of overall *“low sensitivity”*; however, some aspects of the physical landscape, particularly the river channel and corridor, are noted as being *“highly sensitive to change”*. The text notes that any changes *“should not impact on the character of the Thames”*.
- 12.5.9 Landscape character area **B: Lower Valley Floor, B4 – Hurley Thames**, (Berkshire Landscape Character Assessment, October 2003) lies adjacent to the East MRT Site (see **Figure 12.2 in Appendix 12.6**). Relevant key characteristics include:
- Wide, deep, meandering natural river corridors, including the Thames;
  - Deciduous wooded context, which riverbank trees contribute to;
  - Considerable recreational use of the landscape including the Thames Path National Trail; and
  - Boating activities.
- 12.5.10 The remainder of the Combined Site which lies to the west of the River Kennet, is situated within townscape character areas published in Appendix 1: Townscape and Visual Assessment of the Reading Tall Building Strategy (Entec, 2008). These are: **Character Area 11: Napier Road** and **Character Area 23: King’s Meadow**.
- 12.5.11 Key characteristics of townscape character area **11: Napier Road** include:
- Residential and retail land use;
  - Tightly packed buildings between the railway line, Napier Road and the River Thames;

- Parking and landscape areas between medium size building blocks, creating a medium scale townscape; and
- Townscape condition and character is of a “forgotten area” with a weak townscape character.

12.5.12 Key characteristics of townscape character area **23: King’s Meadow** include:

- Sports ground and river meadows;
- Large townscape scale arising from a large expanse of open meadows;
- Open views across the meadows, northwards, to tree skyline of bankside vegetation identified as a key view (view N); and
- Protected open space.

#### **Landscape Character of the Site**

12.5.13 Overall, the Combined Site has a sense of enclosure and a sense of being part of the River Thames corridor through the urban area, with few views out to adjacent areas. Its character is of urban open space and river-edge. There are strong influences from the railway and infrastructure corridor to the south of the Application Site boundary, with views of the railway, moving trains, gantries and overhead cables; which counteracts the calmer and more attractive River Thames to the north of the tow path.

12.5.14 The landscape character of the Combined Site can be described by four distinctive landscape character areas:

- **A: Waterside Amenity:** the eastern sector of the Combined Site, adjacent to the River Thames and extending from the Dreadnought Building eastwards through to the TVP P&R and beyond. This area is strongly influenced by active recreational use of the Thames, for water sports and boating, and the amenity public open space grassed area. The area adjacent to the River Thames appears well-managed and tidy; and there is a high level of use by walkers, runners and cyclists on the tow-path, in addition to the visitors to Wokingham Waterside Centre and people undertaking water sports and boating activities. This area has a sense of being an active public open space, with few views of urban elements to detract from the river corridor. The TVP P&R comprises an unmanaged and overgrown area of trees and scrub, situated behind the Dreadnought Building and Wokingham Waterside Centre, which is not publicly accessible.
- **B: Central:** adjacent to the River Thames, situated between the Dreadnought Building and the mouth of the River Kennet at its confluence with the Thames. This is a linear and narrow space, which is strongly influenced by views of adjacent urban and infrastructure elements, such as the main line railway and associated gantries and overhead wires, the metal framework of a gas holder, electricity pylons and overhead lines, and Network Rail’s metal palisade boundary fencing. This linear space appears unmanaged and unkempt; though it has a high level of active use by walkers, runners and cyclists on the tow-path. There are occasional canal boats moored on the River Thames, near to the mouth of the River Kennet.
- **C: Kennet and Thames Confluence & LWS:** at the confluence of the River Kennet and River Thames and extending west along the LWS and River Thames, north of the Tesco’s car park. At the mouth of the Kennet, there are views southwards of the existing Grade II Listed Railway Bridge and attached Accommodation Bridge over the River Kennet and the main line railway, looking towards the urban area (**Chapter 14 Archaeology and Heritage** of this ES considers this in more detail). Graffiti tags are seen on these structures. The LWS comprises a small area of managed woodland which

provides some sense of enclosure to the character area, particularly when walking along the tow-path adjacent to the Thames. The LWS is demarked by painted metal railings adjacent to the tow-path, and contains winding tarmac footpaths linking the River Thames tow-path to the Tesco's car park. This character area has a treed and river corridor character, with some detracting influences of graffiti, built form and infrastructure.

- **D: Napier Road:** the western sector of the Application Site, extending from the eastern boundary of the Tesco car park, along the southern edge of Tesco's retail store and fuel station areas, to Napier Road. This area has an urban character, comprising built form, car park areas with semi-ornamental planting, and a scrubby, overgrown and unkempt narrow linear space between the Tesco's area and the main line railway, which is not accessible to the public.

## Landform and Watercourses

12.5.15 The Combined Site is located on low lying landform, adjacent to the southern bank of the River Thames which lies to the north of the site and which flows west to east. The proposed route also passes over the mouth of the River Kennet, at its confluence with the River Thames.

12.5.16 To the south, the Great Western Main Line Railway is raised on an embankment.

## Land Use

12.5.17 Currently, the Combined Site forms open land that is undeveloped and includes a section which crosses the River Kennet at its confluence with the River Thames.

## Existing Vegetation and Tree Cover

12.5.18 Broad-leaved woodland is present in the western section of the Application Site which lies within a Local Wildlife Site (LWS) (see **Chapter 13 Ecology** for more information), as well as in the TVP P&R. There are also scattered trees throughout the Combined Site.

12.5.19 A tree survey for the East MRT Site was undertaken in April 2016, which identified 128 individual trees and 65 tree groups within, or in proximity to, the Application Site boundary. Of these, the survey identified:

- 8 individual trees as Category A (trees of high quality);
- 56 individual trees and 28 tree groups as Category B (trees of moderate quality);
- 60 individual trees, 32 tree groups, 5 hedgerow groups and 2 shrubs as Category C (of low quality); and
- 2 individual trees as Category U, and which cannot be realistically retained regardless of land use.

12.5.20 A copy of the East MRT Site tree survey and constraints plan is included at **Appendix 12.4**.

12.5.21 An outgrown native species-rich hedgerow, which includes trees, is located on the northern boundary of the TVP P&R.

12.5.22 Groups of dense and scattered scrub is located within the Combined Site; though this is not continuous.

12.5.23 A small area of acid grassland was identified by the ecology surveys, in the western area of the East MRT Site, near to Napier Road and the nearby retail superstore.

12.5.24 Other vegetation within the Combined Site includes: areas of dense and scattered scrub; semi-improved and amenity grasslands; ruderal vegetation; and shrub (semi-ornamental) planting.

12.5.25 A number of individual and group Tree Preservation Orders (TPOs) and a woodland TPO cover trees within the western part of the East MRT Site, along the River Thames, within the LWS and within the Tesco carpark.

12.5.26 There are no TPOs upon the eastern part of the Combined Site within the borough of Wokingham.

### **Conservation Areas, Listed Buildings and Register of Historic Parks and Gardens of Special Historic Interest**

12.5.27 The Combined Site does not lie within a Conservation Area.

12.5.28 The nearest Conservation Area is Eldon Square, Reading, which lies approximately 0.4km to the south of the Application Site. There is no intervisibility with the Combined Site as a result of intervening built form, the nature of the landform, the main line railway on embankment and vegetation.

12.5.29 There are no Listed Buildings within the Combined Site. The nearest Listed Building is the Grade II Listed Railway Bridge and attached Accommodation Bridge, over the River Kennet. These bridges lie adjacent to the southern boundary of the Application Site, and were built as part of The Great Western Railway in the mid-19th century. **Chapter 14 Archaeology and Heritage** of this ES considers Listed Buildings in more detail.

12.5.30 Approximately 0.15km to the south of the Application Site is Newton School, which is Grade II Listed. The main line railway on embankment and bridges, together with intervening vegetation, prevents intervisibility with the Combined Site.

12.5.31 Other Listed Buildings within 0.5km of the Combined Site boundary, but which do not have intervisibility with the Combined Site due to intervening buildings and vegetation, include:

- Fisherman's Cottage adjacent to the Kennet and Avon Canal, Grade II;
- 47-48 Kenavon Drive, Grade II;
- The Pump and Turbine House, Grade II;
- The Engine House, Grade II;
- The Screens House, Grade II;
- Reading Gaol (main building, former HM Prison), Grade II;
- Church of St. James, Grade II; and
- King's Meadow Swimming Pool, Grade II.

12.5.32 However, intervening built form, the nature of the landform, the main line railway on embankment and vegetation prevent intervisibility between these Listed Buildings and the Combined Site.

12.5.33 Reading Cemetery, 0.6km to the south of the Combined Site, is listed on the Register of Historic Parks and Gardens of Special Historic Interest (RHPG), as Grade II. The Forbury Garden is also listed on the RHPG as Grade II, and is situated approximately 0.5km to the southwest of the East MRT Site. Intervening built form prevents intervisibility from these RHPGs with the Combined Site.

### Scheduled Ancient Monuments (SAM)

12.5.34 Reading Abbey (Cluniac and Benedictine Monastery and Civil War earthwork) is a SAM, located 0.5km to the southwest of the Application Site; intervening built form and the main line railway prevents intervisibility with the Combined Site.

### Public Rights of Way and National Cycle Routes

12.5.35 A Public Right of Way (PRoW), the Thames Path National Trail and National Cycle Routes 4 and 5 (Thames Valley) pass through the Application Site, on the route of the tow-path adjacent to the River Thames. National Cycle Route 4 turns southwards off from the River Thames tow-path and follows the alignment of the River Kennet.

### Landscape Value

12.5.36 Landscapes may be valued at community, local, or national level, or in some cases at a greater level. Existing landscape planning designations are taken to be the initial guide to value, as shown in **Table 1.4, Appendix 12.1 LVIA Methodology**. The value attached to undesignated landscapes also needs to be considered and other factors which influence landscape value, such as landscape or scenic quality, sense of place, rarity, and so forth, are also taken into account as per the detailed criteria in **Table 1.5, Appendix 12.1 LVIA Methodology**, for determining landscape value.

12.5.37 As part of the baseline review, an assessment of value is made for landscape character areas and the individual elements which contribute to landscape character, which may be affected by the proposed development. Landscape values are set out in detail in the **Landscape Effects Table in Appendix 12.2**.

### Key Views and Representative Viewpoints

12.5.38 A key or strategic view within central Reading, View N: North-westwards across King's Meadows, is identified in Reading Borough Council's Townscape and Visual Assessment (Appendix 1, Reading Tall Building Strategy, Entec, 2008). This viewpoint is located at the southern edge of King's Meadow recreation ground, near to Napier Road. From that location, however, there is no intervisibility with the Combined Site due to intervening vegetation and buildings. There are no other published or designated key views which apply to the Combined Site or the area within which the Combined Site is located.

12.5.39 As a result of low lying landform, the River Thames, waterbodies between Lower Caversham and Sonning, the railway corridor and vegetation associated with the river and rail corridors, views towards the Combined Site are typically limited to local views. **Figure 12.4 Visual Analysis** illustrates the visual enclosure of the Application Site and Combined Site. Local views occur from:

- the River Thames;

- the mouth of the River Kennet;
- open spaces adjacent to the Thames;
- the Thames Path National Trail and National Cycle Network Routes 4 and 5 which follow the tow-paths adjacent to the rivers;
- the mainline railway on elevated embankment;
- the roundabout on the A3290;
- the eastern end of Napier Road and Tesco's car park; and
- within the LWS area.

12.5.40 Representative viewpoints (which represent specific views from a location) and sequential viewpoints (which represent the sequences of views when travelling along the Thames Path National Trail in east and west directions) for the visual impact assessment are set out in **Section 2 of Appendix 12-1, LVIA Methodology** and shown on **Figure 12-5, Appendix 12-6 Viewpoint Location Plan**. Reasons for selection are given in **Table 12-1** below.

12.5.41 The baseline description for each viewpoint, including information about the type and relative numbers of people likely to be affected, is set out within the **Visual Effects Table in Appendix 12-3**, which includes representative photograph panoramas illustrating baseline views.

12.5.42 Views which were scoped out of the LVIA are set out in **Table 1-3, Appendix 12-1 LVIA Methodology**.

### Value of Views

12.5.43 All visual receptors are people. The value attached to the views experienced has regard to a number of factors including recognition through the planning designation or heritage assets and the popularity of the viewpoint. **Table 1-9, Appendix 12-1 LVIA Methodology** sets out the criteria for determining the value of views from low to high.

12.5.44 As part of the baseline review, an assessment of value has been made for the views and visual amenity which may be affected by the proposed development. These are set out in detail in the **Visual Effects Table in Appendix 12-3**.

Table 12-2: Selection of Viewpoints for Visual Impact Assessment

| Viewpoint Reference              | Location                                                                             | Reason for Inclusion                                                                                                              |
|----------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>Representative Viewpoints</b> |                                                                                      |                                                                                                                                   |
| 1                                | Towpath south of Kennet and Avon Canal, at end of Cholmeley Road, looking north-east | On National Cycle Route 4<br>To north of Newton School (Grade II Listed Building)<br>To south of listed railway bridge (Grade II) |
| 6                                | Thames and Kennet Marina, looking south                                              | Representative of view from the north                                                                                             |
| 7                                | Entrance to Tesco's, Napier Road                                                     | Represents view for visitors to Tesco and of the western end of the East MRT.                                                     |

|                                                                              |                                                                                 |                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A                                                                            | Local Wildlife Site (LWS), paths between Tesco's car park and Thames Path       | Network of local footpaths through LWS.                                                                                                                                                                                                                                                  |
| E                                                                            | View from Roundabout between Thames Valley Park Drive and A329 (M)              | Transport corridor, adjacent to TVP P&R.                                                                                                                                                                                                                                                 |
| <b>Sequential Views Eastwards and Westwards, with Representative Photos:</b> |                                                                                 |                                                                                                                                                                                                                                                                                          |
| 4                                                                            | Thames Path National Trail, looking east                                        | Area identified by Reading Borough Council as a 'Major Landscape Feature' (Policy CS37, SA17) and an 'Important Area of Open Space' (Policy RC14)                                                                                                                                        |
| 2                                                                            | Thames Path National Trail, looking east                                        | Thames Path National Trail<br>National Cycle Route 5 –Thames Valley<br>Area identified by Reading Borough Council as a 'Major Landscape Feature' (Policy CS37, SA17) and an 'Important Area of Open Space' (Policy RC14)                                                                 |
| 3                                                                            | Thames Path National Trail, looking west                                        | Thames Path National Trail<br>National Cycle Route                                                                                                                                                                                                                                       |
| 5                                                                            | Open space between Thames Path and Thames Valley Park Drive, looking south-west | Public open space<br>Proximity to the Thames Path National Trail<br>Viewpoint 18 – from the Thames Path, east of Reading. Identified as a Long Range view into Central Reading (Reading Borough Council Townscape and Visual Assessment, 2008), which gives the view a high sensitivity. |
| B                                                                            | Thames Path National Trail, looking east (B1) and west (B2)                     | Narrow section of land between River Thames and East MRT Site                                                                                                                                                                                                                            |
| C                                                                            | Thames Path National Trail, adjacent to the Dreadnought Building                | Thames Path National Trail, National Cycle Network                                                                                                                                                                                                                                       |
| D                                                                            | Thames Path National Trail, adjacent to Wokingham Waterside Centre              | Thames Path National Trail, National Cycle Network                                                                                                                                                                                                                                       |

## Lighting Baseline

### Desk Based Study

12.5.45 A desktop review of the site and surrounding area was undertaken to identify potential light sensitive receptors and to establish the Environmental Zone classification for the site in accordance with the ILP's Guidance Notes for Obtrusive Light (2011).

12.5.46 The following sources of publically available information were reviewed:

- Google Street View (September 2016)
- Ordnance Survey Mapping (Crown Copyright 2017)
- Aerial photography (accessed 2017)

12.5.47 Although the desk based information enables a framework to be established for the assessment, the aerial photography and Street View are not up to date and therefore cannot be relied upon as being definitive. In addition, the majority of the site is away from the highway network and therefore Street View is not available.

12.5.48 Therefore, in order to have a definitive understanding of the existing lighting conditions of the site a lighting survey was undertaken.

### Lighting Survey

12.5.49 A lighting survey was undertaken to establish the existing lighting conditions of the site. This follows the procedures set out in ILP (2013) Professional Lighting Guide 04: Guidance on Undertaking Environmental Lighting Impact Assessments.

12.5.50 The lighting survey recorded night time views in a series of photographs from pre-determined viewpoints. The viewpoint locations were chosen to represent light sensitive receptors and were based on the locations established in the Landscape and Visual Assessment (see Chapter 12 Landscape and Visual). A location plan of the viewpoints taken is included as **Appendix 12-5 Lighting Assessment**.

12.5.51 The view was studied to record principal lighting features, obtrusive light and comment on light sources not visible in the photographs.

12.5.52 The night time survey was undertaken on Thursday 20<sup>th</sup> April 2017 between approximately 19:00 and 22:30. The moon phase at the time of the survey was Last Quarter with some cloud coverage and temperatures at 8°C during the night-time survey.

12.5.53 A summary of the existing lighting conditions within and surrounding the site is provided in **Table 12-3**.

Table 12-3: Lighting Conditions Surrounding the Site - Sensitive Receptors

| Viewpoint No. | Location                               | Description of Lighting Conditions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1             | River Kennet South / Cholmeley Road    | Column mounted LED lighting exists along the Kennet & Avon Canal path (5m in height) which illuminates the footpath/cycle path. Light intrusion was observed into the River Kennet channel. White lighting is visible in a northerly direction along the Thames Path. See photo Location 1 in <b>Appendix 12-5 Lighting Assessment</b> .                                                                                                                                                                                                              |
| 2             | Thames Path West of River Kennet Mouth | The level of light is low at this location, due to tree canopy screening from sources along the River Thames such as moored boats and Thames Valley Park. Low level amenity lighting on moored boats across the river was visible, along with distant footpath column lights (LED). Column mounted High Pressure Sodium (HPS) road lights were visible at the Thames Valley Park. Passing trains on the Great Western Mainline provide intermittent light at this location.<br><br>See photo Location 2 in <b>Appendix 12-5 Lighting Assessment</b> . |
| 3             | Thames Path East of River Kennet Mouth | A singular LED street lighting column, approximately 5m in height was seen to be the primary light source at Viewpoint 3 which resulted in concentrated white light along the Thames                                                                                                                                                                                                                                                                                                                                                                  |

|   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                                        | <p>Path. Considerable light intrusion was observed into the River Thames.</p> <p>A white sky glow was visible westerly of the site towards Reading Town Centre. This is likely to stem from LED light as per Policy HW9 - Street lighting (<b>Paragraph 12.3.27</b>).</p> <p>See photo Location 3 in <b>Appendix 12-5 Lighting Assessment</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 4 | Thames Path North of Tesco Extra       | <p>Minimal levels of lighting were observed from within the site. Existing car parking / supermarket store lighting from Tesco Extra along Napier Road was observed to be fully screened by well-established vegetation along the River Thames.</p> <p>Lighting was however visible in the distance (eastwards) from Thames Valley Park Drive with an amber glow. This lighting is likely to stem from high pressure sodium lamps.</p> <p>Red lighting was visible from Oracle's office building in distance (red in nature), as part of Thames Valley Park.</p> <p>Orange sky glow, likely to stemming from high pressure sodium lamps, was visible eastwards towards East Reading / Woodley.</p> <p>See photo Location 4 in <b>Appendix 12-5 Lighting Assessment</b>.</p>                                               |
| 5 | Thames Meadow East of Waterside Centre | <p>Thames Valley Park Drive was observed to be lit by likely to stem from high pressure sodium lamp column street lighting, (approximately 10m in height). The light from these columns intruded onto the Thames Valley floodplain.</p> <p>Spherical car park lighting lights from the Wokingham Waterside Centre, directly to the east of the site, were further visible.</p> <p>Along the western horizon, The Blade (an office building in Reading Town Centre) was visible producing a source of white lighting, likely stemming from LED's.</p> <p>A white sky glow was visible westerly of the site towards Reading Town Centre. This is likely to stem from LED light as per Policy HW9 - Street lighting (<b>Paragraph 12.3.27</b>).</p> <p>See photo Location 5 in <b>Appendix 12-5 Lighting Assessment</b>.</p> |

### Sensitive Lighting Receptors

12.5.54 Sensitive lighting receptors that have been considered during the assessment are presented in **Table 12-4**. Sensitive lighting receptors within and immediately around the site have been identified taking into account the recommendations in ILP Guide 04 (2013).

Table 12-4: Sensitive Lighting Receptors

| Sensitive Class                  | Receptors and sensitivity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Existing residents               | <p>There are no residential properties in direct proximity to the application site.</p> <p>Residents at Luscinia View, to the west of Tesco/ Napier Road junction are located 10 metres from the site and are sensitive to light intrusion, glare and sky glow.</p> <p>Residents on Liverpool Road and Cholmeley Road are within 130 meters of the application site although are screened by trees, a gas storage facility and the Great Western Mainline are therefore scoped out of the lighting assessment.</p>                                                                                                                   |
| Motorist, cyclists & pedestrians | <p>The following receptors have been identified that are sensitive to the effects of glare:</p> <ul style="list-style-type: none"> <li>- Napier Road.</li> <li>- A3290/Thames Valley Park Drive.</li> <li>- Users of Thames Path National Cycle Route/Trail.</li> <li>- Users of Kennet &amp; Avon Canal National Cycle Route/ footpath.</li> <li>- River users on River Thames/ River Kennet e.g. boat owners, rowers etc.</li> <li>- Future users of the MRT</li> </ul>                                                                                                                                                            |
| Railway                          | <p>Drivers/users of the Great Western Mainline Railway are sensitive to the effects of glare.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Heritage                         | <p>A Grade II Listed Railway Bridge is located 10 metres from the site but is not sensitive to obtrusive light and therefore has been scoped out of the assessment.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Wildlife                         | <p>The Coal, Kennetmouth and Kings Meadow Local Wildlife Site (LWS), a non-statutory area of nature conservation importance.</p> <p>Bat Assemblage: at least 8 species of bat use the site, whilst activity levels are highest along the River Thames and adjacent woodland/ tree lines. Soprano pipistrelle and common pipistrelle were the most common species of bat recorded.</p> <p>The river corridors are an important foraging/ commuting habitat for bats. Due to the semi-urban setting, the majority of bats are fairly light tolerant although some are not tolerant so light intrusion should be kept to a minimum.</p> |

## Environmental Zone

12.5.55 The Institution of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light (GN01:2011) sets out exterior lighting controls for Environmental Zones. The Environmental Zone classifications are presented in **Table 12-5**.

12.5.56 The Environmental Zone classification for the Application Site has been undertaken drawing on a desk study of the site and evidence gathered during the site visit. The site is on the

fringes of an industrial/ suburban area with each section characterised by different zones, and therefore has been split accordingly.

12.5.57 It is therefore considered that the development western part of the Application Site, (within RBC's boundary) between the Tesco/ Napier Road Junction and the Kennet Mouth can be classified to be within **Environmental Zone E3**, suburban, medium district brightness. The eastern section of the site (within WBC's boundary) from the Kennet Mouth to the Thames Valley Park roundabout can be classified within **Environmental Zone E2**, village or relatively dark outer suburban locations.

12.5.58 The ILP provides limitations for obtrusive light for each Environmental Zone in terms of the upward lighting ratio; light intrusion and luminaire intensity (see **Appendix 12-5 Lighting Assessment**).

Table 12-5: Environmental Zones for Exterior Lighting Control as Described in the ILP Guidance, 2011

| Zone | Surrounding | Lighting Environment       | Examples                                                  |
|------|-------------|----------------------------|-----------------------------------------------------------|
| E0   | Protected   | Dark                       | UNESCO Starlight Reserves, IDA Dark Sky Parks             |
| E1   | Natural     | Intrinsically dark         | National Parks, Areas of Outstanding Natural Beauty etc.  |
| E2   | Rural       | Low district brightness    | Village or relatively dark outer suburban locations       |
| E3   | Suburban    | Medium district brightness | Small town centers or suburban locations                  |
| E4   | Urban       | High district brightness   | Town/city centers with high levels of night-time activity |

## 12.6 East MRT – Scenario 1

### Potential Effects

12.6.1 Landscape and visual receptors which are considered to be likely to experience change as a result of the proposed development, but which are not likely to experience a significant landscape or visual effect, are scoped out of this LVIA and are not considered further. These receptors are:

- National Landscape Character Area 115: Thames Valley;
- Watercourses;
- Conservation Areas, RHPGs and SAMs;
- Listed Buildings which are dealt with in **Chapter 14 Archaeology and Heritage** of this ES; and
- Visual receptors located beyond 0.5km from the Application Site or Combined Site boundary.

12.6.2 Potentially significant landscape and visual effects arising from the proposed development are those upon:

- Landscape character;

- Landscape features of the site; and
- People's views and visual amenity.

12.6.3 In addition, this chapter considers potential effects arising from new sources of lighting associated with the proposed development through both the construction and operational phases.

12.6.4 The operational lighting requirements have been divided into the following three sections: Tesco/ Napier Road Junction, Tesco Car Park and East MRT cycleway and footway.

#### Landscape Character

12.6.5 It is likely that adverse changes will occur to the Application Site's local landscape character, arising from the new crossing over the River Kennet mouth, the new bridge and embankment and associated necessary infrastructure and loss of existing vegetation. Adverse effects will be minimised by retention of existing trees where practicable, together with new tree and shrub planting, and ecology habitat improvements.

#### Landscape Features

12.6.6 Landscape features of the Application Site, which will potentially be subject to significant changes, arising as a result of the proposed development, include:

- **Existing vegetation and tree cover:** comprising trees, tree groups, shrubs, hedgerows, scrub, ruderal vegetation and grassland – where there is removal and replacement by new tree, shrub and grassland planting;
- **Pedestrian and cycle routes:** through or adjacent to the Application Site – possible redirections during construction;
- **Landform:** adjustments to landform to enable construction of bridge foundations, embankments and new paths; and
- **Land use:** change from open, undeveloped land to a new transport route adjacent to public open space.

#### People's Views and Visual Amenity

12.6.7 There are likely to be adverse changes to local views and visual amenity as a result of seeing the new development. These adverse visual changes will be minimised by retention of existing trees where practicable, together with new tree and shrub planting, and implementation of an integrated landscape and ecology design scheme.

12.6.8 Potential visual receptors of the proposed development in the Application Site are people in the local area:

- Travelling on a short section of the adjacent PRow / Thames Path National Trail and National Cycle Route;
- On Napier Road, accessing the Tesco retail store and fuel station;
- Using the informal paths through the LWS, between the Tesco's car park and the River Thames tow-path.

#### Sensitivity of Landscape and Visual Receptors

- 12.6.9 The detailed landscape and visual impact assessments are set out in the **Landscape Effects Table in Appendix 12-2** and the **Visual Effects Table in Appendix 12-3**. These impact assessments include judgements of receptors' susceptibility to change, which, combined with judgements on the baseline value attributed to receptors, provides an assessment of the overall sensitivity of each receptor. **Appendix 12-1 LVIA Methodology** sets out the typical scales of sensitivity and the criteria for determining susceptibility to change. A summary of overall sensitivity to change arising from the proposed development is set out below.

#### ***Sensitivity of Landscape Receptors***

- 12.6.10 Landscape receptors identified as having a **high sensitivity** to the proposed development are the: major landscape feature designation, important area of open space and public rights of way and cycle routes. This is due to the condition and scenic quality of these features, and their contribution towards recreational activity.
- 12.6.11 All other landscape receptors within the assessment were identified as having a **medium sensitivity** to the proposed development namely: the district landscape and townscape character areas, local landscape character of the site, landform and watercourses, land use and vegetation and tree cover. These features are in moderate condition, provide some scenic quality valued at a local level, and have partial tolerance to the type of proposed development.

#### ***Sensitivity of Visual Receptors***

- 12.6.12 Visual receptors at viewpoints VP4, VP2, VP3, VPB, VPC, VPD and VP5 are all identified as having a **high sensitivity**. This is due to their location upon the Thames Path National Trail / National Cycle Route, and therefore the number of people using this path, who are engaged in outdoor recreation and likely to be focussed on views of the surrounding landscape.
- 12.6.13 Visual receptors at viewpoints VP1, VP6 and VPA are identified as having a **medium sensitivity**. This is due to the views or the view composition including some features of interest and having some amenity value, being of a generally attractive composition with little sign of degradation, or reflecting the viewpoint's location in local parks or open spaces, public realm, public streets or on local Public Rights of Way.
- 12.6.14 Visual receptors at viewpoints VP7 and VPE are identified as having a **low sensitivity**. This is a result of the view or composition having low amenity value, containing few or no visually attractive elements or being of a poor visual composition; the views may be incidental to the viewer or be fleeting in motion.

#### ***Lighting***

- 12.6.15 **Table 12-6** outlines the impact that the proposed lighting design will have upon lighting receptors identified in **Table 12-4**.

Table 12-6: Impact of proposed Lighting Design on identified Sensitive Lighting Receptors

| Sensitive Receptors | Impact of Proposals                                                                                                                                                                                                                                              |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Existing residents  | The bedroom windows on Luscinia View that face the access junction for the development onto Napier Road are already affected by lighting obtrusion on the existing street lighting. Lighting is in place on the western side of the Tesco/ Napier Road junction. |

| Sensitive Receptors              | Impact of Proposals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | <p>The proposed development includes lighting in the same locations as existing, therefore no additional adverse impact is to be expected for the residents of these apartments. SON variety columns will be replaced with LED lighting which will not have a material impact on the residents.</p> <p>The residential properties on Liverpool Road and Cholmeley Road are of sufficient distance away from the development that no lighting obstruction is likely to reach them. Also, they are already adequately screened.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Great Western Mainline           | <p>Lighting is retained within the development boundary and does not approach GW Mainline, therefore train driver's views / sights would not be affected and users of the railway line would be a sufficient distance away from the development to be affected by glare. GW Mainline is raised at a greater height than the height of the luminaires installed so vertical glare is not expected to occur.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Motorist, cyclists & pedestrians | <p>Existing receptors have been identified that are sensitive to the effects of glare:</p> <ul style="list-style-type: none"> <li>- Napier Road.</li> <li>- A3290/Thames Valley Park Drive.</li> <li>- Users of Thames Path National Cycle Route/Trail.</li> <li>- Users of Kennet &amp; Avon Canal National Cycle Route/ footpath.</li> <li>- River users on River Thames/ River Kennet e.g. boat users, rowers etc.</li> <li>- Future users of the MRT</li> </ul> <p>Footway and cycle way users will have a well-lit route which forms an improvement on current conditions where the route is not lit between the Tesco Supermarket and the eastern boundary of the site. Pedestrians and cyclists will have a significantly safer and more secure route than exists currently.</p> <p>The proposed development will include a more direct crossing of the River Kennet especially for cyclists, and divert away from the poorly lit Thames Path.</p> <p>River users unlikely to be using river at night, also no light was observed to spill into River Thames from the lighting modelling undertaken.</p> |
| Wildlife                         | <p>Up to 5 lux light intrusion enters the wildlife reserve, which is also classed as a priority Habitat Inventory - Deciduous Woodland. Due to the limitations of the design process, the light intrusion levels do not include the effect of shielding on the luminaires, which could significantly reduce intrusion into the wildlife reserve.</p> <p>Existing lighting in the Tesco car park creates intrusion into the Coal, Kennetmouth and Kings Meadow LWS, but for the reasons set out within the <b>Ecology Chapter 13 of this ES</b>, it is not considered a significant issue.</p> <p>Minor spill into occurs into the River Kennet, but the level of luminance is under 1 lux at ground level therefore acceptable in</p>                                                                                                                                                                                                                                                                                                                                                                           |

| Sensitive Receptors | Impact of Proposals                                                                    |
|---------------------|----------------------------------------------------------------------------------------|
|                     | relation to BCT guidance – limiting the impact and design of artificial light on bats. |

## Mitigation and Enhancement

### Primary Measures

- 12.6.16 Primary measures have been developed through the iterative design process, and are those which have become integrated or embedded into the project/scheme design.
- 12.6.17 Standard construction and operational management practices are those which will be adopted for avoiding and reducing environmental effects, such as the use of hoardings or tree protection fencing.
- 12.6.18 Primary mitigation measures and standard construction and operational management practices are described in **Chapter 3** of this ES and also in the separate **Design and Access Statement** which accompanies the planning application. Key primary measures incorporated into the proposed development include the:
- Retention of existing trees and vegetation where practicable, and the protection of trees to be retained in accordance with BS5837:2012;
  - Re-routing of services and utilities to the narrow corridor to the south of the proposed East MRT, to enable replacement tree planting to take place free from services and utilities constraints;
  - Height of the proposed bridge element designed such that the Listed railway and accommodation bridge continues to be visible from the tow-path, PRoW / Thames Path and river;
  - New tree planting, and planting of new native trees and shrubs;
  - Selective management and re-planting of the woodland within the LWS to replace trees which require removal, increase diversity to the woodland, and provide additional screening of the East MRT embankment and route from locations within the LWS woodland and on the tow-path adjacent to the LWS. This will include selective removal of existing shrubs and groundcover, e.g. removal of non-native species such as Buddleia and the invasive Virginia Creeper, to increase light levels and promote the growth of a more diverse ground flora;
  - Retain and enhance / extend the existing area of Acid Grassland at the western end of the East MRT route, to provide biodiversity habitat (see **Chapter 13 Ecology**) with scattered new tree planting to create a glade with dappled shade;
  - Enhancements to the riparian corridor, for example removal of Himalayan Balsam, retention of Lodden Lily and the installation of riparian habitat rafts alongside selected areas of engineered banks (east of the River Kennet mouth);
  - Creation of tussocky grassland between the River Thames and the East MRT, and wildflower hydro-seeded grassland on the East MRT embankment;
  - Provision of 'green panels' (for example, living willow panels or CorTen steel panels with climbers), set at an angle to the direction of the tow-path / PRoW / Thames Path to filter people's views of the East MRT and provide additional 'greening' of the space; and

- Creation of reclaimed boat planters, providing raised beds for urban community food growing.

12.6.19 The lighting design for the operation scheme has been ecologically informed and will include the following measures to allow for minimal significant adverse lighting effects where possible:

- Lighting columns along the northern extent of the route only;
- Lighting columns to provide directional lighting to face away from the more sensitive areas (including The Coal, Kennetmouth and Kings Meadow East LWS and Henley Road Pit LWS); and
- Inclusion of a shield on the back of lighting columns to further reduce any light back spill. Where there are areas which light spills along the southern side of the viaduct, front light shields will also be installed.

12.6.20 Further to this, it is important to note that the Lighting Modelling conducted has not accounted for any shield or hoods. As such, the installation of these primary mitigation measures could reduce the level of light spill significantly.

### Secondary Mitigation Measures

12.6.21 Secondary mitigation measures are proposals to address adverse effects which remain after primary measures and standard construction practices have been incorporated into the scheme. No secondary landscape mitigation measures are required, because achievable mitigation has already been included in the primary mitigation measures and standard construction practices.

### Residual Effects

12.6.22 Residual effects are those that are predicted to remain after implementation of the described mitigation measures.

12.6.23 The Landscape Effects Table in **Appendix 12-2** And the Visual Effects Table in **Appendix 12-3** sets out the detailed impact assessments upon landscape and visual receptors. The results are summarised below.

### Summary of Landscape Effects During Construction

12.6.24 The landscape assessment identified temporary, direct, **adverse** effects during construction:

- with a **major level of significance** upon the local landscape character of the site, land use and public rights of way and cycle routes; and
- with a **moderate level of significance** upon the major landscape feature designation, landform and watercourses and vegetation and tree cover.

12.6.25 These effects arise from the construction activity, excavations and plant operating within the application site, including the removal of trees to facilitate the development. The effects also arise due to the phased closure, and diversion, of sections of the Thames Path / National Cycle route, for periods of time during the construction period.

12.6.26 Temporary, **adverse** effects upon the district landscape and townscape character areas, and upon the Important Area of Open Space were assessed as being either **minor** or **negligible**, and therefore **not significant**.

### Summary of Landscape Effects on Completion

- 12.6.27 On completion, the assessment identified long term, direct, **adverse** effects of a **moderate level of significance** upon the major landscape feature designation, local landscape character of the site, land use and vegetation and tree cover.
- 12.6.28 These effects are a result of the East MRT introducing a new land use through the application site and influences the local landscape character, and also the loss of trees to facilitate the proposed development.
- 12.6.29 No change was identified for the public rights of way and cycle routes on completion, as these will fully reopen along their original routes.
- 12.6.30 Long term, **adverse** effects upon the district landscape and townscape character areas, the Important Area of Open Space and landform and watercourses were assessed as being either **minor** or **negligible**, and therefore **not significant**.

### Summary of Landscape Effects 15 years after planting

- 12.6.31 15 years after completion, and when planting is expected to have matured, long term, direct **adverse** effects remain of a **moderate level of significance** upon the major landscape feature designation and landuse. This is due to the presence of the East MRT, and its route through a small section of the major landscape feature.
- 12.6.32 A long term, direct **beneficial** effect with a **moderate level of significance** is assessed for the local landscape character of the application site. This is due to planting having established in accordance with the landscape strategy.
- 12.6.33 Long term, direct **beneficial** effects are assessed with a minor level of significance for vegetation and tree cover and a negligible level of significance for LCA B2 Thames River Valley with Open Water.
- 12.6.34 As on completion, there remains no change to the public rights of way and cycle routes.
- 12.6.35 The other features and character areas assessed remain with **not significant** adverse effects, as on completion.

### Summary of Visual Effects During Construction

- 12.6.36 The visual assessment comprises assessment of 'representative viewpoints' which represent specific views from a location; and 'sequential viewpoints' which are a sequence of views when travelling along the Thames Path National Trail in an eastwards and westwards direction.

### Representative Viewpoints

- 12.6.37 A temporary, direct, **adverse** visual effect during construction with a **major level of significance** is assessed for VPA: Footpath at north-east of Tesco car park. This is due to the new footpath being constructed in this area, and the removal of trees within the view.
- 12.6.38 Temporary, direct, **adverse** visual effects of **minor significance**, and therefore **not significant**, were assessed for VP1: Towpath south of Kennet and Avon Canal, at end of Cholmeley Road, and VP7: Entrance to Tesco supermarket from Napier Road.
- 12.6.39 There is no view of the Application Site from VP6: Thames and Kennet Marina, and VPE: Roundabout on A3290.

### Sequential Viewpoints along 1.2km section of the Thames Path National Trail

12.6.40 Travelling east, the visual assessment identified temporary, direct, **adverse** effects during construction:

- with a **major to severe level of significance** for VP3 and VPB, due to the limited extent of the effect;
- with a **major level of significance** for VP2; and
- with a **moderate level of significance** for VP4.

12.6.41 There is no view of the East MRT site, when looking east, from VPC, VPD and VP5.

12.6.42 Travelling west, the visual assessment identified temporary, direct, **adverse** effects during construction:

- with a **major to severe level of significance** for VPB and VP3 due to the limited extent of the effect;
- with a **major level of significance** for VP2; and
- with a **moderate level of significance** for VP5.

12.6.43 A visual effect with a **minor level of significance**, and therefore **not significant** was identified for VPC.

12.6.44 There is no view of the Application Site, when looking west, from VP4 and VPD.

12.6.45 VP3, VPB and VP2 are all local views from within the site boundary, the proximity of these to the construction activity within the site, results in high levels of visual change being assessed from these locations.

### Summary of Visual Effects on Completion

#### Representative Viewpoints

12.6.46 On completion a long term, direct, **adverse** visual effect with a **moderate level of significance** is assessed for VPA: Footpath at north-east of Tesco car park. This is due to the loss of trees, views of the new footpath and glimpses of the East MRT structure, not yet softened by the new tree planting.

12.6.47 A long term, direct, **adverse** visual effects of **minor significance** was assessed for VP7: Entrance to Tesco supermarket from Napier Road, of **negligible significance** for VP1: Towpath south of Kennet and Avon Canal, at end of Cholmeley Road. Both of these effects are **not significant**.

12.6.48 There is no view of the proposed development within the Application Site from VP6: Thames and Kennet Marina, and VPE: Roundabout on A3290.

#### Sequential Viewpoints along 1.2km section of the Thames Path National Trail

12.6.49 Travelling east, the visual assessment identified long term, direct, **adverse** effects on completion:

- with a **major to severe level of significance** for VP3 and VPB due to the limited effect of development; and
- with a **major level of significance** for VP2.

12.6.50 VP4 was assessed as having an **adverse** effect of **minor significance**, and therefore **not significant**.

12.6.51 There is no view of the proposed development within the Application Site, when looking east, from VPC, VPD and VP5.

12.6.52 Travelling west, the visual assessment identified long term, direct, **adverse** effects on completion:

- with a **major to severe level of significance** for VPB and VP3 due to the limited effect of development; and
- with a **moderate level of significance** for VP5 and VP2.

12.6.53 A visual effect with a **minor level of significance**, and therefore **not significant** was identified for VPC.

12.6.54 There is no view of the Application Site, when looking west, from VPD.

12.6.55 VP3, VPB and VP2 are all local views from the Thames Path National Trail, within the site boundary; the proximity of these to the East MRT bridge, results in high levels of visual change being assessed from these locations.

### **Summary of Visual Effects 15 years after planting**

#### **Representative Viewpoints**

12.6.56 15 years after planting, there are no remaining significant visual effects for the representative viewpoints. The assessment of visual effect remains as on completion for VP7: Entrance to Tesco supermarket from Napier Road and VP1: Towpath south of Kennet and Avon Canal, at end of Cholmeley Road.

12.6.57 Viewpoint A: Footpath at north-east of Tesco car park, now has a long term, direct, **beneficial** effect, which is of **minor significance (not significant)**. This is due to the new tree planting and management within the Coal Woodland, which has become established, enhances the view and filters views of the East MRT structure.

12.6.58 There continue to be no views of the proposed development within the Application Site from VP6: Thames and Kennet Marina, and VPE: Roundabout on A3290.

#### Sequential Viewpoints along 1.2km section of the Thames Path National Trail

12.6.59 Travelling east, the visual assessment identified long term, direct, **adverse** effects remaining 15 years after planting:

- with a **major to severe level of significance** for VPB due to the limited effect of the development;
- with a **major level of significance** for VP3; and
- with a **moderate level of significance** for VP2.

12.6.60 VP4 was assessed as having an **adverse** effect of **minor** significance, and therefore **not significant**.

12.6.61 There continues to be no view of the proposed development within the Application Site, when looking east, from VPC, VPD and VP5.

12.6.62 Travelling west, the visual assessment identified long term, direct, **adverse** effects remaining

15 years after planting with a **major to severe level of significance** for VPB and VP3 due to the limited effect of development.

12.6.63 Visual effects with **minor levels of significance**, and therefore **not significant** were identified for VPC and VP5.

12.6.64 VP2 is assessed as having a **neutral** effect of **negligible significance (not significant)**, this is due to the loss of existing trees, balanced by the newly planted trees, which have now matured.

12.6.65 There is no view of the Application Site, when looking west, from VPD.

12.6.66 VP3, VPB and VP2 are all local views from the Thames Path National Trail, within the site boundary; the proximity of these to the East MRT structure therefore results in high levels of visual change being assessed from these locations.

### Summary of Lighting Effects During Construction

12.6.67 Effects of lighting during construction should be minimal, as there will be limited night time working outside of agreed standard working hours. The lighting required is predictable for fixed elements of the construction works e.g. the site office, compound and welfare facility. Construction compounds are proposed within the Tesco car park and on the TVP P&R, whilst cranes are required temporarily to construct the bridge.

12.6.68 Task specific lighting to maintain safety around excavation areas, water management areas, and other specific activities will vary according to weather conditions, programme and the particular tasks being undertaken. Areas in proximity to the rivers near the site may require additional lighting to maintain safety.

### Summary of Lighting Effects on Completion

12.6.69 The primary effect of lighting once the site is operational is from the Tesco/ Napier Road junction. Light intrusion may occur into the residential properties at Luscinia View, although this can be limited by using front and back shields on the luminaires. Column mounted LED lighting will be provided along the length of the scheme. Benefits of using this as opposed to traditional high pressure sodium bulbs is that it is directional, reduces obtrusive light and uses less energy.

12.6.70 Minimal light intrusion is anticipated across the site and surrounding areas due to this directional lighting. The effect on the nearby river systems is minimal although in one instance light intrusion was observed into the LWS. This again could be mitigated via the installation of shields.

12.6.71 Overall, the development's lighting effects are minimal and are in line with the relevant ILP guidance documents. Further detail on lighting effects and requirements is given in the Lighting Assessment attached as **Appendix 12-5**.

## 12.7 Combined Site (East MRT and Thames Valley Park & Ride) – Scenario 2

### Potential Effects

12.7.1 Potential landscape and visual effects of the Combined Site (Scenario 2) are the same as those set out for East MRT (Scenario 1) in **section 12.8** of this chapter.

12.7.2 The lighting effects for this scenario are expected to be similar to that explained above, but with the addition of the TVP P&R lighting. Since the TVP P&R lighting is only going to be lit during operational hours (07:00-19:00), lighting effects will be minimal and mainly experienced

during winter months when daylight hours are shorter. The lighting is expected to be in the form of 5m columns.

### Mitigation and Enhancement

- 12.7.3 Primary and secondary mitigation and enhancement in relation to landscape and visual effects for the Combined Site (Scenario 2) comprise those set out in **section 12.8** of this chapter for the Application Site (Scenario 1) plus the consented Park and Ride development, which includes proposed tree, hedge and shrub planting.

### Residual Effects

- 12.7.4 Residual effects are those that are predicted to remain after implementation of the described mitigation measures.
- 12.7.5 The **Landscape Effects Table in Appendix 12-2** and the **Visual Effects Table in Appendix 12-3** set out the detailed impact assessments upon landscape and visual receptors. The results are summarised below.

#### Summary of Landscape Effects During Construction

- 12.7.6 Landscape effects during construction, as a result of the Combined Site (Scenario 2) are assessed as being the same as those set out for the Application Site (Scenario 1) in **paragraphs 12.8.24 to 12.8.26** of this chapter.

#### Summary of Landscape Effects on Completion

- 12.7.7 Landscape effects on completion, as a result of the Combined Site (Scenario 2) are assessed as being the same as those set out for the Application Site (Scenario 1) in **paragraphs 12.8.27 to 12.8.30** of this chapter, with the exception of the effect on landscape character area B2 – Thames River Valley with Open Water, which is assessed as a long term **adverse** effect which is of a **minor level of significance**.

#### Summary of Landscape Effects 15 years After Planting

- 12.7.8 Landscape effects 15 years after planting, as a result of the Combined Site (Scenario 2) are assessed as being the same as those set out for the Application Site (Scenario 1) in **paragraphs 12.8.31 to 12.8.35** of this chapter, with the exception of:
- landscape character area B2 – Thames River Valley with Open Water: the landscape effect is assessed as **adverse** and of **minor significance**, therefore remains **not significant**;
  - local landscape character of the Combined Site: the landscape effect is assessed as **adverse** and of a **moderate level of significance**
  - vegetation and tree cover: the landscape effect is assessed as **neutral** and of **negligible significance**, therefore remains **not significant**.

#### Summary of Visual Effects During Construction

- 12.7.9 Visual effects during construction, as a result of the Combined Site (Scenario 2) are assessed as being the same as those set out for the Application Site (Scenario 1) in **paragraphs 12.8.36 to 12.8.44** of this chapter, with the additional visual effects of:

- VPC Thames Path National Trail, north of Dreadnought Building, eastwards: the visual effect is assessed as being **temporary, adverse** and of a **moderate level of significance**;
- VPD Thames Path National Trail, westwards: the visual effect is assessed as being **temporary, adverse** and of a **moderate level of significance**;
- VPE Roundabout on A3290 looking west: the visual effect is assessed as being **temporary, adverse** and of a **moderate level of significance**.

#### Summary of Visual Effects on Completion

12.7.10 Visual effects on completion, as a result of the Combined Site (Scenario 2) are assessed as being the same as those set out for the Application Site (Scenario 1) in **paragraphs 12.8.45 to 12.8.54** of this chapter, with additional visual effects assessed upon VPC Thames Path National Trail, north of Dreadnought Building, eastwards; VPD Thames Path National Trail, westwards; and VPE Roundabout on A3290 looking west. For each of these, the visual effects are assessed as being **adverse** and of a **minor level of significance** which is therefore **not significant**.

#### Summary of Visual Effects 15 Years After Planting

12.7.11 Visual effects 15 years after planting, as a result of the Combined Site (Scenario 2) are assessed as being the same as those set out for the Application Site (Scenario 1) in **paragraphs 12.8.55 to 12.8.65** of this chapter, with the additional visual effects of:

- VP5: Open Space between Thames Path and Thames Valley Park Drive, westwards: the visual effect is assessed as **adverse** and of a **moderate level of significance**;
- VPC Thames Path National Trail, north of Dreadnought Building, eastwards: the visual effect is assessed as being **neutral** and of a **negligible level of significance**, which is **not significant**;
- VPD Thames Path National Trail, westwards: the visual effect is assessed as **a benefit** and of a **minor level of significance** which is therefore **not significant**;
- VPE Roundabout on A3290 looking west: the visual effect is assessed as **adverse** and of a **minor level of significance** which is therefore **not significant**.

#### Summary of Lighting Effects Combined Site (Scenario 2)

12.7.12 The lighting effects for this scenario are expected to be similar to that explained above, but with the addition of the TVP P&R lighting. Since the TVP P&R lighting is only going to be lit during operational hours (07:00-19:00), lighting effects will be minimal and mainly experienced during winter months when daylight hours are shorter.

## 12.8 Cumulative Effects

12.8.1 Definition of cumulative landscape and visual effects was first set out in the 2002 edition of the Guidelines for Landscape and Visual Impact Assessment, and since then has been further refined, in terms of windfarm development, by guidance produced in Scotland, which is used widely and not only in Scotland. The current definitions, as set out in 'Assessing the Cumulative Impact of Onshore Wind Energy Developments', Scottish Natural Heritage (SNH),

2012, are referred to in paragraph 7.3 of the Guidelines for Landscape and Visual Impact Assessment, Third Edition, 2013 (Landscape Institute and IEMA), (GLVIA3) and comprise:

- **Cumulative effects** - 'the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments, taken together';
- **Cumulative visual effects** - effects caused by combined visibility, which 'occurs where the observer is able to see two or more developments from one viewpoint' and/or sequential effects which 'occur when the observer has to move to another viewpoint to see different developments'; and
- **Cumulative landscape/townscape effects** - effects that 'can impact on either the physical fabric or character of the landscape, or any special values attached to it'.

12.8.2 In accordance with the emphasis in EIA, the assessment is required to focus on the cumulative landscape and visual effects which are **likely to be significant**, rather than providing a comprehensive listing of every conceivable cumulative landscape and visual effect that might occur. The approach must be reasonable and proportional to the proposed development.

12.8.3 Committed developments which have been identified for the consideration of cumulative effects are set out in **Section 5.6** of this ES.

12.8.4 Cumulative landscape and visual assessment considers the effects of the proposal in terms of:

- an extension or intensification of the landscape and/or visual effects of other similar developments;
- 'filling' an area over time with similar development, such that the landscape resource, views and visual amenity are judged to be substantially altered; and
- incremental change arising from the proposal, as a result of successive individual developments.

### Cumulative Landscape Effects

12.8.5 In terms of cumulative landscape effects, the following landscape receptors in the LVIA have been scoped out of this cumulative assessment, as they will not be subject to direct effects as a result of the committed developments:

- Major Landscape Feature and King's Meadow and Coal Woodland Important Open Space designations;
- Landscape character areas B4: Hurley Thames, 11: Napier Road, 23 King's Meadow, and local landscape character of the site;
- Features of the Application Site and Combined Site:
  - o Landform and watercourses;
  - o Land use
  - o Vegetation and tree cover;
  - o Public rights of way and cycle routes.

12.8.6 Potential cumulative landscape effects arise during construction and on completion of the proposed development; and are assessed for landscape character area B2: *Thames River Valley with Open Water*. Construction activity and completion of the committed developments situated within this landscape character area will increase the amount of built form within its urban area; but this is in keeping with key characteristics which include a transitional

landscape with considerable urban influences and a strong influence of modern and older commercial and industrial buildings.

- 12.8.7 The cumulative landscape effects will not alter the landscape character area's key natural and environmental characteristics which relate to the Thames river corridor and associated recreational use. It is considered, therefore, that cumulative landscape effects on B2 Thames River Valley with Open Water will be slight adverse, have no greater than a **minor level of significance** and are therefore **'not significant'**.

### Cumulative Visual Effects

- 12.8.8 The LVIA has determined that visual receptors beyond 0.5km from the Application Site or the Combined Site may experience visual changes but that those changes are not likely to result in significant visual effects.
- 12.8.9 Committed developments references 25. 152354, 27. 161666, and 28. 161066 (at Suttons Business Park) are located within 0.5km from the Combined Site boundary and are situated south of the Combined Site and the main railway line. Intervening landform and vegetation prevent intervisibility with the Combined Site and the Application Site. It is therefore considered that there are no cumulative visual effects with these committed developments.
- 12.8.10 The remaining committed developments are located beyond 0.5km from the Application Site and Combined Site, and it is considered that beyond that distance, cumulative visual effects will not be significant.

### Cumulative Lighting Effects

- 12.8.11 Given the location of the application site and separation from other committed developments, not likely significant cumulative effects are anticipated in relation to lighting.

## 12.9 Summary and Conclusions

### Landscape and Visual

- 12.9.1 A landscape and visual impact assessment (LVIA) was conducted to identify the positive and negative effects, and the significance of those effects, resulting from the proposed development at the Application Site and the Combined Site. Effects upon the landscape as an environmental resource in its own right were considered, in addition to effects upon people's views and amenity.
- 12.9.2 The assessment was undertaken using a methodology based upon the Landscape Institute / IEMA 'Guidelines for Landscape and Visual Impact Assessment' (3<sup>rd</sup> Edition, 2013) (GLVIA3), combined with professional experience and judgement. The assessment uses 2016 as the baseline year, during which the site survey was carried out, although it is noted that Network Rail has completed substantial vegetation clearance adjacent to the site since the baseline survey was undertaken. Three time periods were identified for the assessment of effects: during construction, on completion and 15 years after planting.
- 12.9.3 The LVIA considers two scenarios: Scenario 1: East MRT (Application Site) and Scenario 2: East MRT and the consented Park and Ride site (Combined Site).
- 12.9.4 Overall, the Combined Site has a sense of enclosure and a sense of being part of the River Thames corridor through the urban area, with few views out to adjacent areas. Its character is of urban open space and river-edge. This includes the urban character associated with Napier Road, a small managed woodland between Tesco's car park and the river, the bridges across the Kennet mouth and detracting influences of graffiti, as well as the linear narrow open space to the west of the Dreadnought building. There are strong influences from the railway

infrastructure corridor to the south of the Application Site boundary, with views of the railway, moving trains, gantries and overhead cables; which counteracts the calmer and more attractive River Thames to the north of the tow path.

- 12.9.5 Landscape and visual mitigation comprises an integrated landscape and ecology approach, which includes: the retention of existing trees and vegetation where practicable, re-routing of services and utilities, considered height of the proposed bridge, new native trees and shrubs, selective management and re-planting of the woodland within the LWS, enhancement of the existing area of Acid Grassland at the western end of the Application Site, removal of Himalayan Balsam at the river's edge, installation of riparian habitat rolls or rafts alongside selected areas of engineered banks, tussocky grassland and wildflower hydro-seeded grassland, provision of 'green panels' (for example, living willow panels or CorTen steel panels with climbers), set at an angle to the direction of the tow-path and reclaimed boat planters, providing raised beds for urban community food growing.

#### East MRT (Scenario 1)

- 12.9.6 During construction, the landscape impact assessment identified temporary adverse and direct effects of a **major level of significance** upon the local landscape character of the Application Site, land use and public rights of way/cycle routes. Temporary, adverse and direct effects of a **moderate level of significance** were assessed for: the 'Major Landscape Feature' designation; landform and watercourses; vegetation and tree cover. Temporary, direct and adverse effects were assessed for the district landscape and townscape character areas and the Important Area of Open Space, which were of a **minor or negligible level of significance** and are therefore **not significant**.
- 12.9.7 Adverse direct landscape effects occur during construction as a result of construction activity, excavations and the presence of cranes, hoardings, footpath diversions and temporary footpath closure, tree removal, and construction compounds; which will temporarily change the landscape elements of the site and cause visual disruption. The Thames Path National Trail passes through the site, and therefore will be subjected to these temporary adverse effects for a limited section of the much longer route. During construction, adverse, but temporary, changes to local landscape character and the land use of a site are to be expected due to the nature of the construction works required for the proposed development.
- 12.9.8 Of the representative viewpoints, an adverse and temporary effect is assessed upon views from VPA: north east of Tesco car park, of a **major level of significance** during the construction period. This is due to the removal of trees within the view and the proximity of a new footpath being constructed.
- 12.9.9 The sequential assessment identified adverse and temporary visual effects during the construction period, that are of a **major to severe level of significance** for VP3 and VPB when travelling **eastwards along the Thames Path**. This is because the views are from the Thames Path National Trail (high sensitivity) and within the Application Site boundary; and therefore, because of the visual receptor's proximity to the construction works, there will be a dominant change to the view which substantially alters the composition of the view. An adverse and temporary visual effect of a **major level of significance** was assessed for VP2, also arising from the location within the Application Site boundary and the proximity to the construction works and activity. A **moderate level of significance** was assessed for VP4 during construction, which arises as a result of the visual receptor on the Thames Path and the perceptible change and activity seen in the middle distance of the view. There are no views of the Application Site when travelling eastwards in views from VPC, VPD and VP5.
- 12.9.10 Travelling **westwards along the Thames Path National Trail**, the sequential assessment identified adverse and temporary visual effects during the construction period that are of a **major to severe level of significance** for views from VP3 and VPB, and of a **major level of significance** for views from VP2. These results mirror the findings of the eastwards sequential

assessment. A **moderate level of significance** was assessed for views from VP5 during construction, which arises as a result of the visual receptor on the Thames Path and the perceptible change and activity seen in the distance of the view. During construction, an adverse visual effect which is temporary and of a **minor level of significance**, and therefore **not significant**, was assessed for views from VPC. There are no views of the Application Site when travelling westwards in views from VP4 and VPD.

- 12.9.11 On completion, landscape effects that are direct, adverse and long term were assessed as being of a **moderate level of significance** upon the 'Major Landscape Feature' designation, local landscape character, land use, and vegetation and tree cover. These occur as a result of a partial change to the land use of the site and consequential changes to local landscape character, and the loss of trees to facilitate the East MRT. Long term, adverse landscape effects upon district landscape and townscape character areas, the Important Area of Open Space designation, landform and watercourses were identified as either **minor** or **negligible levels of significance**. No change is assessed for the public rights of way / cycle routes, because on completion of the development, the Thames Path National Trail is reopened and remains on its original route.
- 12.9.12 A long term and adverse visual effect which is of a **moderate level of significance** was assessed for the view from VPA: north east of Tesco car park on completion, due to the effects of tree loss, the new footpath and new planting not yet being established.
- 12.9.13 The sequential assessment identified adverse and long term visual effects on completion, that are of a **major to severe level of significance** for views from VP3 and VPB when travelling **eastwards along the Thames Path**. An adverse and long term visual effect of a **major level of significance** was assessed for views from VP2. Travelling **westwards along the Thames Path National Trail**, the sequential assessment identified adverse and long term visual effects on completion that are of a **major to severe level of significance** for VP3 and VPB, and of a **moderate level of significance** for views from VP2 and VP5. These occur due to the visual receptor's location on the Thames Path National Trail within the Application Site boundary and therefore proximity to the new East MRT viaduct and bridge structure which results in a high level of visual change and substantially alters the view.
- 12.9.14 15 years after planting, landscape effects that are direct, adverse and long term were assessed as being of a **moderate level of significance** upon the 'Major Landscape Feature' designation, and land use as a result of permanent change by the East MRT. A long term, direct and beneficial effect that is of a **moderate level of significance** arises on the local landscape character of the Application Site, due to planting, which takes place in accordance with the landscape strategy, establishing and maturing and ongoing management of existing woodland and riparian habitats.
- 12.9.15 15 years after planting, the long term visual effect upon views from VPA: north east of Tesco car park is assessed as being beneficial as a result of maturing tree planting and the management of the Coal Woodland LWS. This was assessed as being of a **minor level of significance** and therefore is **not significant**. No residual significant visual effects were assessed for the representative viewpoints.
- 12.9.16 The sequential assessment identified an adverse and long term visual effect 15 years after planting, of a **major to severe level of significance** for views from VPB when travelling **eastwards along the Thames Path**. Also travelling eastwards, adverse and long term visual effects were assessed of a **major level of significance** for views from VP3 and of a **moderate level of significance** for views from VP2. Travelling **westwards along the Thames Path National Trail**, the sequential assessment identified adverse and long term visual effects 15 years after planting, that are of a **major to severe level of significance** for views from VP3 and VPB. These occur due to the visual receptor's location on the Thames Path National Trail within the Application Site boundary and therefore proximity to the new East MRT viaduct and bridge structure which results in a high level of visual change and

substantially alters the view.

### **Combined Site (Scenario 2)**

12.9.17 During construction, the landscape effects for the Combined Site (Scenario 2) are the same as those identified above for the Application Site (Scenario 1).

12.9.18 Visual effects during construction, as a result of the Combined Site (Scenario 2) are assessed as being the same as those set out for the Application Site (Scenario 1), but with the additional visual adverse temporary effects that are of a **moderate level of significance** upon views from VPC, VPD and VPE.

12.9.19 On completion, the landscape effects for the Combined Site (Scenario 2) are the same as those identified above for the Application Site (Scenario 1) but with an additional long term adverse landscape effect upon district landscape character area B2 – Thames River Valley with Open Water which is of a **minor level of significance**.

12.9.20 Visual effect on completion as a result of the Combined Site (Scenario 2) are assessed as being the same as those set out for the Application Site (Scenario 1) above, with additional visual effects assessed for views from VPC Thames Path National Trail, north of Dreadnought Building, eastwards; VPD Thames Path National Trail, westwards; and VPE Roundabout on A3290 looking west. For each of these, the additional visual effects are assessed as being adverse and of a **minor level of significance** which is therefore **not significant**.

12.9.21 15 years after planting, the long term landscape effects, as a result of the Combined Site (Scenario 2), were assessed as being the same as those set out for the Application Site (Scenario 1), with the exception of:

- landscape character area B2 – Thames River Valley with Open Water: adverse and of **minor significance**, therefore is **not significant**;
- local landscape character of the Combined Site: adverse and of a **moderate level of significance**; and
- vegetation and tree cover: **neutral** and of **negligible significance**, therefore is **not significant**.

12.9.22 Visual effects 15 years after planting, as a result of the Combined Site (Scenario 2) are assessed as being the same as those set out for the Application Site (Scenario 1) but with the following additional visual effects upon views:

- VP5: Open Space between Thames Path and Thames Valley Park Drive, westwards: the visual effect is assessed as adverse and of a **moderate level of significance**;
- VPC Thames Path National Trail, north of Dreadnought Building, eastwards: the visual effect is assessed as being neutral and of a **negligible level of significance**, which is **not significant**;
- VPD Thames Path National Trail, westwards: the visual effect is assessed as a benefit and of a **minor level of significance** which is therefore **not significant**;
- VPE Roundabout on A3290 looking west: the visual effect is assessed as adverse and of a **minor level of significance** which is therefore **not significant**.

### **LVIA Conclusions**

12.9.23 The proposed development, in both Scenario 1 and 2, will result in temporary (short term) adverse and significant landscape effects during the construction period. The Thames Path National Trail passes through the site, and therefore will be subjected to these temporary adverse effects for a limited section of its much longer route. During construction, adverse, but temporary, changes to landscape features and landscape character within the site are to be

expected due to the nature and activity of the construction works required for the proposed developments.

- 12.9.24 On completion, for Scenarios 1 and 2, significant and long term adverse landscape effects occur upon the Major Landscape Feature designation, local landscape character, land use and vegetation and tree cover within the Application Site and Combined Site. For Scenarios 1 and 2, at 15 years after planting which is in accordance with the landscape and ecology strategy, residual significant long term adverse landscape effects remain upon the Major Landscape Feature designation and land use within the Application Site and Combination Site. In Scenario 2, a residual adverse, long term significant landscape effect also remains on the local landscape character of the Combined Site at 15 years after planting. These **local landscape effects** arise from the partial change in use of the Application Site and Combined Site as a result of the proposed developments. A beneficial long term significant and local landscape effect arises 15 years after planting in Scenario 1, upon local landscape character of the Application Site; due to maturing planting and ongoing management of existing woodland and riparian habitats.
- 12.9.25 At 15 years after planting, there are no significant landscape effects on landscape features or landscape character of regional or national importance, which arise as a result of Scenario 1 (East MRT) or Scenario 2 (Combined Site).
- 12.9.26 The LVIA has identified a significant adverse visual effect during construction (short term) and at completion (long term), upon views from VPA: north east of Tesco car park, in Scenarios 1 and 2. This arises due to tree loss and construction of a new footpath. However, at 15 years after planting, there is no significant residual visual effect upon receptor's views from this location.
- 12.9.27 In Scenarios 1 and 2, significant adverse visual effects occur to visual receptor's sequential views from the Thames Path National Trail at locations of VP3, VPB and VP2 in both east and west directions, and at VP5 looking west only, during construction (short term) and on completion (long term). 15 years after planting, residual significant adverse long term visual effects occur upon visual receptor's sequential views for Scenario 1 and 2 at VP3 and VPB in both east and west directions, and VP2 looking east only. These visual effects occur upon visual receptors using a limited length of the Thames Path National Trail, which passes through the site, along the river edge and through urban open space that has a number of different characters and urban influences. The visual receptors are therefore in proximity to the proposed developments. The mainline railway and infrastructure corridor is visible in these views, and therefore although the visual impact assessment identifies substantial or clearly noticeable changes to the view composition due to proximity to the proposed development, the changes are not completely out of keeping with the area that the visual receptor is travelling through.
- 12.9.28 The visual effects of the Scenario 1 and 2 proposed developments upon visual receptors using the limited length of the Thames Path National Trail, although significant and adverse, are **local visual effects** and will not alter the integrity of sites or features of national or regional importance.
- 12.9.29 In Scenario 2, additional adverse short term significant visual effects occur to visual receptor's views from VPC, VPD and VPE; and 15 years after planting, upon VP5. These additional visual effects arise from a greater area of new development; however, these are also **local visual effects** which will not alter the integrity of sites or features of national or regional importance.

### Lighting Summary and Conclusion

- 12.9.30 The proposed development will introduce new light sources into a semi-urban environment in the east of Reading. The application site straddles two administrative boundaries; RBC and

WBC and therefore two levels of district brightness have been adhered to - ILP Environmental Zone 3 (Suburban) for the western section of the site and ILP Environmental Zone 2 (Rural) for the eastern section of the site.

- 12.9.31 The aspiration is for high lighting standards and that it will seek to be efficient, safe and secure for people utilising the East MRT route for walking and cycling, and will be safe for motorists and bus drivers using the proposed junctions onto Napier Road and Thames Valley Drive.
- 12.9.32 The assessment concludes that scenario 1 will introduce some effects to specific locations within the site, notably light intrusion into residential apartments at Luscinia View, and into the LWS site from Tesco Car Park. It is considered that this can be considerably reduced by installing shields and hoods on the luminaires. Other than these two instances, minimal light intrusion is anticipated into the surrounding areas.
- 12.9.33 Scenario 2 is expected to be similar to scenario 1, due to the operational hours of the TVP P&R development not being lit during night time hours. As such, it should not have significant additional effects.

## 13 Ecology

### 13.1 Introduction

- 13.1.1 This chapter has been prepared by Peter Brett Associates LLP (PBA). Given the setting of the East Reading Mass Rapid Transit (East MRT), immediately to the west of the Park and Ride (TVP P&R) Site, it contains:
- An Ecological Impact Assessment (EclA) of the 'proposed East MRT development' in isolation; and
  - An EclA of the proposed East MRT development and the permitted TVP P&R development in combination (hereinafter referred to as the 'combined development').
- 13.1.2 The land within which the proposed East MRT development falls is hereafter referred to as the 'East MRT Site'. The land within which the permitted TVP P&R development falls is hereafter referred to as the 'TVP P&R Site'<sup>21</sup>. The land within which the combined development falls is hereafter referred to as the 'Combined Site'.
- 13.1.3 A combination of baseline ecological desk study and survey data has been used to inform the scope of the assessments. This has been supplemented by a formal scoping process, applicable to the East MRT Site only (see Appendix A: Consultation). Supplementary consultation was also undertaken in relation to the scope of surveys completed for the East MRT Site and works relating to the TVP P&R Site (see Appendix 13-1: Ecology Consultation).
- 13.1.4 The approach to assessment accords with the requirements of the Chartered Institute of Ecology and Environmental Management (CIEEM) guidance, which represents current best practice (CIEEM, 2016). This guidance requires an assessment of likely significant effects on important ecological features, but does not require consideration of effects on every species or habitat that may be present.
- 13.1.5 Considering the above, the following important ecological features have been included within the assessment(s):
- The Coal, Kennetmouth and Kings Meadow East Local Wildlife Site (LWS);
  - Henley Road Gravel Pit LWS;
  - Ancient Woodland;
  - Habitat of Principal Importance (HPI);
  - Running Water;
  - Bats; and
  - Reptiles.

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<sup>21</sup> Baseline ecological reports prepared previously for the P&R Site have also referred to the P&R Site as 'Broken Brow' and the permitted P&R development as 'Thames Valley Park - Park and Ride Scheme'.

## 13.2 Policy Context

- 13.2.1 The assessments contained within this chapter have been informed by current legislation and national and local planning policies, which are relevant to ecology and nature conservation in the context of the East MRT Site and the Combined Site.
- 13.2.2 Full details are provided within Appendix 13-2: Legislation and Planning Policy, with a summary outlined below.

### Legislation Context

- 13.2.3 The following legislation is relevant in the context of the East MRT Site and the Combined Site:
- Conservation of Habitats and Species Regulations 2010 (as amended);
  - Wildlife and Countryside Act 1981 (as amended);
  - The Natural Environmental and Rural Communities Act 2006;
  - The Protection of Badgers Act, 1992; and
  - Wild Mammals Protection Act 1996 (as amended).
- 13.2.4 Full details are provided within Appendix 13-2: Legislation and Planning Policy.

### Planning Policy Context

- 13.2.5 The protection of ecological features is promoted by planning statements and policies made at national and local levels, as contained within the following documents:
- National Planning Policy Framework, 2012;
  - Government Circular: Biodiversity and Geological Conservation, 2005;
  - Reading Borough Council: Core Strategy, 2008 (with alternation adopted 2015);
  - Reading Borough Council: Local Plan (draft), 2017; and
  - Wokingham Borough Council: Core Strategy, 2010.
- 13.2.6 Full details are provided within Appendix 13-2: Legislation and Planning Policy.

### Biodiversity Action Plans

- 13.2.7 The following local Biodiversity Action Plans are also applicable to development of the East MRT Site and the Combined Site:
- Reading Biodiversity Action Plan; and
  - Wokingham Biodiversity Action Plan.
- 13.2.8 Full details are provided within Appendix 13-2: Legislation and Planning Policy.
- 13.2.9 Reference to local Biodiversity Action Plan designations have only been made within the chapter where the ecological feature is not otherwise identified within a legal or policy context (as set out within 'Legislation Context' section or 'Planning Policy Context' section above).

## 13.3 Consultation

- 13.3.1 Formal scoping responses were received from Reading Borough Council (RBC) and Wokingham Borough Council (WBC) in relation to the proposed East MRT development. Copies of these are provided within Appendix A. Further consultation was also undertaken in

relation to the scope of surveys undertaken within the East MRT Site necessary to obtain an ecological baseline capable of assessing the impacts of the scheme. Table 13-1a and Table 13-1b below provides a summary of this, with full details provided within Appendix 13-1: Ecology Consultation.

Table 13-1a: Summary of Consultation: TVP P&R Site

| Date                          | From                                       | To                    | Summary                                                                                                                                                                                                                                                                     |
|-------------------------------|--------------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18/07/2016<br>–<br>24/08/2016 | Between WBC (various) and WSP PB.          |                       | Emails between WBC (various) and WSP PB to discuss the ecological constraints associated with the TVP P&R Site, and agree an approach to dealing with these as the permitted TVP P&R development progressed.                                                                |
| 19/08/2017                    | Principal Transport Planner, WSP PB        | Planning Officer, WBC | Letter outlining the proposed approach to reptile mitigation, to be included within the Ecological Mitigation and Management Plan (EMMP), with additional comments provided on the approach to lighting and landscaping.                                                    |
| 14/10/2016                    | Berks, Bucks & Oxon Wildlife Trust (BBOWT) | Planning Officer, WBC | Response from BBOWT confirming no objection to the scheme subject to detail on mitigation and probable impacts on protected species pre-, during and post-construction; and evidence that the development will ensure no net loss in biodiversity and will seek a net gain. |

Table 13-1b: Summary of Consultation: East MRT Site

| Date                          | From                                           | To          | Summary                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------|------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 29/04/2016<br>–<br>29/07/2017 | Between PBA, WBC and RBC                       |             | Emails between PBA, WBC and RBC to discuss the ecological constraints associated with the East MRT Site, and agree an approach to the baseline survey data acquisition.                                                                                                                                                                 |
| 11/08/2016                    | PBA                                            | RBC and WBC | Scoping report issued to both planning authorities.                                                                                                                                                                                                                                                                                     |
| 12/08/2016                    | Natural Environment Officer and Ecologist, RBC | PBA         | Pre-application advice relating to ecology and the natural environment.                                                                                                                                                                                                                                                                 |
| 29/11/2016                    | Natural England (NE)                           | PBA         | NE's formal input to the EIA Scoping Opinion providing standing advice.                                                                                                                                                                                                                                                                 |
| 03/05/2017                    | Between Ecologist (PBA) and Parks Team, RBC    |             | Emails following up telephone conversation between PBA and Parks Team (RBC) to agree, in principle, an approach to ecological mitigation and management within The Coal, Kennetmouth and Kings Meadow East LWS, including portions of this land located outside the East MRT Site boundary, but still within RBC ownership and control. |

## 13.4 Methodology

### 13.4.1 This section sets out the following:

- Extent of the Study Area;
- Baseline Data Collection Methodologies;

- Approach to Ecological Assessment;
- Terminology;
- Valuation of Ecological Features;
- Assessing Ecological Impacts and Determining Significance;
- Mitigation and Residual Impacts; and
- Assumptions and Limitations.

### Extent of the Study Area

13.4.2 The baseline survey data used to inform this chapter relates to the East MRT Site and the TVP P&R Site; as such also capturing the Combined Site. For the purpose of the ecological desk study, the following search radii were used, as applicable:

- 500 m in relation to waterbodies;
- 2 km in relation to records for protected species, species and habitats of principal importance and designated areas (excluding European designated areas); and
- 10 km in relation to European designated areas.

13.4.3 Given that the planning application boundary for the proposed East MRT development had not been fixed at the time, a study area beyond the immediate footprint of the proposed East MRT development was used during the baseline ecological surveys at the East MRT Site. This varied slightly depending on the targeted ecological feature.

### Baseline Data Collection

13.4.4 Table 13-2 below provides a summary of the baseline data collection methodologies applicable to each of the Sites. Full details are provided within the technical reports contained within Appendices 13-3 – 13-11:

- Appendix 13-3: East MRT: Preliminary Ecological Appraisal;
- Appendix 13-4: East MRT: Reptile Survey Report;
- Appendix 13-5: East MRT: Bat Survey Report;
- Appendix 13-6: East MRT: Botanical Survey Report;
- Appendix 13-7: Broken Brow: Preliminary Ecological Appraisal;
- Appendix 13-8: Broken Brow: Ecology Surveys;
- Appendix 13-9: Thames Valley Park: Park and Ride Scheme: Breeding Bird Survey Report;
- Appendix 13-10: Thames Valley Park: Park and Ride Scheme: Bat Static Data; and
- Appendix 13-11: Broken Brow: Ecology Surveys – Addendum.

Table 13-2: Baseline Data Collection Methodologies - Summaries

| Data Collection | East MRT Site                                                                                                                                                                                         | TVP P&R Site                                                                                                                                                                                   |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Desk study      | A desk study was completed for the East MRT Site in 2016. At this time, data was obtained from within 2 km of the East MRT Site, extended to 10 km for European designated areas (see Appendix 13.3). | A desk study was completed for the TVP P&R Site in 2015. At this time, data was obtained from within 2 km of the TVP P&R Site, with a search for waterbodies within 500 m (see Appendix 13.7). |

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Extended Phase 1 habitat survey | An extended Phase 1 habitat survey of the East MRT Site was carried out in 2016. Habitats were identified and mapped following standard Joint Nature Conservation Committee (JNCC) Phase 1 habitat survey methodology as detailed in the Phase 1 Habitat Survey Handbook (JNCC, 2010). The survey was extended to give particular consideration to the potential of the habitats present to support protected species or species of conservation importance (Appendix 13.3).                                                                                                                                                                                                                                                                                  | An extended Phase 1 habitat survey of the TVP P&R Site was carried out in 2015. Habitats were identified and mapped following JNCC Phase 1 habitat survey methodology as detailed in the Phase 1 Habitat Survey Handbook (JNCC, 2010). The survey was extended to give particular consideration to the potential of the habitats present to support protected species or species of conservation importance (Appendix 13.7). |
| Detailed botanical              | A detailed Phase 2 botanical survey was undertaken in June 2016 (see Appendix 13.6).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | No detailed botanical work was undertaken as it was not considered necessary to determine the ecological baseline.                                                                                                                                                                                                                                                                                                           |
| Bats                            | <p>A series of bat surveys were completed for the East MRT Site in 2016 (see Appendix 13.5). These were completed in accordance with the Bat Conservation Trusts Good Practice Guidance (Collins, 2016) and included:</p> <ul style="list-style-type: none"> <li>▪ A ground-level assessment of trees followed by further detailed inspection and dusk emergence/dawn return to roost surveys of trees classified as having a high/medium level of roosting potential;</li> <li>▪ A dusk emergence survey of the railway bridge spanning the River Kennet; and</li> <li>▪ Monthly activity transect surveys between May and September inclusive, supplemented through the use of automated static bat detectors between May and October inclusive.</li> </ul> | <p>An initial single bat activity survey (static detector monitoring only) was completed for the TVP P&amp;R Site in 2015 (Appendix 13.10).</p> <p>Supplementary bat activity surveys (transects and static detector monitoring) were completed for the TVP P&amp;R Site in 2015, with reference to good practice guidance applicable at the time of the survey (Hunt, 2012 and Mitchell-Jones, 2004) (Appendix 13.8).</p>   |
| Badgers                         | Potential for badgers <i>Meles meles</i> to be present assessed as part of the extended Phase 1 habitat survey (see Appendix 13.3). No further surveys required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | A badger survey was carried out for the TVP P&R Site in 2015 (see Appendix 13.8).                                                                                                                                                                                                                                                                                                                                            |
| Breeding birds                  | Potential for breeding birds to be present assessed as part of the extended Phase 1 habitat survey (see Appendix 13.3). No further surveys required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | A single breeding bird survey was carried out for the TVP P&R Site in 2015 (see Appendix 13.10). The survey work followed a standard method based on the British Trust for Ornithology's (BTO's) Common Bird Census (CBC), as summarised by Bibby et al. (2000).                                                                                                                                                             |
| Great crested newts             | Potential for great crested newts <i>Triturus cristatus</i> to be present assessed as part of the extended Phase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | A Habitat Suitability Index (HSI) Assessment was completed for one waterbody located within 500 m of the                                                                                                                                                                                                                                                                                                                     |

|          |                                                                                                                                                                                                        |                                                                                                                                                                                                       |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | 1 habitat survey (see Appendix 13.3). No further surveys required.                                                                                                                                     | TVP P&R Site in 2015. The methodology was based on that prescribed by Oldham <i>et al.</i> (2000) and simplified by National Amphibian and Reptile Recording Scheme (NARRS).                          |
| Reptiles | A series of reptile presence / likely absence surveys were completed for the East MRT Site in 2016 (see Appendix 13.4). These surveys were based on best practice guidance and professional judgement. | A series of reptile presence / likely absence surveys were completed for the TVP P&R Site in 2015 (see Appendix 13.4). These surveys were based on best practice guidance and professional judgement. |

- 13.4.5 For ease of reference, an appendix has also been produced which contains two figures produced specifically in support of this chapter, see Appendix 13.12: Figures.

### Approach to Assessment

- 13.4.6 This assessment is being undertaken with regard to guidance set out in the Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Impact Assessment (2016) ('the CIEEM Guidelines'). The CIEEM Guidelines state that '*EcIA is a process of identifying, quantifying and evaluating the potential effects of development-related or other proposed actions on habitats, species and ecosystems*'. It requires an assessment of likely significant effects on important ecological features, and as such, does not require consideration of effects on every species or habitat that may be present.
- 13.4.7 In order to determine whether there are likely to be significant effects, it is first necessary to identify whether an ecological feature is 'important', and therefore whether an effect upon it could be significant, and thus, material in decision-making. To achieve this, where possible, animal species and their populations have been valued on the basis of a combination of their rarity, status and distribution, using contextual information where it exists. Habitats and plant communities have been evaluated against existing selection criteria, wherever possible (such as those developed to aid the designation of Site of Special Scientific Interest (SSSI) or non-statutory designated areas).
- 13.4.8 This impact assessment examines effects on important ecological features with regard to the positive (beneficial) or negative (adverse) nature, extent, magnitude, duration, timing, frequency, and reversibility of the impacts. For each ecological feature within the study area, the baseline is identified and evaluated. For each ecological feature identified as being important, relevant impacts are then characterised; effects defined and their significance assessed; mitigation identified and residual impacts reported. This exercise is performed for the proposed East MRT development in isolation and the proposed East MRT development and permitted TVP P&R development together (i.e. the combined development).
- 13.4.9 The design of the proposed East MRT development has been developed with the existing ecological features in mind, balancing effects on particular species or habitats through an iterative process. Therefore, ecological mitigation and enhancement measures in accordance

with the NPPF form an integral part of the development proposals and have been designed specifically to reduce or avoid ecological effects.

- 13.4.10 This chapter is supported by a number of appendices (Appendices 13-1 – 13-11 as identified within the sections above) which provide additional detail in relation to consultation, legislation and planning policy, and statutory designated areas, habitats and species.

### Terminology

- 13.4.11 The terms 'impact' and 'effect' are often used synonymously and this can lead to confusion. For the purposes of this EclA they are defined as follows, in accordance with CIEEM (2016):

- Impacts: Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow.
- Effects: Outcome to an ecological feature from an impact. For example, the effects on a dormouse population from a loss of a hedgerow.

### Determining the Importance of Ecological Features

- 13.4.12 The importance of each ecological feature within the study area has been determined having regard to a number of contributory factors relating to conservation value.

- 13.4.13 The CIEEM Guidelines recognise that determining importance is a complex process, which is a matter of professional judgement guided by the importance and relevance of a number of factors. These include designation and legislative protection as well as biodiversity value, potential value and secondary/supporting value. Consideration of each ecological feature having regard to these factors allows their importance to be determined, with reference to the geographic context set out below:

- International / European;
- National (England);
- Regional (the Thames Valley Region west of London (i.e. Wiltshire, Oxfordshire, Berkshire, Buckinghamshire);
- County (Oxfordshire and / or Berkshire counties); and
- Local (Reading and / or Wokingham Borough unitary authorities).

- 13.4.14 Ecological features that are important within a 'Local' context or above are then considered further within the impact assessment, with ecological features that are of less than 'Local' importance (i.e. those that may be considered to be important only within the context of the parish/ neighbourhood or Site), excluded.

### Assessing Ecological Impacts and Determining Significance

- 13.4.15 The nature and extent of the impacts of the proposed East MRT development / combined development have been informed by other studies reported within and undertaken to support this ES. In particular, the outputs in relation to landscape (Chapter 12), hydrology and flood risk (Chapter 10) and lighting (Chapter 12) are important as these determine the nature and significance of potential impacts on important ecological features.

- 13.4.16 The predicted impacts may be direct or indirect in nature and may occur in the construction and/or operational phase of the development. The determination and description of the significance of the predicted ecological effects is based on professional judgement and made

with regard to the positive (beneficial) or negative (adverse) nature; extent; magnitude; duration; timing; frequency; and reversibility of the impacts assessed.

13.4.17 These factors provide a means of characterising the impacts of the development and thereby support an assessment of the significance of the effects on the important ecological features determined as relevant in this assessment.

13.4.18 Whilst this impact assessment uses generic criteria, based on an expression of severity, to describe the significance of environmental effects, the CIEEM Guidelines encourages the expression of significance of ecological effects with reference to a geographic frame of reference.

13.4.19 The CIEEM Guidelines state that an effect should be determined as being significant when it *'either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general'*. Significance is a concept related to the weight that should be afforded to effects when decisions are made, and to the consequences, in terms of legislation, policy and/or development control. So, a significant negative (adverse) effect on a feature of importance at one level would be likely to trigger related planning policies and, if permissible at all, generate the need for development control mechanisms, such as planning conditions or legal obligations, as described in those policies.

13.4.20 An effect on an important ecological feature may be significant at the same geographic scale at which the feature is determined to be important (see paragraph 13.4.12), or at a lesser geographical scale, depending on the characterisation of the impact. By way of example, limited impacts on a woodland of county importance might be assessed as being significant at a local level of importance. This methodology supports an evidence based approach which supersedes previous matrix-based assessment methodologies.

13.4.21 This ES uses generic criteria, based on an expression of severity, to describe the significance of environmental impacts. For ease of reference, Table 13-3 below provides a means of relating the two approaches and is provided in order to allow the EcIA(s) to be integrated into the wider EIA without compromising the CIEEM best practice approach.

Table 13-3 Ecological Significance Criteria

| Significance level | Criteria                                                                                                                                                                                                                                                                                                                                                 | CIEEM geographical criteria                                                                                                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Severe             | Only adverse effects are assigned this level of significance as they represent key factors in the decision-making process. These effects are generally, but not exclusively associated with sites and features of international, national or regional importance. A change at a regional or district scale site or feature may also enter this category. | Ecological impacts assessed as being significant at national or higher geographical scales and that have triggered a response in development control terms are considered to represent impacts that overall within this assessment are of severe significance. |
| Major              | These effects are likely to be important considerations at a local or district scale but, if adverse, are potential concerns to the project and may become key factors in the decision-making process.                                                                                                                                                   | Ecological impacts assessed as being significant at the regional scales and that has triggered a response in development control terms are considered to represent impacts that overall within this assessment are of major significance.                      |

|            |                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                               |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Moderate   | These effects, if adverse, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource. | Ecological impacts assessed as being significant at the county scale and that has triggered a response in development control terms will be considered to represent impacts that overall within this assessment are of moderate significance. |
| Minor      | These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in enhancing the subsequent design of the project and consideration of mitigation or compensation measures.  | Ecological impacts assessed as being significant at the local scale and that has triggered a response in development control terms will be considered to represent impacts that overall within this assessment are of minor significance.     |
| Negligible | No effect or effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error.                                                                                                                        | Ecological impacts that have been assessed as not being significant at any geographic level                                                                                                                                                   |

## Mitigation and Assessment of Residual Impacts

13.4.22 The guidelines state that: ‘a sequential process should be adopted to avoid, mitigate and compensate ecological impacts’. These measures should be described within the EclA and should be sufficient to allow the competent authority and relevant stakeholders to see clearly how the impacts will be addressed (CIEEM, 2016).

13.4.23 Residual impacts are those that remain after implementation of avoidance and mitigation measures. These are then assessed to determine the significance of their effects on important ecological features.

## Assumptions and Limitations

13.4.24 Limitations associated within the individual ecological baseline surveys are provided within the respective reports (contained within Appendices 13-3 – 13-11).

13.4.25 The following assumptions and limitations are relevant to the current assessment:

- The baseline ecology survey and associated reporting for the TVP P&R Site have been completed by third parties (not under PBA instruction). These have not been audited or influenced by PBA and as such, have been used for reference only. Where conclusions have been drawn by PBA for the purposes of the assessment, they have been indicated within the main body of the Chapter.

## 13.5 Baseline

13.5.1 The baseline conditions presented within this section have been determined following a review of the desk study and field surveys described in the Methodology section of this chapter.

13.5.2 Further information pertaining to these field surveys is provided within Appendices 13-3 to 13-11.

## Designated Areas

13.5.3 Designated areas identified within the search radii outlined within paragraph 13.4.2 are summarised in Table 13-4. Distances above 1 km are rounded to the nearest 0.1 km, with the closest distance to the 'Combined Site' shown in bold.

13.5.4 The geographic context at which designated areas are considered important has also been identified.

Table 13-4: Designated Areas

| Site Name                                   | Designation                | Distance from East MRT Site | Distance from TVP P&R Site <sup>22</sup> | Geographic Context |
|---------------------------------------------|----------------------------|-----------------------------|------------------------------------------|--------------------|
| <i>Statutory Designated Areas</i>           |                            |                             |                                          |                    |
| Highwood                                    | Local Nature Reserve (LNR) | 1.8 km south east           | <b>1.6 km south</b>                      | County             |
| <i>Non-Statutory Designated Areas</i>       |                            |                             |                                          |                    |
| The Coal, Kennetmouth and Kings Meadow East | LWS                        | <b>On-site</b>              | 270 m west                               | County             |
| Henley Road Gravel Pit                      | LWS                        | <b>100 m north</b>          | 150 m north                              | County             |
| Reading Cemetery                            | LWS                        | <b>530 m south</b>          | <b>530 m south</b>                       | County             |
| Thames Valley Park                          | LWS                        | 1.5 km north east           | <b>1.3 km east</b>                       | County             |
| Whiteknights Park                           | LWS                        | <b>1.5 km south</b>         | <b>1.5 km south</b>                      | County             |
| Holy Brook                                  | LWS                        | <b>1.5 km south west</b>    | Over 2 km                                | County             |
| River Kennet / Kennet and Avon Canal        | LWS                        | <b>1.5 km south west</b>    | Over 2 km                                | County             |

13.5.5 No European designated areas were identified within 10 km of the Combined Site.

13.5.6 Full details pertaining to each of the designated areas contained within Table 13-4 are provided within Appendix 13-3: East MRT: Preliminary Ecological Appraisal.

## Habitats

### Ancient Woodland

13.5.7 A single parcel of Ancient Woodland was identified within the search radii outlined within paragraph 13.4.2. Details of this are summarised in Table 13-5. Distances above 1 km rounded to the nearest 0.1 km, with the closest distance to the 'Combined Site' shown in bold.

13.5.8 The geographic context at which this parcel of Ancient Woodland is considered important has also been identified.

<sup>22</sup> Measurements taken from Broken Brow: Preliminary Ecological Appraisal (Appendix G) where defined; or re-measured using desk study data obtained for the MRT East, where undefined.

Table 13-5: Ancient Woodland

| Site Name   | Designation                     | Distance from East MRT Site | Distance from TVP P&R Site <sup>23</sup> | Geographic Context |
|-------------|---------------------------------|-----------------------------|------------------------------------------|--------------------|
| ID: 1504533 | Ancient & Semi-Natural Woodland | <b>960 m north</b>          | 1.2 km north                             | County             |

### Habitats of Principal Importance

13.5.9 Parcels of HPI identified within the search radii outlined within paragraph 13.4.2 are summarised in Table 13-6. Distances above 1 km rounded to the nearest 0.1 km, with the closest distance to the 'Combined Site' shown in bold.

13.5.10 The geographic context at which parcels of HPI are considered important has also been identified.

Table 13-6: Habitats of Principal Importance

| Habitat Type                       | Distance of closest from East MRT Site | Distance of closest from TVP P&R Site <sup>24</sup> | Geographic Context |
|------------------------------------|----------------------------------------|-----------------------------------------------------|--------------------|
| Lowland mixed deciduous woodland   | <b>On-site</b>                         | 300 m west                                          | County             |
| Eutrophic standing waters          | <b>65 m north</b>                      | <b>65 m north</b>                                   | County             |
| Rivers <sup>25</sup>               | <b>990 m north</b>                     | 1.2 km north                                        | County             |
| Traditional orchard                | <b>1.2 km north</b>                    | 1.3 km north                                        | County             |
| Reedbeds                           | 1.3 km north east                      | <b>1.1 km north east</b>                            | County             |
| Lowland fens                       | 1.4 km north east                      | <b>1.2 km north east</b>                            | County             |
| Lowland wood pastures and parkland | 1.9 km south                           | <b>1.8 km south</b>                                 | County             |

### Habitats On-Site

13.5.11 Full details of the habitats on-site are provided within the Preliminary Ecological Appraisal Reports, with the extent and location shown on associated figures (Appendix 13-3: East MRT: Preliminary Ecological Appraisal and Appendix 13-7: Broken Brow: Preliminary Ecological

<sup>23</sup> Measurements taken from Broken Brow: Preliminary Ecological Appraisal (Appendix G).

<sup>24</sup> Not included within the Broken Brow: Preliminary Ecological Appraisal (Appendix G), so measured from desk study data obtained for the MRT East.

<sup>25</sup> Although the River Thames is located immediately north of the Combined Site, it is not identified as HPI: Rivers within the desk study data received.

Appraisal). Additional botanical data, applicable to the East MRT Site (and also therefore the Combined Site) is presented in Appendix 13-6: East MRT: Botanical Survey Report.

13.5.12 For each habitat type identified, the following format has been used:

- Results of the East MRT Site Phase 1 habitat survey (supplemented with the results of the detailed botanical survey, where applicable), with the geographic context at which the habitat type is considered important;
- Results of the TVP P&R Site Phase 1 habitat survey, with the geographic context at which the habitat type is considered important; and
- A concluding statement drawn for the Combined Site, with the geographic context at which the habitat type is considered important.

13.5.13 For ease of reference, the habitat types have been listed in order of alphanumeric codes (as identified within JNCC, 2010).

*Broad-leaved Semi-Natural Woodland (A1.1.1)*

13.5.14 Broad-leaved semi-natural woodland is present within the East MRT Site, to the west of the River Kennet; primarily located within The Coal, Kennetmouth and Kings Meadow East LWS / HPI.

13.5.15 Information obtained during the detailed botanical survey identified four different habitat/habitat mosaic parcels within the portion of broad-leaved semi-natural woodland located between the Tesco Car Park and the River Kennet. These habitats / habitat mosaic parcels were based on vegetation character/structure and species present. Full details are provided within the detailed botanical report (Appendix 13.6: East MRT: Botanical Survey Report), including full botanical species lists (Appendix A)). A high level summary is provided below:

- The woodland making up the bulk of the portion of the LWS located between the Tesco Car Park and the River Kennet (see Appendix 13.6: East MRT: Botanical Survey Report) was divided into two areas north (BW1) and south (BW2) of a surfaced footpath. The northern area (BW1) is located almost wholly outside of the proposed East MRT development boundary. It comprises a mixed secondary woodland with frequent mature and young self-seeded sycamore *Acer pseudoplatanus* and occasional mature ash *Fraxinus excelsior*, plus a dense shrub layer of elder *Sambucus nigra*, hawthorn *Crataegus monogyna* and butterfly-bush *Buddleja davidii*. This section of woodland also has a characteristic row of mature horse chestnut *Aesculus hippocastanum* trees growing along the northern edge adjacent to the Thames path (footpath). Virginia creeper *Parthenocissus quinquefolia* was noted growing on trunks of trees and across the ground in this location. The area of woodland to the south (BW2) is located almost wholly within the proposed East MRT development boundary. It is noticeably different in character (compared to BW1), having abundant silver birch *Betula pendula*, frequent Norway maple *Acer platanoides* and a group of mature hybrid black poplar *Populus deltoides x nigra*, resulting in a more open woodland with a less dense shrub layer (although elder and young sycamore are still frequent). Ground cover in both BW1 and BW2 contains a mixture of species such as common nettle *Urtica dioica*, garlic mustard *Alliaria petiolata*, ground ivy *Glechoma hederacea*, green alkanet *Pentaglottis sempervirens* and cleavers *Galium aparine*. Due to the predominance of shrub species in the bulk of the woodland parcels, both BW1 and BW2 show more affinity to scrub community (e.g. W21 (*Crataegus monogyna* - *Hedera helix*) scrub), as opposed to 'true' woodland.
- The eastern end of the portion of the LWS located between the Tesco Car Park and the River Kennet consists of a more open 'glade' with scattered scrub and ruderal vegetation. Again, this area is located largely within the proposed East MRT development boundary. The scrub component comprises a mixture of young, self-seeded sycamore and ash with frequent butterfly-bush and occasional dogwood *Cornus sanguinea*. Characteristic

ground cover species here include creeping cinquefoil *Potentilla reptans* and common nettle, with other species including thyme-leaved speedwell *Veronica serpyllifolia*, wild mignonette *Reseda lutea* and wood forget-me-not *Myosotis sylvatica*. In the most open areas some grassland has established including creeping bent *Agrostis stolonifera* and red fescue *Festuca rubra*.

- The southern part of the portion of the LWS located between the Tesco Car Park and the River Kennet consists of a strip of scrub/introduced shrub between the woodland (BW2) and the adjacent railway corridor. This area is located wholly within the proposed East MRT development boundary. Dense stands of butterfly-bush are characteristic of this area, with frequent young self-seeded sycamore and patches of bramble *Rubus fruticosus* and common nettle. Where scrub is more open, a variety of ground cover species was recorded including ground ivy, green alkanet, creeping cinquefoil, common ragwort *Senecio jacobaea*, teasel *Dipsacus fullonum*, wood forget-me-not, garlic mustard, cleavers, great mullein *Verbascum thapsus* and dark mullein *Verbascum nigrum*.

13.5.16 Given its setting, largely within The Coal, Kennetmouth and Kings Meadow East LWS / HPI; and having been identified as 'lowland mixed deciduous woodland' HPI following the botanical surveys (albeit whilst acknowledging that the on-site areas of woodland in the LWS are not good examples of this habitat type due to their small size and general lack of mature tree cover), this habitat type is considered to be of importance within the **County** context.

13.5.17 Broad-leaved semi-natural woodland was not recorded within the TVP P&R Site.

13.5.18 Although absent from the TVP P&R Site, overall the presence of broad-leaved semi-natural woodland within the Combined Site is still considered to be of importance within the **County** context.

#### *Broad-leaved Plantation Woodland (A1.1.2)*

13.5.19 A small area of planted broad-leaved woodland is present at the eastern extent of the East MRT Site, where it crosses the TVP P&R Site<sup>26</sup>. Details pertaining to this habitat type are provided within Appendix 13-7: Broken Brow: Preliminary Ecological Appraisal, and summarised below.

13.5.20 Three parcels of planted broad-leaved woodland are present within the TVP P&R Site: (i) along the southern boundary with the railway, (ii) on a steep bank towards the eastern boundary; and (iii) comprising two sections to the south of the Waterside Centre. Although identified within the Preliminary Ecological Appraisal as an HPI (see Appendix 13.7), this habitat type is of low quality, comprising moderate and low grade trees (as identified within the Arboricultural Impact Assessment & Tree Protection Plan (Bosky Trees, 2016)). As such, it is considered to be of low intrinsic ecological value, and is not considered to be of importance within the Local context or greater.

13.5.21 Given the limited extent and low ecological value of this habitat type, broad-leaved plantation woodland is not considered to be of importance within the Local context or greater for the Combined Site.

#### *Dense Scrub (A2.1)*

13.5.22 Dense scrub was present in several discrete areas throughout the East MRT Site, as well as forming part of habitat matrices (see below). Given the common and easily re-creatable nature

<sup>26</sup> This habitat type was surveyed as part of the baseline for the permitted P&R Site, and as such, was completed by third parties (not under PBA instruction). Further details are provided within Appendix 13.7: Broken Brow: Preliminary Ecological Appraisal.

of this habitat type and the species within it, dense scrub is of low intrinsic ecological value, and is not considered to be of importance within the Local context or greater.

13.5.23 The TVP P&R Site is dominated by dense scrub, with a continuous stand across much of the western extent. Three additional discrete pockets are also present along the eastern boundary, and to the south and west of the Waterside Centre. Although extensive in area, given the common and easily re-creatable nature of this habitat type and the species within it, dense scrub is of low intrinsic ecological value, and is not considered to be of importance within the Local context or greater.

13.5.24 In summary, dense scrub is present, although discontinuous, across the Combined Site. Given the common and easily re-creatable nature of this habitat type and the species within it, dense scrub is of low intrinsic ecological value, and is not considered to be of importance within the Local context or greater.

#### *Scattered Scrub (A2.2)*

13.5.25 Scattered scrub was present across the East MRT Site, often encroaching from the adjacent railway corridor. This largely formed part of habitat matrices (see below). Given the common and easily re-creatable nature of this habitat type and the species within it, scattered scrub is of low intrinsic ecological value, and is not considered to be of importance within the Local context or greater.

13.5.26 This habitat type was not identified to be present within the TVP P&R Site.

13.5.27 Given the absence of this habitat type from within the TVP P&R Site, and its common and easily re-creatable nature and the species within it where it occurs within the East MRT Site, overall scattered scrub is not considered to be of importance within the Local context or greater for the Combined Site.

#### *Scattered Broad-Leaved Trees (A3.1)*

13.5.28 Scattered trees are present throughout the East MRT Site. These vary in age, including mature and semi-mature specimen, and comprise common and widespread species. As the main tree resource for the East MRT Site is contained within the broad-leaved semi-natural woodland however (and as such, has been considered within this habitat type above), the remaining scattered trees are limited in number and as such are not considered to be of importance within the Local context or greater.

13.5.29 Scattered trees are present within the dense scrub pockets at the TVP P&R Site. Although these range in age and species type, providing some intrinsic ecological value, all are moderate, low or very poor in quality; as such, they are not considered to be of importance within the Local context or greater.

13.5.30 In summary, scattered broad-leaved trees are present across the Combined Site. These range in age and quality, with only a proportion comprising mature, native specimen of high quality. Although they provide some intrinsic ecological value, they are not considered to be of importance within the Local context or greater.

#### *Acid Grassland (B1.2)*

13.5.31 This habitat type was found to be present within one of the detailed botanical sampling locations at the East MRT Site (location 9, see Appendix 13.6: East MRT: Botanical Survey Report). Characterised by short sward of sheep's fescue *Festuca ovina* with low-growing herbs including sheep's sorrel *Rumex acetosella* and creeping cinquefoil, this area showed some affinity to a U1 (*Festuca ovina*-*Agrostis capillaris*-*Rumex acetosella*) calcifugous (acid) grassland community. The U1 acid grassland community type is one of the grassland communities included in the 'lowland dry acid grassland' HPI habitat description. However, the

acid grassland areas within the East MRT Site are not good examples of this habitat type, being very small in area and containing common and widespread species. As such, the presence of acid grassland within the East MRT Site is not considered to be of importance within the Local context or greater.

13.5.32 This habitat type was not identified to be present within the TVP P&R Site.

13.5.33 Given the absence of this habitat type from within the TVP P&R Site, and its limited extent and lack of botanical diversity where it does occur within the East MRT Site, overall it is not considered to be of importance within the Local context or greater for the Combined Site.

*Unimproved Calcareous Grassland (B3.1)*

13.5.34 Small areas of unimproved calcareous grassland are present within the eastern extent of the East MRT Site, where it crosses the TVP P&R Site<sup>27</sup>. Details pertaining to this habitat type are provided within Appendix 13.7: Broken Brow: Preliminary Ecological Appraisal and are summarised below.

13.5.35 Pockets of unimproved calcareous grassland were present as paths between the dense scrub within the TVP P&R Site, as well as an area to the south. Although identified within the Preliminary Ecological Appraisal as an HPI (see Appendix 13.7) and as such, of intrinsic ecological value, this habitat type is a low quality example. It was found to be heavily grazed (by rabbits) and vegetated with rank grass species, such as yorkshire fog *Holcus latatus* (dominant), false oat grass *Arrhenatherum elatius* (rare) and cocksfoot *Dactylis glomerata* (dominant), indicating a degree of historical nutrient improvement. As such, unimproved calcareous grassland is not considered to be of importance within the Local context or greater.

13.5.36 Given the limited extent of this habitat type, it's heavy grazing, and lack of botanical diversity, overall it is not considered to be of importance within the Local context or greater for the Combined Site.

*Poor Semi-Improved Grassland (B6)*

13.5.37 The majority of the eastern portion of the East MRT Site comprises poor semi-improved grassland. Although semi-improved grassland is referenced within the Urban II Habitat Action Plan within Reading BAP ('open grassland') and the Grassland and Hedgerow Habitat Action Plan within Wokingham BAP ('all types of lowland grassland'), the example of this habitat type with the East MRT Site is species poor, and of low intrinsic ecological value, being dominated by common plant species and easily re-creatable in nature. As such, poor semi-improved grassland is considered to be of importance within the Local context or greater.

13.5.38 This habitat type was not identified to be present within the TVP P&R Site.

13.5.39 Given the absence of this habitat type from within the TVP P&R Site, and its limited botanical interest where it does occur within the East MRT Site, overall it is not considered to be of importance within the Local context or greater for the Combined Site.

*Tall Ruderal (C3.1)*

13.5.40 Areas dominated by tall ruderal habitat are present on the East MRT Site with this habitat type also associated with the habitat matrices (see below). Given the common and easily re-creatable nature of this habitat type and the species within it, tall ruderal habitat is of low

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<sup>27</sup> This habitat type was surveyed as part of the baseline for the permitted P&R Site, and as such, was completed by third parties (not under PBA instruction). Further details are provided within Appendix 13.7: Broken Brow: Preliminary Ecological Appraisal.

intrinsic ecological value, and is not considered to be of importance within the Local context or greater.

13.5.41 Tall ruderal was not identified as a standalone habitat type within the TVP P&R Site, with tall ruderal species included as part of the 'dense scrub' habitat description within the Preliminary Ecological Appraisal (Appendix 13.7). Refer to paragraph 13.5.22 for further details.

13.5.42 Given the absence of this habitat type from within the TVP P&R Site (as a standalone habitat type), its low intrinsic ecological value where it does occur within the East MRT Site, overall it is not considered to be of importance within the Local context or greater for the Combined Site.

#### *Running Water (G2)*

13.5.43 Running water associated with the River Kennet is present within the East MRT Site boundary (where the proposed East MRT development route crosses it). This is connected to the River Thames (located to north); which is located adjacent to the East MRT Site along much of the extent. Riparian habitat associated with the edge of this habitat type is considered within the section below (Marginal Vegetation (F2.1)). Given its link to many of the designated areas and HPI, as identified within section the Designated Areas / HPI sections above, running water is considered to be of importance within the **County** context.

13.5.44 This habitat type was not identified to be present within the TVP P&R Site.

13.5.45 Whilst absent from within the TVP P&R Site, the running water where it occurs within and adjacent to the East MRT Site links to many of the designated areas and HPI. Overall, the presence of running water within and adjacent to the Combined Site is considered to be of importance within the **County** context.

#### *Marginal Vegetation (F2.1)*

13.5.46 Located at the confluence between the River Kennet (western bank), and the River Thames (southern bank), a portion of bankside marginal vegetation was identified on the East MRT Site. This is associated with The Coal, Kennetmouth and Kings Meadow East LWS.

13.5.47 Information obtained during the detailed botanical survey identified a strip of vegetation north of the Thames path (footpath) growing on the south bank of the River Thames. The majority of this strip (now located wholly outside the proposed East MRT development boundary) was recorded as scattered broadleaved trees and tall ruderal vegetation (SBW/TR1). The eastern end of this strip of vegetation (again, located outside the proposed East MRT development boundary) was recorded as a mosaic of tall ruderal and marginal vegetation (TR/MV1) growing where there is a break in tree cover. Characteristic species here included clumps of yellow iris *pseudacorus* on the water's edge with dense stands of Himalayan balsam *Impatiens glandulifera* on the bank along with common nettle, cleavers, creeping thistle *Cirsium arvense* and clustered dock *Rumex conglomeratus* (among others). The LWS boundary also appears to include a narrow strip of land leading up to the existing railway bridge (i.e. along the west of the River Kennet, and within the proposed East MRT development boundary). This area includes stands of common nettle as well as characteristic mature crack willow *Salix fragilis* pollards

13.5.48 Given its inclusion within the designation for the LWS, marginal vegetation is considered to be of importance within the **County** context.

13.5.49 This habitat type was not identified to be present within the TVP P&R Site.

13.5.50 Whilst absent from within the TVP P&R Site, the areas of marginal vegetation where it occurs within the East MRT Site fall within The Coal, Kennetmouth and Kings Meadow East LWS.

Overall, the presence of marginal vegetation within the Combined Site considered to be of importance within the **County** context.

*Amenity Grassland (J1.2)*

- 13.5.51 A strip of amenity grassland is present along the riverside footpath in the eastern portion of the East MRT Site. Although amenity grassland is referenced within the Urban II Habitat Action Plan within Reading BAP ('open grassland') and the Grassland and Hedgerow Habitat Action Plan within Wokingham BAP ('all types of lowland grassland'), this habitat type is limited in extent, close mown/ grazed and largely of poor quality with a high proportion of bare ground. As such, it is of low intrinsic ecological value, and is not considered to be of importance within the Local context or greater.
- 13.5.52 An area of well managed amenity grassland is present to the south of the Waterside Centre on the TVP P&R Site. Although this provides some species diversity, it is regularly mown and managed for amenity use. Again, it is of low intrinsic ecological value, and is not considered to be of importance within the Local context or greater.
- 13.5.53 Amenity grassland is present, although discontinuous, across the Combined Site. Given the common and easily re-creatable nature of this habitat type and the species within it, amenity grassland is of low intrinsic ecological value, and is not considered to be of importance within the Local context or greater for the Combined Site.

*Ephemeral/ Short Perennial Habitat (J1.3)*

- 13.5.54 An area dominated by ephemeral / short perennial habitat is present at the western extent of the East MRT Site, with further ephemeral/ short perennial habitat forming part of on-site habitat matrices (see below). Although the ephemeral/short-perennial habitat has characteristics of 'open mosaic habitat on previously developed land' it does not fit the description of this HPI category as it is too small in area (<0.25 ha) and is largely vegetated (i.e. lacking areas of bare ground). It is not therefore considered to be of importance within the Local context or greater.
- 13.5.55 Ephemeral / short perennial habitat was not identified to be present within the TVP P&R Site.
- 13.5.56 Given the absence of this habitat type from within the TVP P&R Site, and its limited extent and lack of botanical interest where it occurs within the East MRT Site, overall it is not considered to be of importance within the Local context or greater for the Combined Site.

*Introduced Shrub (J1.4)*

- 13.5.57 Significant beds of introduced shrub planting were present on the East MRT Site; namely within the Tesco car park. Given these areas are man-made and comprise non-native species planting, this habitat type is of low intrinsic ecological value, and is not considered to be of importance within the Local context or greater.
- 13.5.58 A small patch of previously managed introduced shrub exists to the rear of the Waterside Centre. As with the East MRT Site, this habitat type is of low intrinsic ecological value, and is not considered to be of importance within the Local context or greater.
- 13.5.59 Introduced shrub is present, although discontinuous, across the Combined Site. Given the common and easily re-creatable nature of this habitat type and the dominance of non-native species within it, it is not considered to be of importance within the Local context or greater for the Combined Site.

### *Hedgerows*

- 13.5.60 A single hedgerow is present within on the East MRT Site ('Defunct Species Poor' (J2.2.2)). Although hedgerows are referenced within the Ancient and / or Species Rich Hedgerows Habitat Action Plan within Reading BAP and the Grassland and Hedgerow Habitat Action Plan within Wokingham BAP, the example present within the East MRT Site is defunct, with a poor structure and lacks botanical interest. As such, it is of low intrinsic ecological value, and is not considered to be of importance within the Local context or greater.
- 13.5.61 A native species-rich hedgerow with trees (Hedge and Trees – Native Species Rich (2.3.1)) is present on the TVP P&R Site, along the northern boundary. This is largely outgrown, defunct in places and dominated by hawthorn *Crataegus monogyna*. Although identified within the Preliminary Ecological Appraisal as an HPI (see Appendix 13.7) and as such, of intrinsic ecological value, this habitat type is a low quality example; outgrown, dominated by a single species. Indeed, within the East MRT Preliminary Ecological Appraisal this area was not even identified as a hedgerow, being so outgrown, and instead categorised as dense scrub and a series of 'tree groups' within the Arboricultural Impact Assessment report. This habitat type is not considered to be of importance within the Local context or greater.
- 13.5.62 Given the limited extent of hedgerow habitat across the Combined Site, and the defunct or poor quality of the hedgerow habitat where present, it is not considered to be of importance within the Local context or greater for the Combined Site.

### *Boundary Features – Fence (J4), and Hardstanding (J3.4)*

- 13.5.63 Fence and hardstanding are both present along much of the extent of the East MRT Site. These 'habitat types' provide no intrinsic ecological value and are not considered to be of importance within the Local context or greater.
- 13.5.64 This habitat type was not identified to be present within the TVP P&R Site.
- 13.5.65 Overall, boundary features are not therefore considered to be of importance within the Local context or greater for the Combined Site.

### *Buildings (J3.6)*

- 13.5.66 No buildings are present within the East MRT Site.
- 13.5.67 A single building is located within the TVP P&R Site. Although this provides no intrinsic ecological value (and is not considered to be of importance within the Local context or greater), it has been included within the habitat baseline as it is referred to later within the assessment in relation to bats.
- 13.5.68 Given the absence of this habitat type from within the East MRT Site, the habitat description and geographic context at which it is important remains for the Combined Site as for the TVP P&R Site only.

#### *Bare Ground (J4)*

13.5.69 A small area of bare ground is present within the eastern extent of the East MRT Site, where it crosses the TVP P&R Site<sup>28</sup>. Details pertaining to this habitat type are provided within Appendix 13.7: Broken Brow: Preliminary Ecological Appraisal and are summarised below.

13.5.70 An area of bare ground exists within the eastern part of the TVP P&R Site. This provides no intrinsic ecological value, lacking any botanical interest, and is not considered to be of importance within the Local context or greater.

13.5.71 Overall, bare ground is not therefore considered to be of importance within the Local context or greater for the Combined Site.

#### *Other Habitat (J5)*

13.5.72 A number of habitat matrices were present on the East MRT Site, where more than one habitat type as outlined above, was identified within a discrete area. Given that these matrices comprised namely habitats of low intrinsic ecological value, and were themselves limited in area and botanical diversity, they are not considered to be of importance within the Local context or greater.

13.5.73 No 'other habitat types' were identified to be present within the TVP P&R Site.

13.5.74 Overall, the presence of habitat matrices within the Combined Site is not therefore considered to be of importance within the Local context or greater.

#### *Summary*

13.5.75 A summary of habitat types, their levels of importance, and associated areas (in meters square) are provided within Table 13.5 below.

Table 13-5: Habitat Summary

| Habitat Type                              | East MRT Site Area (m <sup>2</sup> )       | Geographic Context | TVP P&R Site Area (m <sup>2</sup> )        | Geographic Context | Combined Site Area (m <sup>2</sup> )       | Geographic Context |
|-------------------------------------------|--------------------------------------------|--------------------|--------------------------------------------|--------------------|--------------------------------------------|--------------------|
| <b>Broad-leaved Semi-Natural Woodland</b> | 2633.84                                    | <b>County</b>      | 0.00                                       | N/A                | 2633.84                                    | <b>County</b>      |
| Broad-leaved Plantation Woodland          | 5.18                                       | N/A                | 1676.08                                    | Less than Local    | 1681.26                                    | Less than Local    |
| Dense Scrub                               | 7013.27                                    | Less than Local    | 9600.44                                    | Less than Local    | 16613.71                                   | Less than Local    |
| Scattered Scrub                           | N/A – scattered within other habitat types | Less than Local    | N/A – scattered within other habitat types | N/A                | N/A – scattered within other habitat types | Less than Local    |
| Scattered Broad-Leaved Trees              | N/A – scattered within other habitat types | Less than Local    | N/A – scattered within other habitat types | Less than Local    | N/A – scattered within other habitat types | Less than Local    |

<sup>28</sup> This habitat type was surveyed as part of the baseline for the permitted P&R Site, and as such, was completed by third parties (not under PBA instruction). Further details are provided within Appendix 13.7: Broken Brow: Preliminary Ecological Appraisal.

| Habitat Type                       | East MRT Site Area (m <sup>2</sup> ) | Geographic Context | TVP P&R Site Area (m <sup>2</sup> ) | Geographic Context | Combined Site Area (m <sup>2</sup> ) | Geographic Context |
|------------------------------------|--------------------------------------|--------------------|-------------------------------------|--------------------|--------------------------------------|--------------------|
| Acid Grassland                     | N/A <sup>29</sup>                    | Less than Local    | 0                                   | N/A                | N/A <sup>30</sup>                    | Less than Local    |
| Unimproved Calcareous Grassland    | 753.80                               | N/A                | 1933.75                             | Less than Local    | 2687.55                              | Less than Local    |
| Poor Semi-Improved Grassland       | 2760.94                              | Less than Local    | 0.00                                | N/A                | 2760.94                              | Less than Local    |
| Tall Ruderal                       | 3630.85                              | Less than Local    | 0.00                                | N/A                | 3820.41                              | Less than Local    |
| Running Water                      | 2325.69                              | <b>County</b>      | 0.00                                | <b>County</b>      | 2325.69                              | <b>County</b>      |
| <b>Marginal Vegetation</b>         | 160.09                               | <b>County</b>      | 0.00                                | N/A                | 160.09                               | <b>County</b>      |
| Amenity Grassland                  | 189.56                               | Less than Local    | 2164.11                             | Less than Local    | 2164.11                              | Less than Local    |
| Ephemeral/ Short Perennial Habitat | 1018.66                              | Less than Local    | 0.00                                | N/A                | 1018.66                              | Less than Local    |
| Introduced Shrub                   | 3037.99                              | Less than Local    | 15.18                               | Less than Local    | 3053.16                              | Less than Local    |
| Hedgerows                          | 35.14                                | Less than Local    | 0.00                                | N/A                | 35.14                                | Less than Local    |
| Boundary Features and Hardstanding | 0.00                                 | Less than Local    | 59.21                               | N/A                | 59.21                                | Less than Local    |
| Buildings                          | 5786.59                              | N/A                | 0.00                                | Less than Local    | 5786.59                              | Less than Local    |
| Bare Ground                        | 0.00                                 | N/A                | 35.12                               | Less than Local    | 35.12                                | Less than Local    |
| Habitat Matrices                   | 567.04                               | Less than Local    | 636.23                              | N/A                | 1203.28                              | Less than Local    |

### Protected and Notable Species

13.5.76 This section provides a summary of baseline information pertaining to protected and notable species of relevance to the proposed development(s). Full details are provided within the

<sup>29</sup> N/A – identified within a parcel during the detailed botanical work, and as such not included on the habitat plan from which measurements have been made.

<sup>30</sup> N/A – identified within a parcel during the detailed botanical work, and as such not included on the habitat plan from which measurements have been made.

Preliminary Ecological Appraisal Reports and Species Specific Survey Reports (Appendices 13.3 – 13.11).

13.5.77 For each species / species group identified, the following format has been used:

- Results pertaining to the East MRT Site, with the geographic context at which the species / species group is considered important;
- Results pertaining to the TVP P&R Site, with the geographic context at which the species / species group is considered important;
- A concluding statement drawn for the Combined Site, with the geographic context at which the species / species group is considered important.

#### *Bats*

13.5.78 Full results of the findings of the suite of bat surveys undertaken at the East MRT Site are provided within Appendix 13.5: East MRT: Bat Survey Report, with a summary provided below:

- A total of three trees/tree groups were assessed as having high roosting potential (T88, T91 and G115), and one tree (T163) was assessed as having medium roosting potential. T163 supported roosting features that were at low-level and could therefore be inspected with the aid of a ladder and a fibre-optic scope. No signs of roosting bats were found within these cavities at the time of the inspection. This inspection enabled current use of this tree by roosting bats to be ruled out. T88, T91 and G115 were subject to further dusk emergence / dawn re-entry survey. No bats were observed roosting in any of these trees during the surveys.
- No bats were observed emerging from the railway bridge during the dusk emergence survey.
- At least five species of bats were recorded over the course of the monthly activity transect surveys. The confirmed species or species groups include: Myotis sp. (likely Daubenton's Myotis daubentonii bat given recorded call parameters and observed flight behaviour), noctule Nyctalus noctula, soprano pipistrelle Pipistrellus pygmaeus, common pipistrelle Pipistrellus and nathusius' Pipistrellus nathusii pipistrelle.
- Activity levels were highest along the River Thames and adjacent to woodland/tree-lines which is to be expected as this constitutes high quality foraging and commuting habitat for bats. Activity peaked during May and July, likely the result of bats intensively foraging prior to the maternity period and to replenish fat reserves in May (following hibernation). This may also be a result of that year's cohort adding to the number of bats using the site, as young bats become independent by July-August (Mitchell-Jones, 2004).
- Soprano pipistrelle and common pipistrelle bat calls made up the majority of the calls recorded (73.83% of total activity, including pipistrelle bats calling at 50 kHz) which is unsurprising as both species are common and widespread throughout the UK. Both of these species were recorded throughout the transect route, though higher numbers of soprano pipistrelle bats were noted. The second most frequently recorded species was the noctule bat, which was recorded foraging along the River Thames during most survey visits. Higher levels of activity from this species were also noted along the southern boundary of the East MRT Site, particularly in the south-west close to the Network Rail compounds where the bats were foraging on invertebrates attracted to the lighting along the edge of the compound. This species (as well as pipistrelle and Leisler's bats) can tolerate high levels of lighting and are known to use lighting as a foraging resource (feeding upon invertebrates attracted to the lights) (Rich and Longcore, 2005). Of the remaining three species / species groups encountered, only a very small number of calls were recorded.
- In addition to the species listed above, the following species were also identified during the automated static bat detector surveys: Leisler's Nyctalus leisleri, Nyctalus sp. (either Noctule or Leisler's bat), serotine Eptesicus serotinus; and Barbastelle Barbastella

barbastellus. Activity levels were highest in May with 1,500 calls (46.77% of all calls recorded). This is likely a result of bats undertaking increased foraging activity in preparation for the maternity period. Activity levels were also high in both August and September with 618 and 635 calls (19.27% and 19.80% of all calls recorded respectively). This is likely to be due to the presence of that year's cohort adding to the number of bats using the site as young bats become independent by July-August (Mitchell-Jones, 2004).

- Activity levels were higher at detector S1 (2,186 calls, 68.16% of calls) in comparison to S2 (1,021 calls, 31.84% of calls) despite detector S1 being located slightly further from the River Thames than S2. The woodland in which detector S1 was sited provides good quality foraging and commuting habitat in its own right, which likely accounts for these high levels of activity.

13.5.79 The bat surveys as summarised above, identified a range of species utilising the East MRT Site and surrounding area for foraging and commuting purposes. Although no roosting bats were identified, trees with potential to support roosts are present. When considered within the wider landscape context, however, the value of the East MRT Site for bats is reduced on account of the existing presence of the mainline railway immediately to the south (already limiting the north south connectivity) and the presence of more suitable habitat (both linear and extensive 'other' habitat) to the north. Considering the above, the assemblage of bat species utilising the East MRT Site is considered to be of importance within the **Local** context.

13.5.80 A preliminary bat activity survey (static detector) was completed for the TVP P&R Site in July 2015 (see Appendix 13.10). In total call recordings characteristic of three species were recorded during the surveys, namely common pipistrelle, soprano pipistrelle and noctule. In addition, a number of calls identified to genus level were recorded from an unidentified pipistrelle species *Pipistrellus* sp. These calls had a peak frequency of 50kHz, which could mean they were made by either common or soprano pipistrelle.

13.5.81 Following the initial preliminary bat survey, a suite of further bats surveys was undertaken at the TVP P&R Site. Full results are provided within Appendix 13.8: Broken Brow: Ecology Surveys, with a summary provided below:

- Bat activity surveys (transects): Four species of bat were recorded and passes were dominated by soprano pipistrelle (64% of all calls) and common pipistrelle (33% of all calls), with myotis sp. bats (less than 2% of all calls) and noctule bats (less than 2% of all calls). Most bat activity was recorded in the area of amenity grassland behind the Waterside Centre, with relatively high levels of activity also recorded along the river.
- Bat activity surveys (static detectors): Five species of bats were recorded with soprano pipistrelle bats accounting for 77% of all calls and common pipistrelle and pipistrelle spp. making up a further 16% of all calls. Low numbers of myotis bats, bats from the *Eptesicus*/*Nyctalus* guild (NSL) and *nathusius* 'pipistrelle were also identified. The highest proportion of activity was again identified within the area of amenity grassland behind the Waterside Centre.

13.5.82 It was noted that (although outside the boundary of the TVP P&R Site), early evening calls and bat activity were recorded from within proximity to the Waterside Centre. It was considered likely therefore that this building, or the adjacent storage shed, supports a roost of soprano pipistrelle bats.

13.5.83 Considering the results of the bats survey, the bat assemblage using the TVP P&R Site is considered to be of importance within the **Local** context. A detailed justification is provided within Appendix 13.8: Broken Brow: Ecology Surveys.

13.5.84 Although the Combined Site provides a greater area of habitat suitable for use by bats, given that the habitat types present are similar throughout, with the same external factors of note (such as lighting, proximity to the mainline railway etc.) it is considered unlikely that the assemblages of bat species will be any more extensive or notable than for the individual sites.

Further to this, the habitats provided by the Combined Site are small and of sub-optimal quality when considered within the context of the local area, i.e. located to the south of the River Thames, beyond which are more extensive areas of suitable foraging, commuting and roosting habitat. This conclusion is supported by the results of the activity surveys for each of the component parts, with largely comparable species (and proportions) identified within each of the Sites. As such, the bat assemblage using the Combined Site is considered to be of importance within the **Local** context.

#### *Great Crested Newts*

13.5.85 For reasons outlined within the Preliminary Ecological Appraisal (Appendix 13.3), great crested newt *Triturus cristatus* are considered unlikely to utilise the habitats present on site. This species is considered likely absent from the East MRT Site.

13.5.86 One pond was identified to be present within 500 m of the TVP P&R Site, with the TVP P&R Site itself identified to provide suitable terrestrial habitat for this species (see Appendix 13.7). A habitat Suitability Index (HSI) assessment of the pond identified it to provide 'good' habitat for great crested newts. Given the distance between this pond and the TVP P&R Site however, the absence of other waterbodies within 500 m, and the presence of the A3290 / Thames Valley Park Drive as a partial barrier, it is considered unlikely that terrestrial phase great crested newts would be present on the TVP P&R Site, in the unlikely event they do breed within the nearby pond.

13.5.87 Given the results of the above, great crested newts are considered likely absent from the Combined Site, and as such they are not considered further within this assessment.

#### *Hazel Dormouse*

13.5.88 Although the East MRT Site provides habitats which could be suitable for use by hazel dormouse *Muscardinus avellanarius*, these are limited in extent and isolated from more substantive areas of suitable habitat within the wider landscape. Furthermore, no records of hazel dormouse were identified from within 2 km of the East MRT Site. As such hazel dormice are considered likely absent from the East MRT Site.

13.5.89 Similarly, although the TVP P&R Site provides habitats which could be suitable for use by hazel dormouse, these are also limited in extent and isolated with no connectivity to the wider landscape (see Appendix 13.7). Furthermore, no records of hazel dormouse were identified from within 2 km of the TVP P&R Site. As such hazel dormice are considered likely absent from the TVP P&R Site.

13.5.90 Give the results of the above, hazel dormouse is considered likely absent from the Combined Site, and as such are not considered further within this assessment.

#### *Otter*

13.5.91 Although, the East MRT Site provides some habitat which may be suitable for terrestrial use by otter *Lutra* (for example, woodland edges and mature trees); due to the limited extent of habitat present, and high levels of anthropogenic disturbance in this context, the value of the East MRT Site for this species is greatly reduced (see Appendix 13.3 for further details). As

such, it is considered unlikely that any population of otter using the East MRT Site is of importance within the Local context or greater.

13.5.92 Habitats at the TVP P&R Site are unsuitable for use by otters (see Appendix 13.7).

13.5.93 Given the absence of habitat suitable for otter from within the TVP P&R Site, and the limited suitability of the habitats within the East MRT Site for otter, the importance of the Combined Site for this species is not considered of value at the Local context or greater.

#### *Badger*

13.5.94 For reasons outlined within the Preliminary Ecological Appraisal (Appendix 13.3), it is considered unlikely that badgers *Meles* use the East MRT Site as a primary resource for either sett building or foraging; particularly given the presence of the more suitable Network Rail corridor located immediately to the south, and the more extensive King's Meadow to the west. As such, it is considered unlikely that any population of badger using the East MRT Site is of importance within the Local context or greater.

13.5.95 Although the habitat within the TVP P&R Site is suitable for use by badgers, both for sett building and foraging, only one fresh scat was identified across a series of site visits. As such, the TVP P&R Site it does not appear to be regularly or heavily used by this species (see Appendix 13.7). It is considered unlikely that any population of badger using the TVP P&R Site is of importance within the Local context or greater.

13.5.96 Although the Combined Site provides a greater area of habitat suitable for use by badgers, given the only very limited evidence of badger activity and lack of any setts, it is unlikely that the Combined Site comprises a primary resource for either sett building or foraging for local badger clans. It is unlikely therefore that any population of badger using the Combined Site is of importance within the Local context or greater.

#### *Breeding Birds*

13.5.97 Although many of the habitat types within the East MRT Site are considered suitable for use by common and widespread breeding birds, typical of the semi-urban environment (including those species identified during the site walkover survey); use by a particularly notable or diverse assemblage is considered unlikely (as justified within the Preliminary Ecological Appraisal (see Appendix 13.3)). As such, the breeding bird assemblage within the East MRT Site is not considered to be of importance within the Local context or greater.

13.5.98 A single breeding bird survey visit was completed for the TVP P&R Site in 2015. This recorded a total of twenty-four species within the survey area. Of these, robin *Erithacus rubecula* was identified as a confirmed breeder and long-tailed tit *Aegithalos caudatus* a probable breeder. Fourteen species were identified as possible breeders and eight species were categorised as non-breeders. Of the species identified, eight are listed on Section 41 of the NERC Act, 2006, local Biodiversity Action Plans and / or are identified as 'Species of Conservation Concern'.

13.5.99 Taking into account the survey findings, the TVP P&R Site was not considered likely to constitute a key area of habitat for breeding birds, providing only very limited habitat suitable for breeding birds in the context of the wider landscape; in particular, the extensive areas of semi-natural habitat that occur to the north of the River Thames. Furthermore, the assemblage of breeding birds identified utilising the TVP P&R Site was relatively small in terms of the number of species, as well as the number of breeding pairs and associated territories. As such, the breeding bird assemblage within the TVP P&R Site is not considered to be of importance within the Local context or greater.

13.5.100 Although the Combined Site provides a greater area of habitat suitable for use by breeding birds, it is considered unlikely to support a particularly diverse assemblage, as identified for each of the component Sites above. As such, the breeding bird assemblage

within the Combined Site is not considered to be of importance within the Local context or greater.

#### *Reptiles*

13.5.101 Full results of the reptile surveys undertaken in 2016 at the East MRT Site are provided within Appendix 13.4: East MRT: Reptile Survey Report, with a summary provided below:

- Reptile presence / absence surveys revealed two species of reptile to use the East MRT Site; grass snake *Natrix* and slow worm *Anguis fragilis*. Only very low numbers of grass snakes were recorded (single individuals), with numbers of slow worms (including juveniles) indicating that a medium breeding population of this species is likely to be present on the East MRT Site and in the surrounding area. Reptiles were concentrated along the margins of grassland and scrub habitats, particularly close to an adjacent railway corridor in the central part of the East MRT Site, as well as in open areas to the east and west.

13.5.102 Considering the reptile species and populations present, the East MRT Site does not meet the selection criteria for a SSSI, Site of Importance for Nature Conservation (SINC) (or LWS) or key reptile site. Neither does it provide high quality habitat, particularly when considered in relation to other surrounding habitat (for example, habitat along the railway corridor to the south, or surrounding the Henley Road Gravel Pit to the north). Considering the above, the reptile population associated with the East MRT Site is considered to be of importance within the **Local** context.

13.5.103 Full results of the reptile surveys undertaken at the TVP P&R Site are provided within Appendix 13.8: Broken Brow: Ecology Surveys, with a summary provided below:

- A peak count of one female adult slow worm *Anguis fragilis* was identified on the TVP P&R Site. Juvenile slow worms were also identified (with a peak count of four), indicating the presence of a breeding population.

13.5.104 Although the report concludes that these findings are indicative of a 'medium' population size class, 'of significance at the local level', the guidelines used to inform this assessment have been revoked. Given that only a single adult slow worm has been recorded across a total of 11 survey visits, the slow worm population is considered to be 'low', and as such, is not considered to be of importance within the Local context or greater.

13.5.105 The Combined Site provides connecting habitat, suitable for use by reptiles, along the entire extent. Although it is not possible to identify a peak count of slow worm and grass snake across the Combined Site (on account of surveys within each element being completed at different times of year, with different refuge densities etc.), the on-site reptile population is considered to be of importance within the **Local** context. This is due to (i) the presence of two species of reptile; and (ii) a known medium population breeding population of slow worm within the East MRT portion of the Combined Site. This species (and equally grass snake) can move freely between the two component parts of the Combined Site, where suitable habitat prevails.

#### *Water Vole*

13.5.106 Given the nature of the banks of the River Thames and River Kennet throughout the extent of the East MRT Site (either reinforced or shallow and isolated from nearby suitable burrowing habitat), the limited presence and diversity of a suitable foodsource, and the high levels of anthropogenic disturbance, the East MRT Site was considered unsuitable for water

vole *Arvicola amphibius* throughout (see Appendix 13.3); as such, water vole are considered likely absent from the East MRT Site.

13.5.107 Similarly, the TVP P&R Site does not provide suitable habitat for water vole, lacking direct connectivity to waterways.

13.5.108 Given the above, water voles are considered likely absent from the Combined Site, and as such are not considered further within this assessment

#### *Invertebrates*

13.5.109 The East MRT Site provides a variety of terrestrial habitats which may support a broad diversity of invertebrates including protected and notable terrestrial species such as stag beetle *Lucanus cervus*, a species identified from the desk study. That said, due to the nature of habitats present, and the fact they are limited in extent, it is considered unlikely that the East MRT Site would support a notable site-wide invertebrate assemblage (as justified within the Preliminary Ecological Appraisal (see Appendix 13.3)). As such, the invertebrate assemblage within the East MRT Site is not considered to be of importance within the Local context or greater.

13.5.110 The TVP P&R Site similarly provides a variety of terrestrial habitats which may support a diversity of invertebrates including protected and notable terrestrial species such as stag beetle and cinnabar moth *Tyria jacobaeae* (with the latter species also identified from the desk study). Due to the small size of the TVP P&R Site however, it is considered unlikely it would support a notable site-wide invertebrate assemblage. As such, the invertebrate assemblage within the TVP P&R Site is not considered to be of importance within the Local context or greater.

13.5.111 Although the Combined Site provides a greater habitat resource for invertebrates, given that the broad habitat types are similar across the Combined Site, and still limited in extent in the context of other suitable habitat present within the wider area, it is considered unlikely that a notable invertebrate assemblage would be present. As such, the invertebrate assemblage within the Combined Site is not considered to be of importance within the Local context or greater.

#### *Hedgehog*

13.5.112 No evidence of use by European hedgehog *Erinaceas europeaus* was identified throughout the surveys completed at the East MRT Site. Further to this, although the East MRT Site provides a range of habitats which may be utilised by (including woodland, scrub and open grassland), should they be present within the vicinity, their suitability is reduced on account of the high level of management and other anthropogenic disturbance. As such, it is considered unlikely that any population of European hedgehogs using the East MRT Site is of importance within the Local context or greater.

13.5.113 Again, no evidence of use by European hedgehog was identified throughout the surveys completed across the TVP P&R Site. Furthermore, although habitat within the TVP P&R Site is suitable for use by European hedgehog, given the small size of the TVP P&R Site, it is considered unlikely that any population of European hedgehogs using the TVP P&R Site is of importance within the Local context or greater.

13.5.114 Although the Combined Site provides a greater habitat resource for hedgehog, should they be present within the local area, given the absence of evidence of current use, and the high levels of anthropogenic disturbance as identified above, it is considered unlikely that any

population of European hedgehog using the Combined Site is of importance within the Local context or greater.

#### Summary

- 13.5.115 A summary of protected and notable species considerations and their levels of importance are provided within Table 13.6 below.

Table 13.6: Protected and Notable Species

| Protected / Notable Species        | East MRT Site Geographic Context | TVP P&R Site Geographic Context | Combined Site Geographic Context |
|------------------------------------|----------------------------------|---------------------------------|----------------------------------|
| <b>Protected and Notable Flora</b> | <b>County</b>                    | N/A                             | <b>County</b>                    |
| <b>Bats</b>                        | <b>Local</b>                     | <b>Local</b>                    | <b>Local</b>                     |
| Great Crested Newt                 | N/A                              | N/A                             | N/A                              |
| Hazel Dormouse                     | N/A                              | N/A                             | N/A                              |
| Otter                              | Less than Local                  | N/A                             | Less than Local                  |
| Badger                             | Less than Local                  | Less than Local                 | Less than Local                  |
| Breeding Birds                     | Less than Local                  | Less than Local                 | Less than Local                  |
| <b>Reptiles</b>                    | <b>Local</b>                     | Less than Local                 | <b>Local</b>                     |
| Water Voles                        | N/A                              | N/A                             | N/A                              |
| Invertebrates                      | Less than Local                  | Less than Local                 | Less than Local                  |
| European hedgehog                  | Less than Local                  | Less than Local                 | Less than Local                  |

### Summary of Baseline

- 13.5.116 Given that a number of the ecological features of importance within the **Local** context or greater are wholly contained within The Coal, Kennetmouth and Kings Meadow East LWS, a combined assessment will be made for this feature, which includes consideration of the following:

- Broad-leaved Semi-Natural Woodland;
- Marginal Vegetation; and
- Protected and Notable Flora.

- 13.5.117 As such, the following ecological features of importance in the **Local** context or greater are considered further within the assessment(s):

- The Coal, Kennetmouth and Kings Meadow East LWS;
- Henley Road Gravel Pits LWS;
- Ancient Woodland;
- Habitat of Principal Importance;
- Running Water;

- Bats; and
- Reptiles.

13.5.118 Impacts on habitats and species valued at lower than **Local** level are not considered further within this assessment as they are not expected to experience significant effects that would form a material consideration during planning. Nevertheless, the information gained on habitat and species valued at lower than **Local** level has been used to determine the approach necessary to ensure that future development will be acceptable with reference to the planning and legal framework relating to ecological resources. Further consideration of these features is provided within the Mitigation and Enhancement Section of this chapter.

13.5.119 In the absence of development, and assuming the current management regimes remain in place, there is no reason to believe that baseline conditions would alter greatly in the foreseeable future. It is possible that should management significantly alter, (i.e. through increased or lapsed management), the value of habitats for use by protected and notable species could change, potentially benefitting some species, but limiting to others e.g. removal of scrub habitat may result in more open grassland habitat, suitable for use by reptiles; however largely removing habitat suitable for use by breeding birds. The below assessments are made against the baseline conditions, existing at the time of the assessment(s), which is considered a reasonable approach given the conditions identified.

## 13.6 Predicted Impacts

13.6.1 The following sections set out an assessment of predicted impacts and subsequent effects arising from the construction and/ operation of the:

- Proposed East MRT development; and
- Combined development.

### Identification of Impacts

13.6.2 In the absence of mitigation, a number of direct and indirect impacts with the potential to result in a significant effect on important ecological features have potential to occur as a result of construction and operation related activities.

13.6.3 Potential direct and indirect impacts that may occur as a result of construction phase activities, and in the absence of mitigation, include:

- Reduction in habitat extent, quality and connectivity within the extent of the works footprint. This could result in a permanent, adverse impact during construction, with resulting long-term effects;
- Construction of a physical barrier. This could result in a permanent adverse impact, caused during construction, but remaining through the lifespan of the structure (i.e. throughout operation). This impact could occur where the structure bisects habitat suitable for individual animals;
- Mortality/injury of individual animals. This could result in a permanent, adverse impact caused during construction only. This impact could occur in habitat suitable for individual animals;
- Changes in lighting levels during construction. Although the construction will be predominantly completed during daylight hours (with no artificial lighting required), there may be occasion where such lighting is necessary. This could result in a temporary, adverse impact and could occur in areas where compounds are located and / or night works take place and as such, would be of small magnitude and easily reversible following construction works;

- Changes in air quality, for example, through increased levels of dust creation during construction. This could result in a temporary, adverse impact, caused during construction only. The magnitude, extent and reversibility of such change is not possible to identify; and
  - Changes in water quality, for example, as a result of a pollution incident during construction, or through surface run-off carrying increased levels of waterborne pollutants, including chemicals and sediments. This could result in a temporary, adverse impact, caused during construction only. The magnitude, extent and reversibility of such change is not possible to identify.
- 13.6.4 Possible changes in noise levels as a result of construction that could result in a significant effects on the important ecological features of **Local** value or above are considered unlikely. Such impacts have therefore been discounted from further consideration within these assessments. Best practice noise mitigation measures will be incorporated into the Construction Environmental Management Plan (CEMP) nonetheless (see Embedded Mitigation Section below). These measures will remain in place throughout the duration of the construction.
- 13.6.5 Potential direct and indirect impacts that may occur as a result of operation phase activities and in the absence of mitigation, include:
- Severance / loss of foraging / commuting routes. This could result in a permanent, adverse impact. This impact could occur along the extent of development footprint, and into suitable habitat beyond;
  - Mortality/injury of individual animals. This could result in a permanent, adverse impact caused during operation. This impact could occur in habitat suitable for individual animals;
  - Hydrological changes including changes in water movement as a result of altered run-off patterns and/ or changes in water quality as a result of increased residential use. This impact could result in a permanent beneficial or adverse impact, the magnitude, extent and reversibility of such change is not possible to identify;
  - Changes in lighting levels. This could result in a permanent, adverse impact. This impact could occur along the extent of development footprint, and beyond where there is light spill; and
  - Increase in overshadowing. This could result in a permanent adverse impact. This impact could occur along the extent of the development footprint, where adjacent to particularly light sensitive habitats.
- 13.6.6 In addition, once the scheme is operational, improvements in habitat quality and connectivity could result in a permanent beneficial impact in the long-term. This impact could occur within the entire extent of the works footprint and beyond into the immediate vicinity; and as such, would be of magnitude within the vicinity of the works.
- 13.6.7 Possible changes in air quality and noise levels as a result of operation are considered unlikely to arise in significant effects on the important ecological features of **Local** value or

above. Such impacts have therefore been discounted from further consideration within this assessment. Further details relating to air quality are provided within Chapters 9 - Air Quality.

### Embedded Ecological Mitigation

- 13.6.8 Ecological input has been provided as the design of the proposed East MRT development has evolved; and as such, the scheme provides embedded mitigation for ecology, which has been discussed and agreed with the project design team, and RBC, where appropriate.
- 13.6.9 Further to this, the design of the permitted TVP P&R development includes ecological mitigation, as contained within the documentation submitted for the planning application for the TVP P&R Site (Planning Application 161596).
- 13.6.10 The following assessment(s) therefore consider the impacts and assess the effects of the schemes on important ecological features taking account these measure. This approach is in accordance with the CIEEM Guidelines which promotes the assessment of effects of the mitigated scheme only, where there is high confidence that integrated mitigation will be implemented; as in this situation.
- 13.6.11 The following embedded ecological mitigation will be provided for the proposed East MRT development:
- Implementation of a CEMP which will remain in place throughout the duration of the construction of the scheme. This will include best practice mitigation measures relating to:
    - o The control of construction phase noise;
    - o The control of construction phase lighting;
    - o The control of dust or other air pollutants that may arise as a result of the construction;
    - o The control of oil / chemical / chemical spillage or other water pollutants that may arise as a result of construction, including where working near to water.
  - Implementation of a comprehensive Ecological Mitigation and Management Strategy which will be created either sitting within the CEMP, or as a standalone document to sit alongside the CEMP. This will include measures in relation to ecology during the construction phase (including a targeted Reptile Mitigation Strategy and Bat Mitigation Strategy), and once the scheme is operational;
  - Implementation of an ecologically informed lighting strategy once the scheme is operational. This will include measures such as:
    - o Lighting columns along the northern extent of the route only;
    - o Lighting columns to provide directional lighting to face away from the more sensitive areas (including The Coal, Kennetmouth and Kings Meadow East LWS and Henley Road Pit LWS); and
    - o Inclusion of a shield on the back of lighting columns to further reduce any light backspill. Where there are areas which light spills along the southern side of the viaduct, front light shields will also be installed.
  - Implementation of the appropriate flood and environmental control measures, as defined within the Flood Risk Assessment (PBA, 2017). These will include:
    - o The use of a channel system (Althon or similar) to the west of the River Kennet. This will run on both sides of the cambered carriageway to provide on-site attenuation. The surface water will then be conveyed via a carrier drain northward to a point (adjacent to the realigned towpath) into an oil interceptor. To address level constraints, a

pumping station will to be installed which will pump the water to discharge into the Thames at a controlled greenfield rate via a flapped outfall.

- o The use a combined kerb drainage system to the east of the River Kennet. This will collect the surface water runoff to the low point (adjacent to the TVP P&R site). Surface water will then be conveyed via a carrier drain into an oil interceptor and then into a cellular storage attenuation system prior to discharging into the Thames at the greenfield runoff rate. The surface water attenuation measures will be designed to accommodate a 1 in 100-year storm plus allowance for climate change so if flooding occurs the storage will still be functional. At times the outfall will be submerged so a non-return flap valve will be installed on the outfall.
- Implementation of a Landscape and Ecology Strategy (see Chapter 12: Landscape and Visual, Figure 12.6 Landscape and Ecology Strategy, for further details). This will include:
  - o Habitat improvements across the East MRT Site; for example, inclusion of native and species rich habitat types, managed for biodiversity. Such habitat types include: acid grassland, woodland (within The Coal, Kennetmouth and Kings Meadow East LWS, see below), riparian habitat (both with The Coal, Kennetmouth and Kings Meadow East LWS, see below, and to the east of the River Kennet), tussocky grassland and trees.
  - o Habitat improvements specifically within the on-site portion of The Coal, Kennetmouth and Kings Meadow East LWS (totalling 1,438 m<sup>2</sup>); for example, additional native species planting; the targeted removal of invasive species both within the woodland (e.g. butterfly bush) and the marginal vegetation (e.g. Himalayan balsam); and the targeted management to encourage native species growth, increasing overall habitat biodiversity. This has been agreed in principal with the Parks Team at Reading Borough Council (see Appendix 13.1: Ecology Consultation).
  - o Habitat improvements within the off-site portion of The Coal, Kennetmouth and Kings Meadow East LWS (totalling 2.88 ha); to include those measures outlined above, but for an area extended to include the entire footprint of the LWS. Although off-site, this area is within RBC ownership and management. In addition to providing ecological mitigation, such habitat improvement will provide overall ecological enhancement. This has been agreed in principal with the Parks Team at Reading Borough Council (see Appendix 13.1: Ecology Consultation).
- Inclusion of species specific mitigation and enhancement measures, to include:
  - o Bat boxes on mature / semi-mature trees to be retained throughout the proposed East MRT development and within the off-site portion of The Coal, Kennetmouth and Kings Meadow East LWS;
  - o Bird boxes on mature / semi-mature trees to be retained throughout the proposed East MRT development and within the off-site portion of The Coal, Kennetmouth and Kings Meadow East LWS;
  - o Deadwood habitat and rubble piles.

## 13.7 Ecological Impact Assessment: Proposed East MRT Development

### The Coal, Kennetmouth and Kings Meadow East LWS

- 13.7.1 With the exception of The Coal, Kennetmouth and Kings Meadow East LWS and Henley Road Pit LWS (see below), the designated areas located within the Study Area, are located sufficiently far from the East MRT Site, and isolated from it by already highly urbanised land,

that effects arising as a result of the proposed East MRT development are not anticipated. No further consideration is made to these designated areas within this assessment.

- 13.7.2 An assessment of potential impact on The Coal, Kennetmouth and Kings Meadow East LWS is provided within this section, with an assessment of potential impact on Henley Road Pit LWS provided within the section below.

### Potential Effects

#### *Construction Phase Impacts*

- 13.7.3 With reference to The Coal, Kennetmouth and Kings Meadow East LWS citation and based on the results of the 2016 field survey (see Appendix 13.6: East MRT: Botanical Survey Report), key features (i.e. those of the greatest biodiversity or cultural/landscape value) within the on-site portion the LWS, and the area immediately surrounding (i.e. between the Tesco Car Park and the River Kennet as a whole), include:
- The presence of Loddon lily<sup>31</sup>;
  - The row of mature horse chestnut trees along the northern edge of BW1;
  - The mature poplar trees located in BW2; and
  - The mature crack willow trees on the western bank of the River Kennet.
- 13.7.4 Although of these, only mature black poplar trees located within BW2 are on-site, given the potential for indirect impacts on the key features of the LWS as a whole, consideration of this area as a whole has been made within the assessment.
- 13.7.5 The construction phase of the proposed East MRT development will result in the removal of up to 5,240 m<sup>2</sup> of habitat within The Coal, Kennetmouth and Kings Meadow East LWS. Habitat removal will predominantly affect the south-eastern end of the LWS, including areas of broad-leaved semi-natural woodland, within which the mature poplar trees are located (BW1 and BW2 – see Appendix 13.6), as well as the area of shrubs and ruderal vegetation (SS/TR1 – see Appendix 13.6) and scrub adjacent to the railway corridor (DS/IS1 – see Appendix 13.6). These areas are characterised by dense shrubs and secondary woodland. The row of mature horse chestnut trees along the northern edge of BW1 are located outside the proposed East MRT development boundary and will remain unaffected by the works.
- 13.7.6 The majority of the riparian trees and vegetation (including the crack willow pollards further south) associated with the Kennetmouth part of the LWS are also located outside the proposed East MRT development boundary and will not be affected, aside from the area immediately beneath the new bridge itself. Importantly, the riparian habitat at the confluence of the River Thames and River Kennet where Loddon lily was recorded is located outside the proposed East MRT development boundary and will remain unaffected by the works.
- 13.7.7 The construction phase of the proposed East MRT development will result in permanent reduction in the overall size of The Coal, Kennetmouth and Kings Meadow East LWS. However, the majority of key features associated with the LWS are located outside the proposed East MRT development boundary and will remain unaffected by the works.
- 13.7.8 To suitably control construction phase changes in air quality, water quality and lighting (which might otherwise impact on the LWS, or the protected and / or notable species it is likely to

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<sup>31</sup> Loddon lily *Leucojum aestivum* subsp. *Aestivum* (or summer snowflake as it is also known) is present within The Coal, Kennetmouth and Kings Meadow East LWS, immediately north of the MRT East Site. Loddon lily is included in the Vascular Plant Red Data List for Great Britain (Cheffings et al., 2005) as 'nationally scarce' (i.e. found in between 16 and 100 hectads in the Ordnance Survey National Grid). It is also identified as a Priority Species within Reading BAP.

support<sup>32</sup>); appropriate measures will be specified within the CEMP, and implemented as part of the proposed East MRT development (see Embedded Mitigation Measures section).

- 13.7.9 Considering the above, the construction phase of the proposed East MRT development will result in permanent reduction in the overall size of the on-site portion of The Coal, Kennetmouth and Kings Meadow East LWS; as such resulting in a **permanent adverse effect** on this important ecological feature. Given that the majority of key features associated with the LWS are located outside the proposed East MRT development boundary however, and will remain unaffected by the works, this is not anticipated to be significant beyond the **Local** context.

#### *Operation Phase Impacts*

- 13.7.10 Once operational, the proposed East MRT development will result in the overall improvement of up to 1,438 m<sup>2</sup> of on-site habitat within The Coal, Kennetmouth and Kings Meadow East LWS, with an additional 2.88 ha of improvements within the wider (and off-site) LWS. Further details are provided within the Embedded Mitigation Measures section.
- 13.7.11 To suitably control changes in water quality / quantity (which could otherwise adversely affect the habitats for which the LWS have been designated), appropriate control measures have been specified within the Flood Risk Assessment. These will be implemented as part of the proposed East MRT development. Further details are provided within the Embedded Mitigation Measures section.
- 13.7.12 As identified above, although the designation for The Coal, Kennetmouth and Kings Meadow East LWS relates namely to habitat interest features (which, in themselves, would be unaffected by changes in lighting), protected and notable species (including light sensitive species) will be reliant on these habitats and as such, have been considered within the context of The Coal, Kennetmouth and Kings Meadow East LWS. Given that the operational lighting design has been ecologically informed however, with measures included to mitigate for impacts on local wildlife, the lighting of the scheme, once operational, will be suitably controlled such that adverse effects on species as a result of increased light spill are not anticipated (see Embedded Mitigation Measures section). Further consideration relating to bats and lighting specifically is provided within the assessment for 'Bats' below.
- 13.7.13 Once operational, there will be a permanent improvement in the quality of habitat present within The Coal, Kennetmouth and Kings Meadow East LWS, resulting in a **permanent beneficial effect** on this important ecological feature. Given that there will be an overall reduction in size of The Coal, Kennetmouth and Kings Meadow East LWS associated with the construction phase of the proposed East MRT development however, (see above); this is not anticipated to be significant beyond the **Local** context.

### **Henley Road Gravel Pits LWS**

- 13.7.14 Given the location of Henley Road Gravel Pits LWS (approximately 100 m north of the East MRT Site), an assessment of potential impact on this site is provided below. Given that much of the Henley Road Gravel Pits LWS comprises the same area as the closest parcel of the

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<sup>32</sup> Whilst the designation for The Coal, Kennetmouth and Kings Meadow East LWS relates namely to habitat interest features (which, in themselves, would be unaffected by changes in lighting), protected and notable species (including light sensitive species) will be reliant on these habitats and as such, have been considered within the context of The Coal, Kennetmouth and Kings Meadow East LWS. Further consideration relating to bats and lighting specifically is provided within the assessment for 'Bats' below

HPI 'eutrophic standing water' to the East MRT Site, this habitat type too will be considered within this assessment.

#### *Construction Phase Impacts*

- 13.7.15 No direct impacts on Henley Road Gravel Pits LWS / eutrophic standing water HPI are anticipated as a result of the construction phase of the proposed East MRT development.
- 13.7.16 To suitably control that construction phase changes in air quality or water quality (which might otherwise impact the habitats within the LWS, including the eutrophic standing water HPI), appropriate measures will be specified within the CEMP, and implemented as part of the proposed East MRT development (see Embedded Mitigation Measures section).
- 13.7.17 Although Henley Road Gravel Pits LWS is identified to support a range of water fowl species, which may be sensitive to changes in lighting levels, it is a sufficient distance from the proposed East MRT development that adverse effects on these species as a result of construction phase light spill are not anticipated.
- 13.7.18 Considering the above, and subject to the implementation of the CEMP, **no significant effects** on Henley Road Gravel Pits LWS / eutrophic standing water HPI are anticipated as a result of the construction phase of the proposed East MRT development.

#### *Operation Phase Impacts*

- 13.7.19 No direct impacts on Henley Road Gravel Pits LWS / eutrophic standing water HPI are anticipated as a result of the proposed East MRT development, once operational.
- 13.7.20 To suitably control that changes in water quality / quantity (which could adversely affect the habitats (including eutrophic standing water) on which the waterfowl (identified within the designation for the LWS) rely), appropriate control measures have been specified within the Flood Risk Assessment (as detailed within the Embedded Mitigation Measures section). These will be implemented as part of the proposed East MRT development.
- 13.7.21 Although Henley Road Gravel Pits LWS is identified to support a range of water fowl species, which may be sensitive to changes in lighting levels, it is a sufficient distance from the proposed East MRT development that adverse effects on these species as a result of increased light spill once the scheme is operational are not anticipated.
- 13.7.22 Considering the above, and subject to the implementation of appropriate hydrological control measures, **no significant effects** on Henley Road Gravel Pits LWS / eutrophic standing water HPI are anticipated as a result of the proposed East MRT development, once operational.

### **Ancient Woodland**

- 13.7.23 The single portion of Ancient Woodland identified to be present within the Study Area is located sufficiently far from the East MRT Site (approximately 960 m north and located on an island within the Henley Gravel Pits), that effects arising as a result of the proposed East MRT development are not anticipated. No further consideration is made to Ancient Woodland within this assessment.

### **Habitats of Principal Importance**

- 13.7.24 Of the HPI types identified to be present within 2 km of the East MRT Site, parcels of the following are either present on site or directly connected to it, via the River Thames:
- Lowland mixed deciduous woodland (located within the on-site portion of The Coal, Kennetmouth and Kings Meadow East LWS);

- Lowland fens and reedbeds (located downstream of the East MRT Site); and
- Eutrophic standing waters (with the closest parcel opposite the East MRT Site, located within The Henley Road Gravel Pits LWS).

13.7.25 As the lowland mixed deciduous woodland has been considered within the earlier assessment relating to The Coal, Kennetmouth and Kings Meadow East LWS, and the eutrophic standing water has been considered within the earlier assessment relating to Henley Road Gravel Pits LWS; an assessment of potential impacts on 'lowland fens' and 'reedbeds' only is provided within the sections below.

13.7.26 Effects on the remaining HPI parcels located within 2 km of the East MRT Site as a result of the proposed East MRT development are not anticipated as these are sufficiently isolated from the East MRT Site such that indirect impacts are highly unlikely to occur. No further consideration is made to these HPI within this assessment.

### Potential Effects

#### *Construction Phase Impacts*

13.7.27 No direct impacts on 'lowland fens' and 'reedbeds' are anticipated as a result of the construction phase of the proposed East MRT development.

13.7.28 To suitably control that construction phase changes in air quality or water quality (which might otherwise impact these HPI), appropriate measures will be specified within the CEMP, and implemented as part of the proposed East MRT development (see Embedded Mitigation Measures section).

13.7.29 Considering the above, and subject to the implementation of the CEMP, **no significant effects** on 'lowland fens' and 'reedbeds' are anticipated as a result of the construction phase of the proposed East MRT development.

#### *Operation Phase Impacts*

13.7.30 No direct impacts on 'lowland fens' and 'reedbeds' are anticipated as a result of the proposed East MRT development, once operational. Furthermore, subject to the implementation of appropriate control measures as specified within the Flood Risk Assessment (see details within the Embedded Mitigation Measures section), **no significant effects** on 'lowland fens' and 'reedbeds' are anticipated as a result of the proposed East MRT development, once operational.

### Running Water

13.7.31 The River Kennet passes south - north through the East MRT Site, under the footprint of the works. Furthermore, the River Thames is located immediately adjacent to the East MRT Site, to the north.

### Potential Effects

#### *Construction Phase Impacts*

13.7.32 To suitably control that construction phase changes in air quality or water quality (which might otherwise impact the 'running water' habitat), appropriate measures will be specified within the CEMP, and implemented as part of the proposed East MRT development (see Embedded

Mitigation Measures section). As such, **no significant effects** on 'running water' habitat are anticipated as a result of the construction phase of the proposed East MRT development.

#### *Operation Phase Impacts*

- 13.7.33 No direct impacts on the 'running water' habitat are anticipated as a result of the proposed East MRT development, once operational.
- 13.7.34 To suitably control that changes in water quality / quantity (which could adversely affect the 'running water' habitat), appropriate control measures have been specified within the Flood Risk Assessment (as detailed within the Embedded Mitigation Measures section). These will be implemented as part of the proposed East MRT development.
- 13.7.35 Once operational the proposed East MRT development will comprise a structure 316 m in length. Where this crosses the River Kennet, or is located immediately adjacent to the River Thames (i.e. at the 'pinch point' to the east of the River Kennet), overshadowing of the running water habitat beneath or immediately adjacent will occur.
- 13.7.36 The interest features of the running water habitat along this section of the River Kennet are already very limited on account of the high levels of overshadowing associated with the adjacent railway bridge and horseshoe bridge, the reinforcement of the river banks and an absence of in-channel vegetation. The interest features of the running water habitat along this section of the River Thames are similarly limited, through reinforcement of the river banks and with an absence of in-channel vegetation. Furthermore, given the linear east – west nature of the scheme, it is anticipated that the extent of the shadow will be limited to areas below or within the immediate vicinity of the structure only; limiting their impact. As such, where overshadowing does occur, the effect on the running water habitat is unlikely to be significant on account of both the limited time this overshadowing will occur, the limited extent of this shadowing, and the nature of the running water habitat to be affected.
- 13.7.37 Considering the above, and subject to the implementation of appropriate hydrological control measures, **no significant effects** on 'running water' habitat are anticipated as a result of the proposed East MRT development, once operational.

### **Bats**

- 13.7.38 Habitats on-site and immediately adjacent to it are utilised by a range of foraging and commuting bat species. Although no roosting bats were identified, trees with potential to support roosts are also present.

### **Potential Effects**

#### *Construction Phase Impacts*

- 13.7.39 The survey results have shown that the East MRT Site provides a good quality foraging and commuting resource for an assemblage of at least eight species of bats.
- 13.7.40 Of the habitats present, and within the immediate surrounding, the tree-lines, woodland parcels and nearby water courses were identified to be of most value to foraging and commuting bats. The construction phase of the proposed East MRT development will result in the removal of 2.56 ha of habitat within the footprint of the Site, of which up to 2,634 m<sup>2</sup> comprises woodland, with tree lines also present. This will result in a permanent reduction in the overall extent of habitat valuable to foraging and commuting bats; and as such, a permanent adverse effect on foraging and commuting populations of bats. The East MRT Development will further affect (indirectly) 814 m<sup>2</sup> of the River Kennet, where this waterway passes underneath the route alignment. The affected habitat (in terms of direct and indirect) represents only a small proportion of the overall area of these habitat types present on-site

and within the immediate vicinity and overall habitat connectivity is to be maintained throughout construction, albeit reduced in overall extent.

- 13.7.41 Although no roosting bats were identified during the survey work, current best practice guidance states that *'From what is known about the ecology of tree-roosting bats, it is arguable that all trees with bat roosting potential should be considered part of a resource that will be used at one time or another by tree roosting bats in order to determine the extent of impacts. Survey work on individual trees may confirm presence but is unlikely to conclusively confirm absence. Precautionary measures are likely to still be essential during works even where surveys have not identified occupancy'*. To minimise the risk of killing and/or injury of bats during construction work is avoided (namely through the removal of trees with potential to support roosting bats) appropriate measures as included with the Bat Mitigation Strategy for the proposed East MRT development will be adhered to.
- 13.7.42 Given the time that is likely to elapse between this assessment and the proposed East MRT development commencing, it is likely such measures will require the following: the two trees and one tree group assessed as having high roosting potential will be reassessed through conducting a pre-felling dawn return to roost surveys during the bats' active period (i.e. May to October) to confirm the current presence/likely absence of roosting bats. Furthermore, those trees assessed as having Low-Medium potential to support roosting bats and which will require felling to facilitate the proposed development will need to be removed with reference to good practice guidance (Collins, 2016). Any additional trees required for removal (for example, to ensure compliance with health and safety recommendations) will also be assessed and subject to further survey as appropriate.
- 13.7.43 To mitigate for the loss of potential roosting habitat (albeit if unused at the time of survey), bat boxes will be installed on mature / semi mature trees to be retained throughout the development, and within the off-site portion of The Coal, Kennetmouth and Kings Meadow East LWS.
- 13.7.44 Common and soprano pipistrelle bats, noctule, Leisler's and serotine bats all tolerate relatively high light levels, often foraging on invertebrates attracted to street-lighting. As such no adverse significant effects on these species are anticipated as a result of the use of construction phase lighting along the proposed East MRT development.
- 13.7.45 A number of species however, (including *Myotis* bats, barbastelle bats and long-eared bats (identified from within 2 km of the East MRT Site during the desk study) prefer to roost, commute and forage within areas with very low levels of lighting or preferably no artificial lighting. The CEMP (as described within the Embedded Ecological Mitigation section) will include prescriptions with regards to construction phase lighting; particularly in relation to bats, and will be implemented as part of the proposed East MRT development.
- 13.7.46 Considering the above, and in spite of a Bat Mitigation Strategy being implemented during the construction phase of works, given an absence of specific mitigation associated with the construction phase habitat loss, there remains a residual **adverse effect** on the local bat assemblage utilising the East MRT Site for the duration of the construction period. This is potentially significant within the **Local** context.

#### *Operation Phase Impacts*

- 13.7.47 Once operational, the proposed East MRT development will include a variety of habitat suitable for use by foraging and commuting bats. These habitats will include:
- A 5,676 m<sup>2</sup> strip of tussocky grassland between the route and the adjacent railway corridor along the entire extent of the proposed East MRT development;
  - 3,278 m<sup>2</sup> of acid grassland and wildflower planting at the western extent of the East MRT Site (a proportion of which is included within the LWS, see below);

- 2,805 m<sup>2</sup> of tussocky grassland and tree planting alongside the River Thames, within the eastern portion of the East MRT Site; and
- 1,438 m<sup>2</sup> of improved on-site habitat within the on-site portion of The Coal, Kennetmouth and Kings Meadow East LWS.

13.7.48 Habitat improvements (as outlined above) will be extended to the portion of The Coal, Kennetmouth and Kings Meadow East LWS beyond the East MRT Site boundary (totalling 2.88 ha). This has been agreed in principle with the Parks Team at Reading Borough Council (see Appendix 13.1: Ecology Consultation).

13.7.49 Furthermore, habitat improvements will be included within the River Thames immediately to the north of the eastern portion of the East MRT Site. These will comprise rafts of planted riparian species in front of the existing hard engineering, totalling 420 m<sup>2</sup> and will provide a 'semi-natural' edge habitat adding floristic diversity (and therefore likely invertebrate diversity and an increased food source) to the River Thames.

13.7.50 Subject to the implementation of the interventions above, and once new growth has become established, there will be improvements in quality and diversity of habitat and retention in overall habitat connectivity, in spite of the construction phase losses. As such, no significant effects on the foraging and commuting bats are anticipated as a result of habitat changes once the scheme is operational.

13.7.51 A study undertaken by Kerth and Melber in 2009 investigated the barrier effects that a motorway would have on foraging barbastelle and Bechstein's bats. The authors of this report stated that due to similarities in morphology/ecology the findings of their study would also be applicable to noctule and Leisler's bats (in the case of the barbastelle bat results) and other species of *Myotis* bats (in the case of Bechstein's bat results). This study focussed on a motorway which, although a significantly larger barrier than the proposed East MRT development, provides a useful indication of how bats can be affected by linear transport features. This study found that the ecology and physiology of the two different bat species affected their ability to cross roads. Barbastelle bats (a hawking aerial species) were found to cross over the road with far greater regularity, with Bechstein's bats found to use underpasses rather than fly over the road (Kerth & Melber, 2009). Therefore, the physiology and ecology of different bat species leads bats to be affected by severance of commuting habitats to a greater or lesser extent.

13.7.52 Aerial hawking species (pipistrelle bats, noctule, Leisler's, serotine and barbastelle bats) will often fly over open habitats, with the *Nyctalus* (noctule and Leisler's) bats known to commute at greater heights of around 10-70 m above ground level (Russ, 1999). As such, the proposed East MRT development is not considered to be a barrier to these species, as they are adapted to flying at high levels and over more open landscapes. Pipistrelle bats do tend to prefer to fly close to vegetation to avoid predation but will regularly cross roads.

13.7.53 The UK bat species adapted to gleaning invertebrates from vegetation (*Myotis* bats and long-eared bats) fly at low levels often within dense vegetation (including along hedgerows), with Daubenton's bats favouring riverine habitats. Given that such vegetation is largely absent extending in a north-south direction from the East MRT Site into the wider landscape; and that the north-south connectivity via vegetation is already severely compromised by the presence of the adjacent mainline railway; the likelihood of these species preferentially foraging and commuting in a north south direction across the proposed East MRT development, is low. Furthermore, and namely in relation to Daubenton's bats, given that the stretch of the River Kennet from the confluence with the River Thames south already contains four structures within c. 150 m, addition of the proposed East MRT development, spanning the River Kennet at the same elevation as the existing adjacent rail bridge is equally unlikely to significantly alter the foraging or commuting conditions for Daubenton's bats.

13.7.54 Notwithstanding the ecology of the bat species known to be associated with the East MRT site, and their foraging preferences, there remains a risk that mortality of individuals may occur

as a result of collision with vehicles. This risk is however considered low due to the fact that no buses will run between 00.00 and 04.00, those that will be running, will be travelling at speeds of less than 30 mph, with no more than 30 passes per hour; movements that are both comparable to the adjacent train movements.

- 13.7.55 Common and soprano pipistrelle bats, noctule, Leisler's and serotine bats all tolerate relatively high light levels. As such the use of street-lighting along the proposed East MRT development is predicted to have a negligible or limited adverse impact on these species. A number of species (including *Myotis* bats, barbastelle bats and long-eared bats) prefer to roost, commute and forage within areas with very low levels of lighting or preferably no artificial lighting. Therefore, the lighting design for the scheme once operational has been ecologically informed (as summarised within the Embedded Ecological Mitigation section), ensuring consideration for local bat species has been appropriately made. Specifically, lux levels of no more than 1 lux will occur along the extent of the watercourses.
- 13.7.56 As such, **no significant effects** on the bat assemblage known to commute, forage and potentially roost within the East MRT Site are anticipated as a result of the operational phase of the proposed East MRT development.

## Reptiles

- 13.7.57 Only very low numbers of grass snakes were recorded (single individuals) with numbers of slow worms (including juveniles) indicating that a medium-sized breeding population of this species is likely to be present on site and in the surrounding area.

## Potential Effects

### *Construction Phase Impacts*

- 13.7.58 Reptiles were concentrated along the margins of grassland and scrub habitats, particularly close to an adjacent railway corridor in the central part of the East MRT Site as well as in open areas to the east and west. The construction phase of the proposed East MRT development will result in the removal of a total of 2.55 ha of habitat, which will include habitat suitable for use by grass snake and slow worms. Although the affected habitat represents only a proportion of the overall area of these habitat types present on-site and within the immediate vicinity the overall on-site habitat resource will nonetheless be reduced as a result of construction.
- 13.7.59 In addition to the above, the establishment of the construction footprint (i.e. as a result of habitat removal and the establishment of a works area through fencing etc.), will result in a physical barrier to the movement of reptiles in a north-south direction. Although specific mitigation will not be provided for construction phase habitat loss, construction of the proposed East MRT development will be phased ensuring that temporary severance of north – south connectivity will not occur across the entire footprint of the scheme at once.
- 13.7.60 To minimise the risk of killing and/or injury of reptiles during the construction works is avoided (namely during the period when site clearance works are being undertaken) an appropriate Reptile Mitigation Strategy will be developed to avoid the construction phase effects on reptiles. This will include appropriate working methods to avoid incidental mortality and injury of reptiles during clearance of areas of suitable reptile habitat during construction and a strategy for the retention and protection of suitable habitat post-construction. This will be included within the Ecological Mitigation and Management Strategy. Further details are provided within the Mitigation section of this chapter.
- 13.7.61 Given habitat suitable for reptile species is to be retained on-site and is present immediately adjacent to the site, this will likely target sensitive vegetation clearance to encourage reptiles to leave areas to be developed prior to works commencing, with habitat then retained in an 'unsuitable condition' for the duration of the works. Following this, and once habitat measures

(as outlined above) have become established, populations will be allowed to recolonise naturally. Further details are provided within the Mitigation section of this chapter.

13.7.62 Considering the above, and in spite of a Reptile Mitigation Strategy being implemented during the construction phase of works, given an absence of specific mitigation associated with construction phase habitat loss and temporary albeit phased severance of north – south connectivity, there remains a residual **adverse effect** on populations of grass snake and slow worm utilising the East MRT Site for the duration of the construction period. This is potentially significant within the **Local** context.

#### *Operation Phase Impacts*

13.7.63 Once operational, the proposed East MRT development will include a variety of habitat suitable for use by reptiles. These habitats will include:

- A 5,676 m<sup>2</sup> strip of tussocky grassland along the entire extent of the East MRT Site, between the route and the adjacent railway corridor;
- 3,278 m<sup>2</sup> of acid grassland and wildflower planting at the western extent of the East MRT Site (a proportion of which is included within the LWS, see below);
- 2,805 m<sup>2</sup> of tussocky grassland alongside the River Thames, within the eastern portion of the East MRT Site; and
- 1,438 m<sup>2</sup> of improved on-site habitat within the on-site portion of The Coal, Kennetmouth and Kings Meadow East LWS.

13.7.64 Habitat improvements (as outlined above) will also be extended to the portion of The Coal, Kennetmouth and Kings Meadow East LWS beyond the East MRT Site boundary (totalling 2.88 ha). This has been agreed in principle with the Parks Officer at Reading Borough Council (see Appendix 13.1: Ecology Consultation). Specific improvements of value to the local reptile population comprise:

- Selective removal of the shrub layer (particularly non-native species) to increase light levels and promote growth of diverse ground flora;
- Improvement of the riparian corridor;
- Installation of deadwood features and rubble piles to be created from trees / materials removed to facilitate works.

13.7.65 Subject to the implementation of the measures as described above, and once new growth has become established, there will be improvements in quality and diversity of habitat for reptiles, in spite of the construction phase losses.

13.7.66 Once operational the proposed East MRT development will comprise a structure 316 m in length. This will begin at ground level in the west and will increase in height along a solid embankment to the west of the River Kennet. From the River Kennet east, the structure will comprise a concrete and stainless steel structure, on vertical columns. Although north – south connectivity will be retained once the scheme is operational, this will be via reptile tunnels and sub-optimal habitat only; resulting in some limitation to the north – south movement of reptiles when compared to the existing baseline.

13.7.67 To supplement the reptile tunnels and habitat crossing points, guide walls will be installed as appropriate within the proposed East MRT development. These act to direct reptiles towards the tunnels, ensuring their ability to move north – south across the proposed East MRT development is maintained, whilst preventing them from climbing on to the carriageway and reducing the risk that injury or mortality of individuals may occur as a result of vehicle accidents once the scheme is operational.

13.7.68 Subject to the implementation of habitat interventions, reptile tunnels and guide walls across the entire East MRT Site and the wider The Coal, Kennetmouth and Kings Meadow East

LWS, as appropriate, and once new growth has become established, **no significant effects** on the reptile population associated with the East MRT site is anticipated to arise once the scheme is operational.

## 13.8 Ecological Impact Assessment: Combined Development

### The Coal, Kennetmouth and Kings Meadow East LWS

- 13.8.1 With the exception of The Coal, Kennetmouth and Kings Meadow East LWS and Henley Road Pit LWS, the designated areas located within the Study Area, are located sufficiently far from the Combined Site, and isolated from it by already highly urbanised land, that effects arising as a result of the combined development are not anticipated. No further consideration is made to these designated areas within this assessment.
- 13.8.2 An assessment of potential impact on The Coal, Kennetmouth and Kings Meadow East LWS is provided within this section, with an assessment of potential impact on Henley Road Pit LWS provided within the section below.

#### Potential Effects

##### *Construction Phase Impacts*

- 13.8.3 The construction phase of the combined development will result in permanent reduction in the overall size of The Coal, Kennetmouth and Kings Meadow East LWS (see paragraphs 13.7.3 - 13.7.7 for details). However, the majority of key features for which the LWS is noted will be retained. No specific mitigation will be provided for construction phase habitat loss.
- 13.8.4 To suitably control construction phase changes in air quality, water quality and lighting (which might otherwise impact on the LWS, or the protected and / or notable species it is likely to support<sup>33</sup>), appropriate measures will be specified within CEMP documents<sup>34</sup>, and implemented as part of the combined development.
- 13.8.5 Considering the above, the construction phase of the combined development will result in permanent reduction in the overall size of the on-site portion of The Coal, Kennetmouth and Kings Meadow East LWS; as such resulting in a **permanent adverse effect** on this important ecological feature. Given that the majority of key features associated with the LWS are located outside the combined development boundary however, and will remain unaffected by the works, this is not anticipated to be significant beyond the **Local** context.

##### *Operation Phase Impacts*

- 13.8.6 Once operational, the combined development will result in the overall improvement of up to 1,438 m<sup>2</sup> of on-site habitat within The Coal, Kennetmouth and Kings Meadow East LWS, with an additional 2.88 ha of improvements within the wider (and off-site) LWS. Further details are provided within the Embedded Mitigation Measures section.
- 13.8.7 To suitably control changes in water quality / quantity (which could otherwise adversely affect the habitats for which the LWS have been designated), appropriate control measures have been specified within the Flood Risk Assessment (see the Embedded Ecological Mitigation section). These will be implemented as part of the proposed East MRT development. Given

<sup>33</sup> Whilst the designation for The Coal, Kennetmouth and Kings Meadow East LWS relates namely to habitat interest features (which, in themselves, would be unaffected by changes in lighting), protected and notable species (including light sensitive species) will be reliant on these habitats and as such, have been considered within the context of The Coal, Kennetmouth and Kings Meadow East LWS. Further consideration relating to bats and lighting specifically is provided within the assessment for 'Bats' below

<sup>34</sup> In addition to the CEMP relating to the 'proposed East MRT development', a CEMP will be produced in relation to the permitted P&R development (Planning Application 161596 – Planning Condition 19).

the isolation of the TVP P&R Site from The Coal, Kennetmouth and Kings Meadow East LWS, no further considerations specific to the TVP P&R Site are considered necessary in relation to this important ecological feature.

- 13.8.8 As identified above, although the designation for The Coal, Kennetmouth and Kings Meadow East LWS relates namely to habitat interest features (which, in themselves, would be unaffected by changes in lighting), protected and notable species (including light sensitive species) will be reliant on these habitats and as such, have been considered within the context of The Coal, Kennetmouth and Kings Meadow East LWS. Given that the operational lighting design has been ecologically informed however, with measures included to mitigate for impacts on local wildlife, the lighting of the scheme, once operational, will be suitably controlled such that adverse effects on species as a result of increased light spill are not anticipated (see Embedded Mitigation Measures section). Given the isolation of the TVP P&R Site from The Coal, Kennetmouth and Kings Meadow East LWS, no further considerations specific to the TVP P&R Site are considered necessary in relation to this important ecological feature.
- 13.8.9 Further consideration relating to bats and lighting specifically is provided within the assessment for 'Bats' below.
- 13.8.10 Once operational, there will be a permanent improvement in the quality of habitat present within The Coal, Kennetmouth and Kings Meadow East LWS, resulting in a **permanent beneficial effect** on this important ecological feature. Given that there will be an overall reduction in size of The Coal, Kennetmouth and Kings Meadow East LWS associated with the construction phase of the combined development however, (see above); this is not anticipated to be significant beyond the **Local** context.

### Henley Road Gravel Pits LWS

- 13.8.11 Given the location of Henley Road Gravel Pits LWS (approximately 100 m north of the Combined Site), an assessment of potential impact on this site is provided below. Given that much of the Henley Road Gravel Pits LWS comprises the same area as the closest parcel of the HPI 'eutrophic standing water' to the Combined Site, this habitat type too will be considered within this assessment.

#### *Construction Phase Impacts*

- 13.8.12 No direct impacts on Henley Road Gravel Pits LWS / eutrophic standing water HPI are anticipated as a result of the construction phase of the combined development.
- 13.8.13 To suitably control construction phase changes in air quality or water quality (which might otherwise impact the habitats within the LWS, including the eutrophic standing water HPI), appropriate measures will be specified within the CEMP documents<sup>35</sup>, and implemented as part of the combined development.
- 13.8.14 Although Henley Road Gravel Pits LWS is identified to support a range of water fowl species, which may be sensitive to changes in lighting levels, it is a sufficient distance from the

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<sup>35</sup> In addition to the CEMP relating to the 'proposed East MRT development', a CEMP will be produced in relation to the permitted P&R development (Planning Application 161596 – Planning Condition 19).

combined development that adverse effects on these species as a result of construction phase light spill are not anticipated.

- 13.8.15 Considering the above, and subject to the implementation of the CEMP documents, **no significant effects** on Henley Road Gravel Pits LWS are anticipated as a result of the construction phase of the combined development.

#### *Operation Phase Impacts*

- 13.8.16 No direct impacts on Henley Road Gravel Pits LWS are anticipated as a result of the combined development, once operational.
- 13.8.17 To suitably control changes in water quality / quantity (which could adversely affect the habitats (including eutrophic standing water) on which the waterfowl (identified within the designation for the LWS) rely), appropriate control measures have been specified within the Flood Risk Assessment (as detailed within the Embedded Mitigation Measures section). These will be implemented as part of the combined scheme. Given that the TVP P&R element of the Combined Site is set back from the River Thames, and as such, is isolated from it by existing vegetation and the Thames Path, appropriate control measures have been specified for the East MRT element of the Combined Site only.
- 13.8.18 Although Henley Road Gravel Pits LWS is identified to support a range of water fowl species, which may be sensitive to changes in lighting levels, it is a sufficient distance from the combined development that adverse effects on these species as a result of increased light spill once the scheme is operational are not anticipated.
- 13.8.19 Considering the above, and subject to the implementation of appropriate hydrological control measures, **no significant effects** on Henley Road Gravel Pits LWS / eutrophic standing water HPI are anticipated as a result of the combined development, once operational.

### **Ancient Woodland**

- 13.8.20 The single portion of Ancient Woodland identified to be present within the Study Area is located sufficiently far from the Combined Site (approximately 960 m north at its closest point, and located on an island within the Henley Gravel Pits), that effects arising as a result of the combined development are not anticipated. No further consideration is made to Ancient Woodland within this assessment.

### **Habitats of Principal Importance**

- 13.8.21 Of the HPI types identified to be present within 2 km of the Combined Site, parcels of the following are either present on site or directly connected to it, via the River Thames:
- Lowland mixed deciduous woodland (located within the on-site portion of The Coal, Kennetmouth and Kings Meadow East LWS);
  - Lowland fens and reedbeds (located downstream of the Combined Site); and
  - Eutrophic standing waters (with the closest parcel opposite the Combined Site, located within The Henley Road Gravel Pits LWS).
- 13.8.22 As the lowland mixed deciduous woodland has been considered within the earlier assessment relating to The Coal, Kennetmouth and Kings Meadow East LWS, and the eutrophic standing water has been considered within the earlier assessment relating to Henley Road Gravel Pits LWS; an assessment of potential impacts on 'lowland fens' and 'reedbeds' only is provided within the sections below.
- 13.8.23 Effects on the remaining HPI parcels as a result of the combined development are not anticipated as these are sufficiently isolated from the Combined Site such that indirect impacts

are highly unlikely to occur. No further consideration is made to these HPI within this assessment.

### Potential Effects

#### *Construction Phase Impacts*

- 13.8.24 No direct impacts on 'lowland fens' and 'reedbeds' are anticipated as a result of the construction phase of the combined development.
- 13.8.25 To suitably control construction phase changes in air quality or water quality (which might otherwise impact these HPI), appropriate measures will be specified within the CEMP documents<sup>36</sup>, and implemented as part of the combined development (see Embedded Mitigation Measures section).
- 13.8.26 Considering the above, and subject to the implementation of the CEMP documents, **no significant effects** on 'lowland fens' and 'reedbeds' are anticipated as a result of the construction phase of the combined development.

#### *Operation Phase Impacts*

- 13.8.27 No direct impacts on 'lowland fens' and 'reedbeds' are anticipated as a result of the combined development, once operational. Furthermore, subject to the implementation of appropriate measures as specified within the Flood Risk Assessment (see details within the Embedded Mitigation Measures section), **no significant effects** on 'lowland fens' and 'reedbeds' are anticipated as a result of the combined development, once operational. Given that the TVP P&R element of the Combined Site is set back from the River Thames, and as such, is isolated from it (and therefore from influencing the 'lowland fens' and 'reedbeds') by existing vegetation and the Thames Path, appropriate control measures have been specified for the East MRT element of the Combined Site only.

### Running Water

- 13.8.28 The River Kennet passes south – north through the Combined Site, under the footprint of the works. Furthermore, the River Thames is located immediately adjacent to the Combined Site, to the north.

### Potential Effects

#### *Construction Phase Impacts*

- 13.8.29 To suitably control construction phase changes in air quality or water quality (which might otherwise impact the 'running water' habitat), appropriate measures will be specified within the CEMP documents<sup>37</sup>, and implemented as part of the combined development (see Embedded

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<sup>36</sup> In addition to the CEMP relating to the 'proposed East MRT development', a CEMP will be produced in relation to the permitted P&R development (Planning Application 161596 – Planning Condition 19).

<sup>37</sup> In addition to the CEMP relating to the 'proposed East MRT development', a CEMP will be produced in relation to the permitted P&R development (Planning Application 161596 – Planning Condition 19).

Mitigation Measures section). As such, **no significant effects** on 'running water' habitat are anticipated as a result of the construction phase of the combined development.

#### *Operation Phase Impacts*

- 13.8.30 No direct impacts on the 'running water' habitat are anticipated as a result of the combined development, once operational.
- 13.8.31 To suitably control changes in water quality / quantity (which could adversely affect the 'running water' habitat), appropriate control measures have been specified within the Flood Risk Assessment (as detailed within the Embedded Mitigation Measures section). Given that the TVP P&R element of the Combined Site is set back from the River Thames, and as such, is isolated from it (and therefore the running water habitat) by existing vegetation and the Thames Path, appropriate control measures have been specified for the East MRT element of the Combined Site only.
- 13.8.32 Once operational the combined development will include a structure 316 m in length. Where this crosses the River Kennet, or is located immediately adjacent to the River Thames (i.e. at the 'pinch point' to the east of the River Kennet), overshadowing of the running water habitat beneath or immediately adjacent will occur.
- 13.8.33 The interest features of the running water habitat along this section of the River Kennet are already very limited on account of the high levels of overshadowing associated with the adjacent railway bridge and horseshoe bridge, the reinforcement of the river banks and an absence of in-channel vegetation. The interest features of the running water habitat along this section of the River Thames are similarly limited, through reinforcement of the river banks and with an absence of in-channel vegetation. Furthermore, given the linear east – west nature of the scheme, it is anticipated that the extent of the shadow will be limited to areas below or within the immediate vicinity of the structure only; limiting their impact. As such, where overshadowing does occur, the effect on the running water habitat is unlikely to be significant on account of both the limited time this overshadowing will occur, the limited extent of this shadowing, and the nature of the running water habitat to be affected.
- 13.8.34 Considering the above, and subject to the implementation of appropriate hydrological control measures, **no significant effects** on 'running water' habitat are anticipated as a result of the combined development, once operational.

### **Bats**

- 13.8.35 Habitats on-site and immediately adjacent to it are utilised by a range of foraging and commuting bat species. Although no roosting bats were identified, trees with potential to support roosts are also present. Further to this, the Waterside Centre and / or the adjacent storage shed (off-site but immediately adjacent) are anticipated to support a roost of soprano pipistrelle bats.

### **Potential Effects**

#### *Construction Phase Impacts*

- 13.8.36 The survey results have shown that the Combined Site provides, in part, a high quality foraging and commuting resource for an assemblage of at least 8 species of bats.
- 13.8.37 Of the habitats present and within the immediate surrounding the outgrown hedgerow / dense scrub, tree-lines, woodland parcels and nearby water courses were identified to be of most value to foraging and commuting bats. The construction phase of the combined development will result in the removal of a total of 4.46 ha of habitat within the footprint of the Combined Site, of which 2.10 ha comprises the existing outgrown hedgerow / dense scrub and woodland parcels, with tree lines also present. It will further affect (indirectly) 814 m<sup>2</sup> of the River Kennet

where this watercourse passes underneath the route alignment. The affected habitat represents only a proportion of the overall area of these habitat types present on-site and within the immediate vicinity however; meaning that overall habitat connectivity is to be maintained throughout construction, albeit reduced in overall extent. No specific mitigation will therefore be provided for construction phase habitat loss.

13.8.38 As detailed within paragraphs 13.7.41 -13.7.43, a Bat Mitigation Strategy will be implemented to minimise the risk of killing and/or injury of bats (namely through the removal of trees with potential to support roosting bats).

13.8.39 The Waterside Centre and / or the adjacent storage shed are anticipated to support a roost of soprano pipistrelle bats. Given that these are located outside the footprint of the combined development however no further consideration is made.

13.8.40 Finally, the CEMP documents<sup>38</sup> will include prescriptions with regards to construction phase lighting; particularly in relation to bats. These will be implemented as part of the combined development.

13.8.41 Considering the above, and in spite of a Bat Mitigation Strategy being implemented during the construction phase of works, given an absence of specific mitigation associated with the construction phase habitat loss, there remains a residual **adverse effect** on the local bat assemblage utilising the Combined Site for the duration of the construction period. This is potentially significant within the **Local** context.

#### *Operation Phase Impacts*

13.8.42 Once operational, the combined development will include a variety of habitat suitable for use by foraging and commuting bats. These habitats are described within paragraph 13.7.47 above, with additional shrub, tree and hedgerow planting within the TVP P&R Site.

13.8.43 Habitat improvements will be extended to the portion of The Coal, Kennetmouth and Kings Meadow East LWS beyond the Combined Site boundary (totalling 2.88 ha). This has been agreed in principle with the Parks Team at Reading Borough Council (see Appendix 13.1: Ecology Consultation).

13.8.44 Furthermore, habitat improvements will be included within the River Thames immediately to the north of the eastern portion of the Combined Site. These will comprise rafts of planted riparian species in front of the existing hard engineering, totalling 420 m<sup>2</sup> and will provide a 'semi-natural' edge habitat adding floristic diversity (and therefore likely invertebrate diversity and an increased food source) to the River Thames.

13.8.45 For the reasons outlined within paragraphs 13.7.51 – 13.7.53 above, no adverse effects on the north – south foraging and commuting of bat species is anticipated as a result of route severance caused by the combined development, once operational. The risk of mortality of individuals as a result of vehicle collision is also considered to be negligible.

13.8.46 For the reasons set out within paragraph 13.7.55 above, effects on the local bat assemblage as a result of changes in lighting are not anticipated as a result of the proposed East MRT section of the combined development. Further to this, ecological input has been provided into the lighting design for the TVP P&R element of the combined development, the detail of which

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<sup>38</sup> In addition to the CEMP relating to the 'proposed East MRT development', a CEMP will be produced in relation to the permitted P&R development (Planning Application 161596 – Planning Condition 19).

is due to be captured within a planning condition associated with the scheme (Planning Application 161596 – Planning Condition 16).

- 13.8.47 As such, **no significant effects** on the bat assemblage known to commute, forage and potentially roost within the Combined Site are anticipated as a result of the operational phase of the combined development.

## Reptiles

- 13.8.48 The Combined Site supports only very low numbers of grass snakes. Numbers of slow worms recorded (including juveniles) indicate that a medium breeding population of this species is likely to be present on the Combined Site and in the surrounding area.

## Potential Effects

### *Construction Phase Impacts*

- 13.8.49 Reptiles were concentrated along the margins of grassland and scrub habitats, particularly close to an adjacent railway corridor in the central and eastern portions of the Combined Site, as well as in open areas to the east and to the north. The construction phase of the combined development will result in the removal of a total of 4.46 ha of habitat, which will include habitat suitable for use by grass snake and slow worms. Although the affected habitat represents only a proportion of the overall area of these habitat types present on-site and within the immediate vicinity the overall on-site habitat connectivity will be lost albeit temporarily as a result of construction.
- 13.8.50 In addition to the above, the establishment of the construction footprint (i.e. as a result of habitat removal and the establishment of a works area through fencing etc.), will result in a physical barrier to the movement of reptiles in a north-south direction.
- 13.8.51 Although specific mitigation will not be provided for construction phase habitat loss, construction of the combined development will be phased, ensuring that temporary severance of north – south connectivity will not occur across the entire footprint of the scheme at once.
- 13.8.52 To minimise the risk of killing and/or injury of reptiles during the construction work (namely during the period when site clearance works are being undertaken), an appropriate Reptile Mitigation Strategy will be developed for the Combined Site to avoid the construction phase effects on reptiles. This will include appropriate working methods to avoid incidental mortality and injury of reptiles during clearance of areas of suitable reptile habitat during construction and a strategy for the retention and protection of suitable habitat post-construction. This will be included within the Ecological Mitigation and Management Strategy. Further details are provided within the Mitigation section of this chapter.
- 13.8.53 Considering the above, and in spite of a Reptile Mitigation Strategy being implemented during the construction phase of works, given an absence of specific mitigation associated with construction phase habitat loss and temporary severance of north – south connectivity, there remains a residual **adverse effect** on populations of grass snake and slow worm utilising the Combined Site for the duration of the construction period. This is potentially significant within the **Local** context.

### *Operation Phase Impacts*

- 13.8.54 Once operational, the combined development will include a variety of habitat suitable for use by reptiles. These habitats are described within paragraph 13.7.63, with additional areas of

retained habitat adjacent to the railway corridor and protected by a retaining wall and post and rail fence.

- 13.8.55 Habitat improvements (as outlined above) will be extended to the portion of The Coal, Kennetmouth and Kings Meadow East LWS beyond the East MRT Site (totalling 2.88 ha). This has been agreed in principle with the Parks Team at Reading Borough Council (see Appendix 13.1: Ecology Consultation). Specific improvements of value to the local reptile population are outlined in paragraph 13.7.64.
- 13.8.56 Once operational the combined development will include a structure approximately 316 m in length, along with the TVP P&R car park. Details of the structure are set out within paragraph 3.7.66. Although north – south connectivity will be retained once the Combined Scheme is operational, this will be via reptile tunnels and sub-optimal habitat only; resulting in some limitation to the north – south movement of reptiles when compared to the existing baseline.
- 13.8.57 To supplement the reptile tunnels and habitat crossing points, guide walls will be installed as appropriate within the proposed East MRT development. These act to direct reptiles towards the tunnels, ensuring their ability to move north – south across the proposed East MRT development is maintained, whilst preventing them from climbing on to the carriageway and reducing the risk that injury or mortality of individuals may occur as a result of vehicle accidents once the scheme is operational.
- 13.8.58 Subject to the implementation of habitat interventions, reptile tunnels and guide walls across the Combined Site and the wider The Coal, Kennetmouth and Kings Meadow East LWS, as appropriate, and once new growth has become established, **no significant effects** on the reptile population associated with the Combined Site is anticipated to arise once the scheme is operational.

## 13.9 Summary of Residual Effects

- 13.9.1 Table 13.7 sets out the residual effects remaining for the important ecological features considered within these EcIA's.

Table 13.7: Summary of Residual Effects

| Important Ecological Feature                  | Proposed East MRT Development |                              | Combined Development      |                              |
|-----------------------------------------------|-------------------------------|------------------------------|---------------------------|------------------------------|
|                                               | Construction                  | Operation                    | Construction              | Operation                    |
| The Coal, Kennetmouth & Kings Meadow East LWS | Permanent adverse (Local)     | Permanent beneficial (Local) | Permanent adverse (Local) | Permanent beneficial (Local) |
| Henley Road Gravel Pits LWS                   | None                          | None                         | None                      | None                         |
| Ancient Woodland                              | N/A                           | N/A                          | N/A                       | N/A                          |
| HPI                                           | None                          | None                         | None                      | None                         |
| Running Water                                 | None                          | None                         | None                      | None                         |
| Bats                                          | Temporary adverse (Local)     | None                         | Temporary adverse (Local) | None                         |
| Reptiles                                      | Temporary adverse (Local)     | None                         | Temporary adverse (Local) | None                         |

## 13.10 Cumulative Effects

13.10.1 A number of recent planning applications are present within 1 km of the proposed East MRT development / combined development from within the last 3 years. Of these, none are identified as requiring assessment against the proposed East MRT development or combined development as no likely significant in-combination (cumulative) adverse effects on the 'important ecological features' identified are anticipated. This is mainly on account of:

- The types of developments identified, which mainly relate to buildings, as opposed to transport:
  - o Change of use / conversion developments (e.g. from existing residential units / offices to new residential units);
  - o New residential / other accommodation developments; and
  - o New office / retail development.
- The location of these developments within Reading Town Centre itself, therefore isolated from the Combined Site; and
- Their anticipated isolation from habitats or features which support the important ecological features as identified and assessed within this chapter.

## 13.11 Mitigation and Enhancement

13.11.1 Mitigation measures as required in relation to important ecological features are set out within the assessment section above. Where appropriate, further details are provided within this section.

13.11.2 Further to this, the East MRT Site and / or the Combined Site are known to support populations of other protected species. Whilst impacts on these have not been formally assessed, owing to the geographic framework at which they are considered to be important (i.e. less than 'Local'), the proposed East MRT development in isolation, and / or the combined development will be required to implement appropriate mitigation with the regards to the legislation by which these species are protected relevant to planning policy.

13.11.3 A CEMP will be developed for implementation during the construction phase of the proposed East MRT development. This will set out avoidance and mitigation measures that should be implemented to avoid or minimise impacts on ecological features (both 'important' or otherwise legally protected). The CEMP will be secured by a pre-commencement planning condition and can be expected to include measures relating to the control of dust and other pollutants and recommendations for the timing of construction works.

13.11.4 A comprehensive Ecological Mitigation and Management Strategy will be created either sitting within the CEMP, or as a standalone document to sit alongside the CEMP. The Ecological Mitigation and Management Strategy will link with the landscape strategy for the proposed East MRT scheme and / or Combined Scheme and will be developed as the detailed proposals are brought forward and planning conditions discharged with newly created habitats designed and managed to make best use of their ecological value, particularly for species that are biodiversity priorities for Reading and Wokingham.

13.11.5 This Ecological Mitigation and Management Strategy will cover detailed elements of the proposed East MRT development and / or combined development, such as timing of works, appropriate work practices, species licensing (if necessary) and details of proposed habitat creation and management. The Ecological Mitigation and Management Strategy will also be

secured by a pre-commencement planning condition and can be expected to include the following elements:

- Details on important ecological areas and how they are to be protected throughout construction, procedures for site clearance and specification for ecological fencing (e.g. trees, woodland / LWS and aquatic protection zones);
- Ecological input to the control of construction phase lighting;
- Prescriptions in relation nesting birds to avoid killing, injury of breeding birds, eggs and young and destruction of active nests. This will include recommendations for seasonal timing and appropriate working methods;
- Prescriptions in relation to bats to avoid killing, injury and disturbance to roosting bats (i.e. a 'Bat Mitigation Strategy'). This will include recommendations in relation to felling trees with potential to support roosting bats, for example, re-survey prior to felling, and precautionary measures should buildings within the TVP P&R Site be removed or otherwise affected by the scheme (e.g. through increased disturbance);
- Prescriptions in relation to reptiles to avoid killing and /or injury to reptile species as a result of site clearance and landscaping works, and restoration of suitable habitats following the completion of works (i.e. a Reptile Mitigation Strategy'). This will include recommendations for seasonal timing and appropriate working methods (see details below);
- Prescriptions in relation to wild mammals (to include precautionary measures in relation to badgers and hedgehogs) to avoid unnecessary suffering to wild mammals, including by crushing and asphyxiating. These will largely include recommendations for appropriate working methods;
- Details of the on-site and wider habitat improvement measures, including the nature, extent, and ecological input to the specification of native seed mixes and species for landscape planting;
- Details of enhancement measures for species, to include the specification and location of features such as bat and bird boxes/bricks, deadwood habitat and reptile hibernacula; and
- Prescriptions in relation to the management of land within The Coal, Kennetmouth and Kings Meadow East LWS. The aim of this will be to promote biodiversity within retained areas of woodland, scrub and grassland habitat and within areas of new habitat creation.

#### **Draft Reptile Mitigation Strategy**

13.11.6 Both slow worms and grass snakes prefer areas with a mixture of habitats, including areas of dense cover, as well as more open sites for basking. Across the Combined Site, areas used by reptiles include rough grassland, the margins between grassland and scrub and taller ruderal vegetation within scrub. Maintaining or establishing this 'mosaic' of habitats both on-site and within adjacent, off-site receptor areas is therefore important prior to any translocation of reptiles. Although this can be achieved through appropriate landscaping and or habitat management, the following would need to be considered:

- Whilst The Coal, Kennetmouth and Kings Meadow East LWS provides suitable habitat for reptile dispersal, it lacks the complex mosaic of optimal habitat. Therefore, management of the vegetation within The Coal, Kennetmouth and Kings Meadow East LWS, both within the Combined Site and areas outside the scheme boundary to the west (but still within the LWS) would be required prior to encouraging reptiles to disperse. This would include selective clearance and cutting back of scrub to open up some parts of the ground to promote the growth of grasses and shorter vegetation. Further enhancements could include the creation of log and/or brash piles to provide suitable refuges for reptiles.
- Although it may also be possible to utilise the railway corridor for reptile dispersal, given that this land falls outside the Combined Site and is within Network Rail control, it is

unlikely any formal management agreement would be possible. As such, this area has been excluded from consideration as a suitable receptor area within the current draft Reptile Mitigation Strategy.

- 13.11.7 Once habitat improvements have been implemented within The Coal, Kennetmouth and Kings Meadow East LWS, a two phase approach to the clearance of the Combined Site for reptiles is likely to be required.

*Land West of the River Kennet*

- 13.11.8 For land to the west of the River Kennet, it will be possible to encourage reptiles to naturally disperse into the adjacent The Coal, Kennetmouth and Kings Meadow East LWS using habitat manipulation. This would involve sequential reduction of cover via careful strimming or cutting to gradually reduce the height and remove cover for reptiles. This would likely need to be done under ecological supervision, with any reptiles discovered during the process removed by hand to the area of receptor habitat. Cutting/trimming would be undertaken from west to east, starting at the furthest point from the receptor habitat and moving toward it, to encourage dispersal in that direction. Initial cuts should be to a height of around 10 to 15 cm, with vegetation progressively removed to a very short height (i.e. ground level). Once cleared, it will be imperative that land within the construction footprint is maintained in unsuitable conditions to deter reptiles from recolonising ahead of development works. The removal of the top layer of soil (likely under ecological supervision) would help with this. Reptile-proof fencing may also be useful along the boundary to prevent re-colonisation, particularly if on-going vegetation management is not practicable.

*Land East of the River Kennet*

- 13.11.9 For land to the east of the River Kennet, it may be necessary to translocate the reptile population from the works footprint into The Coal, Kennetmouth and Kings Meadow East LWS. Such translocation would typically involve the use of reptile-proof fencing to isolate areas, with reptiles being captured from within the fencing using a combination of artificial refugia and habitat management. In this case, as the Combined Site contains discrete areas of suitable habitat it may be practical to create a series of individual compartments as opposed to fencing off the entire construction footprint. Full details would be contained within a Reptile Mitigation Strategy, however the following steps would likely be required:

- The installation of reptile-proof fencing to isolate suitable habitat on site (such that reptile cannot re-colonise from outside) and the deployment of artificial refugia within fenced compartments (at high density; e.g. 100 refugia per hectare of suitable habitat);
- The checking of suitable habitat and refugia from within the fenced areas over a series of days, with any reptiles found being captured and removed to the receptor site. For a medium population of slow worms, a minimum capture period of 70 days is recommended (HGBI, 1998). However, the duration of trapping could be shorter than this (with agreement from the RBC/WBC) depending on trapping results (i.e. if an extended period is reached during which no reptiles are caught, despite favourable weather conditions). A minimum of 5 suitable days during which no reptiles are caught should be reached before trapping can cease;
- In combination with trapping, once approximately half of the trapping days have been completed, habitat manipulation within fenced compartments can be employed to focus trapping effort. This could involve partially reducing vegetation within compartments to a short height (e.g. 10 to 15 cm) via careful strimming/cutting to facilitate capture of reptiles and focus animals in remaining areas of taller vegetation; and
- Once a sufficient trapping period has been reached the site can be 'destructively searched'. This involves first reducing vegetation to ground level under the supervision of an ecologist (with any remaining reptiles discovered captured and removed) followed by the removal of the top layer of soil; e.g. using an excavator fitted with a toothed bucket. This should also be completed under ecological supervision.

## 13.12 Monitoring

- 13.12.1 The CIEEM Guidelines prescribe the requirement for monitoring of mitigation, compensation and / or enhancement measures where there are uncertainties in predicting the effectiveness of measures, or mitigation packages are novel i.e. to determine whether the predicted efficiency of the mitigation meets expectations.
- 13.12.2 Given that the measures prescribed within this Chapter are standard mitigation procedures, and considering that no significant adverse effects are anticipated as a result of the proposed East MRT / combined development(s), monitoring measures are not required.

## 13.13 Summary

- 13.13.1 This chapter presents the ecological baseline of the East MRT Site in isolation, and the Combined Site. It provides an evaluation of the ecological features relevant to each of these Sites. It has been informed by a combination of baseline ecological desk study and survey data.
- 13.13.2 This chapter describes the methods used to determine the impacts of the proposed East MRT development and the combined development on current baseline conditions; the mitigation measures incorporated within the scheme(s) to prevent, reduce or offset any adverse effects; and any likely residual effects after these measures have been employed.
- 13.13.3 The habitats within the East MRT Site and Combined Site are generally of low intrinsic ecological value; with broadleaved semi-natural woodland, running water and marginal vegetation (namely associated with the on-site LWS and adjacent water courses) the only habitat types of importance in the Local context or greater. With the exception of slow worm and grass snake populations, and roosting, foraging and commuting bats; protected or otherwise notable species recorded within and adjacent to the East MRT Site and / or Combined Site are not considered to be of importance within the 'Local' context or greater, and as such, have not been considered within the current assessment(s).
- 13.13.4 There are a number of designated areas of nature conservation importance within the wider area, including The Coal, Kennetmouth and Kings Meadow East LWS and Henley Road Gravel Pits LWS.
- 13.13.5 In summary, important ecological features that have been considered within this chapter include:
- The Coal, Kennetmouth and Kings Meadow East LWS;
  - Henley Road Gravel Pits LWS;
  - Ancient Woodland;
  - Habitat of Principal Importance;
  - Running Water;
  - Bats; and
  - Reptiles.
- 13.13.6 This assessment informs a full planning application and includes for implementation of a number of measures in relation to species protection and habitat enhancement. These measures relate to the approach to works affecting habitats within The Coal, Kennetmouth and Kings Meadow East LWS, habitats suitable for reptiles and bats, the timing of clearance of vegetation that may be used by nesting birds, the approach to general welfare measures

during construction, and ecological input relating to the habitats to be retained and provided as part of the proposed East MRT development and combined development.

13.13.7 Although the construction phase of the proposed East MRT / combined development will result in residual adverse effects on a small number of important ecological features at the local level; once operational, the development provides enhancement opportunities for protected and notable species namely through the enhancement and appropriate management of The Coal, Kennetmouth and Kings Meadow East LWS. This, in the long-term, will deliver high quality, biodiverse habitat on site and within the surrounding area.

## 13.14 References

- Bibby C.J., Burgess N.D., Hill D.A., Mustoe S.H. (2000). Bird Census Techniques. Second Edition. Elsevier Ltd.
- Bosky Trees (2016): Arboricultural Impact Assessment & Tree Protection Plan
- Cheffings, C.M. & Farrell, L. (Eds), Dines, T.D., Jones, R.A., Leach, S.J., McKean, D.R., Pearman, D.A., Preston, C.D., Rumsey, F.J., Taylor, I. (2005). The Vascular Plant Red Data

## 14 Archaeology and Heritage

### 14.1 Introduction

- 14.1.1 This chapter summarises the assessment of the likely significant effects of the construction and operational phases of the East MRT development in terms of the historic environment. It incorporates the results of a historic environment desk based assessment prepared by Orion Heritage Ltd (Appendix 14-1).
- 14.1.2 The historic environment includes a wide range of features resulting from human intervention in the landscape, varying in scope from buried archaeological remains to late 20th century industrial and military structures. It can be divided into the following two categories: Archaeology which comprises of Scheduled Monuments (SMs) and non-designated archaeological heritage assets and Built Heritage which comprises of listed buildings (all grades), registered parks and gardens (all grades), conservation areas, historic battlefields and World Heritage Sites.
- 14.1.3 The chapter describes the assessment methodology; the legislative and policy framework, the baseline conditions at the application site and surroundings; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed. This chapter has been prepared by Orion Heritage Ltd.

### 14.2 Legislation, Planning Policy and Guidance

#### Legislation

##### **Ancient Monuments & Archaeological Areas Act 1979**

- 14.2.1 The Ancient Monuments & Archaeological Areas Act 1979 (as amended) protects the fabric of Scheduled Monuments, but does not afford statutory protection to their settings.

##### **Planning (Listed Building and Conservation Areas) Act 1990**

- 14.2.2 The Planning (Listed Building and Conservation Areas) Act 1990 sets out broad policies and obligations relevant to the protection of listed buildings and conservation areas and their settings.

- 14.2.3 Section 66(1) states:

*'In considering whether to grant planning permission for development which affects a listed building or its setting, the local planning authority or, as the case may be, the Secretary of State shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses'.*

- 14.2.4 Section 69 of the Act requires local authorities to define as conservation areas any 'areas of special architectural or historic interest the character or appearance of which it is desirable to preserve or enhance' and Section 72 gives local authorities a general duty to pay special attention 'to the desirability of preserving or enhancing the character or appearance of that area' in exercising their planning functions. These duties are taken to apply only within a

Conservation Area. The Act does not make specific provision with regard to the setting of a Conservation Area that is provided by the policy framework outlined below.

### **National Planning Policy Framework (NPPF) & Planning Practice Guidance (PPG)**

- 14.2.5 Government policy in relation to the historic environment is outlined in section 12 of the National Planning Policy Framework (NPPF), entitled Conserving and Enhancing the Historic Environment. This provides guidance for planning authorities, property owners, developers and others on the conservation and investigation of heritage assets. Overall, the objectives of Section 12 of the NPPF can be summarised as seeking the:
- Delivery of sustainable development
  - Understanding the wider social, cultural, economic and environmental benefits brought by the conservation of the historic environment;
  - Conservation of England's heritage assets in a manner appropriate to their significance, and
  - Recognition of the contribution that heritage assets make to our knowledge and understanding of the past.
- 14.2.6 Section 12 of the NPPF recognises that intelligently managed change may sometimes be necessary if heritage assets are to be maintained for the long term.
- 14.2.7 Paragraph 128 states that planning decisions should be based on the significance of the heritage asset and that the level of detail supplied by an applicant should be proportionate to the importance of the asset and should be no more than sufficient to understand the potential impact of the proposal upon the significance of that asset.
- 14.2.8 Heritage Assets are defined in Annex 2 as: A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. Heritage asset includes designated heritage assets and assets identified by the local planning authority (including local listing).
- 14.2.9 Archaeological Interest is defined as a heritage asset which holds or potentially could hold evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.
- 14.2.10 Designated *Heritage Assets* comprise: World Heritage Sites, Scheduled Monuments, Listed Buildings, Protected Wreck Sites, Registered Park and Gardens, Registered Battlefields and Conservation Areas.
- 14.2.11 *Significance* is defined as: The value of a heritage asset to this and future generations because of its heritage interest. This interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting.
- 14.2.12 Setting is defined as: The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may

make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.

- 14.2.13 The NPPF is supported by the Planning Policy Guidance (PPG). In relation to the historic environment, paragraph 18a-001 states that:

*“Protecting and enhancing the historic environment is an important component of the National Planning Policy Framework’s drive to achieve sustainable development (as defined in Paragraphs 6-10). The appropriate conservation of heritage assets forms one of the ‘Core Planning Principles’.”*

- 14.2.14 Paragraph 18a-002 makes a clear statement that any decisions relating to listed buildings and their settings and conservation areas must address the statutory considerations of the Planning (Listed Buildings and Conservation Areas) Act 1990 as well as satisfying the relevant policies within the National Planning Policy Framework and the Local Plan.

- 14.2.15 Paragraph 18a-013 outlines that the assessment of the impact of a proposed development on the setting of a heritage asset needs to take into account and be proportionate to the significance of the asset being considered and the degree to which the proposed development enhances or detracts from the significance of the asset and the ability to appreciate the significance.

- 14.2.16 The PPG outlines that although the extent and importance of setting is often expressed in visual terms, it can also be influenced by other factors such as noise, dust and vibration. Historic relationships between places can also be an important factor stressing ties between places that may have limited or no intervisibility with each other. This may be historic as well as aesthetic connections that contribute or enhance the significance of one or more of the heritage assets.

- 14.2.17 Paragraph 18a-013 concludes:

*“The contribution that setting makes to the significance of the heritage asset does not depend on there being public rights or an ability to access or experience that setting. This will vary over time and according to circumstance. When assessing any application for development which may affect the setting of a heritage asset, local planning authorities may need to consider the implications of cumulative change. They may also need to consider the fact that developments which materially detract from the asset’s significance may also damage its economic viability now, or in the future, thereby threatening its on-going conservation.”*

- 14.2.18 The key test in NPPF paragraphs 132-134 is whether a proposed development will result in substantial harm or less than substantial harm. However, substantial harm is not defined in the NPPF. Paragraph 18a-017 of the PPG provides additional guidance on substantial harm. It states:

*“What matters in assessing if a proposal causes substantial harm is the impact on the significance of the heritage asset. As the National Planning Policy Framework makes clear, significance derives not only from a heritage asset’s physical presence, but also from its setting. Whether a proposal causes substantial harm will be a judgment for the decision taker, having regard to the circumstances of the case and the policy in the National Planning Policy Framework. In general terms, substantial harm is a high test, so it may not arise in many cases. For example, in determining whether works to a listed building constitute substantial harm, an important consideration would be whether the adverse impact seriously affects a key*

*element of its special architectural or historic interest. It is the degree of harm to the asset's significance rather than the scale of the development that is to be assessed."*

- 14.2.19 Paragraph 134 of the NPPF outlines that where a proposed development results in less than substantial harm to the significance of a heritage asset, the harm arising should be weighed against the public benefits accruing from the proposed development. Paragraph 18a-020 of the PPG outlines what is meant by public benefits:

*"Public benefits may follow from many developments and could be anything that delivers economic, social or environmental progress as described in the National Planning Policy Framework (Paragraph 7). Public benefits should flow from the proposed development. They should be of a nature or scale to be of benefit to the public at large and should not just be a private benefit. However, benefits do not always have to be visible or accessible to the public in order to be genuine public benefits."*

- 14.2.20 In considering any planning application for development, the planning authority will be mindful of the framework set by government policy, in this instance the NPPF, by current Development Plan Policy and by other material considerations.

### Local Planning Policy

- 14.2.21 The East MRT development is within the Reading Borough Council (RBC) Local Planning Authority area, as well as the Wokingham Borough Council (WBC).
- 14.2.22 Local Plan policy in RBC is currently provided by the adopted 2008 Core Strategy (updated 2015) and the Sites and Detailed Policies Document, which was adopted in 2012 and updated in 2015. RBC has only one heritage-specific policy in its current Local Plan:

#### **Policy CS33: Protection and Enhancement of the Historic Environment**

*Historic features and areas of historic importance and other elements of the historic environment, including their settings, will be protected and where appropriate enhanced.*

*This will include:*

- Listed Buildings;
- Conservation Areas;
- Other features with local or national designation, such as sites and features of archaeological importance, and historic parks and gardens.

*Planning permission will only be granted where development has no adverse impact on historic assets and their settings. All proposals will be expected to protect and where appropriate enhance the character and appearance of the area in which they are located.*

- 14.2.23 RBC is in the process of developing a New Local Plan, and the Draft Reading Borough Local Plan has been published for consultation (May 2017). It contains the following policies relevant to this assessment:

#### **EN1: PROTECTION AND ENHANCEMENT OF THE HISTORIC ENVIRONMENT**

*Historic features, areas of historic importance and other elements of the historic environment, including their settings will be protected and where appropriate enhanced.*

*This will include:*

- *Listed Buildings;*
- *Conservation Areas; and*
- *Other features with local or national significance, such as sites and features of archaeological importance, Ancient Monuments, historic parks and gardens and locally listed assets.*

*Planning permission will only be granted where the new development makes a positive contribution to local character and distinctiveness and has no adverse impact on heritage assets and their settings. All proposals will be expected to protect and where appropriate enhance the historic character and local distinctiveness of the area in which they are located. Proposals should seek to avoid harm in the first instance. Any harm to or loss of a heritage asset should require clear and convincing justification.*

*Applications which affect, or have the potential to affect, the significant features of heritage assets should be justified by a Heritage Statement.*

*The Council will monitor buildings or other heritage assets at risk through neglect, decay or other threats, proactively seeking solutions for assets at risk including consideration of appropriate development schemes that will ensure the repair and maintenance of the asset, and, as a last resort, using its statutory powers.*

#### **EN2: AREAS OF ARCHAEOLOGICAL SIGNIFICANCE**

*Applicants should identify and evaluate sites of archaeological significance. Where remains cannot be preserved 'in situ,' remains should be properly excavated, investigated and recorded.*

#### **EN4: LOCALLY IMPORTANT HERITAGE ASSETS**

*Development proposals that affect locally important heritage assets will be expected to demonstrate that development conserves architectural and historical significance which may include the appearance, character and setting of the asset.*

*Planning permission may be granted in cases where a proposal could result in harm to or loss of a locally important heritage asset only where it can be demonstrated that the benefits of the development significantly outweigh the asset's significance. Where it is accepted by the Local Planning Authority that retention is not important, recording of the heritage asset should be undertaken and submitted alongside development proposals. Replacement buildings should draw upon heritage elements of the previous design, taking cues from the historical qualities that made the previous building significant. This may include appearance, scale and architectural quality.*

#### **EN6: NEW DEVELOPMENT IN A HISTORIC CONTEXT**

*In areas characterised by heritage assets, the historic environment will inform and shape new development. New development will be expected to make a contribution to the historic character of the area by respecting and enhancing its architectural and visual qualities and considering how heritage considerations can give cues as to the design of new development. When determining planning applications for new development, the following factors will be taken into consideration:*

- a. *The positive contribution of the development to the existing historic townscape (scale, height, mass, proportion, plot size, street form, materials, significant vistas and views, and open space);*
- b. *Sensitivity to historic context;*

- c. Reflection of borough-wide major heritage themes that contribute to local distinctiveness (e.g. patterned brickwork or former worker terraced housing);
- d. Whether development promotes and/or improves access to previously undiscovered or neglected historic significance.

14.2.24 As draft policies, these policies are given weight in accordance with Annex 1 of the NPPF.

14.2.25 Local plan policy in WBC is provided by the 2010 Core Strategy, which contains the following policy relevant to this assessment:

***Policy CP3: General Principles for Development***

*Planning permission will be granted for proposals that:*

- a. *Are of an appropriate scale of activity, mass, layout, built form, height, materials and character to the area together with a high quality of design without detriment to the amenities of adjoining land users including open spaces or occupiers and their quality of life;*
- b. *Provide a functional, accessible, safe, secure and adaptable scheme;*
- c. *Have no detrimental impact upon important ecological, heritage, landscape (including river valleys) or geological features or water courses.*
- d. *Maintain or enhance the ability of the site to support fauna and flora including protected species;*
- e. *Use the full potential of the site and contribute to the support for suitable complementary facilities and uses;*
- f. *Contribute to a sense of place in the buildings and spaces themselves and in the way they integrate with their surroundings (especially existing dwellings) including the use of appropriate landscaping;*
- g. *Provide for a framework of open space in secure community use achieving at least 4.65 ha/1,000 population provision together with recreational/sporting facilities in addition to private amenity space;*
- h. *Contribute towards the provision of an appropriate sustainable network of community facilities;*
- i. *Do not lead to a net loss of dwellings and other residential accommodation or land; and*
- j. *Do not lead to a loss of community or recreational facilities/land or infrastructure unless suitable alternative provision is available.*

*Development proposals will be required to demonstrate how they have responded to the above criteria through the submission of Design and Access Statements, clear and informative plans, elevations and streetscenes and where required Masterplans, Development Briefs, Concept Statements and Design Codes.*

14.2.26 WBC is also working on a Local Plan update to their Core Strategy, and are aiming to adopt this in 2019. No draft policies from the update were published at the time of writing.

### 14.3 Consultation

14.3.1 The LPA were consulted and provided with a Scoping Report in support of a request for an EIA Scoping Report. In initial comments to the East MRT development, dated the 23<sup>rd</sup> of June, 2016, the RBC heritage officer highlighted that:

- *The bridge design needs to be seen as a separate project in its own right in order to achieve a well-designed bridge which is of a quality appropriate to the setting of the listed bridge i.e. it requires a dedicated designer who is either an architect or an engineer with a solid design background.*
- *It will be important that the structure should be visually subsidiary/subservient to the listed bridge. This can be achieved having a bridge which is as low as possible, visually permeable and lightweight.*
- *Although there will be restrictions on the minimum height above river for bridges, reducing the height of the structure would reduce the visual impact.*
- *The design should use a lightweight structure which is visually permeable in order to reduce the visual impact on the setting. A well-designed steel structure may achieve this effect.*
- *Weathering steel could be an appropriate material which would be sympathetic to the railway bridge (in its weathered colour) and to the accommodation bridge (in terms of materials).*
- *Location of the bridge (within the constraints of the protected route) as well as alignment may help to reduce the visual impact.*

14.3.2 These comments were considered and incorporated into the design of the East MRT development.

### 14.4 Methodology

#### Scope of the Assessment

14.4.1 As outlined in the Scoping Report the assessment has involved the following key tasks:

- A 1km search radius has been carried out from the site boundary for non-designated and designated archaeological remains;
- Production of an historic environment desk-based assessment in accordance with the Chartered Institute for Archaeologists Standards and Guidance for Heritage Desk-based Assessments (Appendix 14-1). Sources reviewed include: Reading Historic Environment Record (HER); National Monuments Record; historic cartographic and documentary sources at the Berkshire and Oxfordshire Record Office and the British Library; aerial photographs and unpublished material from recent nearby archaeological investigations;
- A 1km search radius of search from the site boundary for all listed buildings (Grade I, Grade II\* and Grade II);
- A 500m of radius search of the site boundary for all conservation areas;

- A 1km radius search of the site boundary for all Registered Parks and Gardens (Grades I, II\* and II);
- World Heritage Sites, registered battlefields and protected wrecks were not included as there such designated heritage assets within the search area;

## Significance criteria

14.4.2 Criteria for assessing the magnitude of predicted change are given in Table 14-1.

Table 14.1 Criteria for assessing magnitude of change on historic environment receptors

| Magnitude  | Effect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High       | <p>Total or substantial loss of the significance of a heritage asset.</p> <p>Substantial harm to a heritage asset's setting such that the significance of the asset would be totally lost or substantially reduced (e.g. the significance of a designated heritage asset would be reduced to such a degree that its designation would be questionable; the significance of an undesignated heritage asset would be reduced to such a degree that its categorisation as a heritage asset would be questionable).</p> <p>These effects are likely to be important considerations at a regional or Borough level.</p>                                     |
| Medium     | <p>Partial loss or alteration of the significance of a heritage asset. Considerable harm to a heritage asset's setting, such that the asset's significance would be materially affected/considerably devalued, but not totally or substantially lost.</p> <p>These effects, if adverse, while important at a local scale, are not likely to be key decision making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource</p>                                                                                                                      |
| Low        | <p>Slight loss of the significance of a heritage asset. This can include the removal of fabric that forms part of the heritage asset, but that is not integral to its significance (e.g. the demolition of later extensions/additions of little intrinsic value).</p> <p>Some harm to the heritage asset's setting, but not to the degree that it would materially compromise the significance of the heritage asset. Level of harm perceivable, but insubstantial relative to the overall interest of the heritage asset.</p> <p>These effects may be raised as local issues but are unlikely to be of importance in the decision making process.</p> |
| Negligible | <p>A very slight change to a heritage asset. This can include a change to a part of a heritage asset that does not materially contribute to its significance.</p> <p>Very minor change to a heritage asset's setting such that there is a slight impact not materially affecting the heritage asset's significance.</p>                                                                                                                                                                                                                                                                                                                                |

14.4.3 The sensitivity of the heritage asset will depend on factors such as the condition of the asset and its perceived heritage value and significance. The sensitivity of the heritage asset receptor is defined by its significance in terms of national or local statutory or non-statutory protection and grading of the asset. Table 14-2 sets out the criteria for assessing sensitivity.

Table 14.2 Criteria for assessing sensitivity of receptors

| Sensitivity | Criteria                                                                                                                                                                                                                                                       |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High        | World Heritage Sites<br>Scheduled Monuments & Areas of Archaeological Importance<br>Archaeological sites of schedulable quality & significance<br>Listed buildings (all grades)<br>Registered Historic Parks and Gardens (all grades)<br>Historic Battlefields |
| Medium      | Local Authority designated sites e.g. Conservation Areas and their settings<br>Undesignated sites of demonstrable regional importance                                                                                                                          |
| Low         | Sites with significance to local interest groups.<br>Sites of which the significance is limited by poor preservation and poor survival of contextual associations.                                                                                             |

14.4.4 Negligible sensitivity is not used for heritage assets as this would equate to a feature/building with no heritage significance. In such a circumstance, such a feature/building would not be regarded as a heritage asset.

14.4.5 The sensitivity of the receiving environment, together with the magnitude of change, defines the significance of the impact (**Table 14-3**). Impacts of 'major' or 'moderate' significance in relation to the historic environment are considered to equate to significant impacts highlighted in the context of the EIA Regulations. The impacts could potentially be adverse, negligible or beneficial.

Table 14-3 Matrix for Determining the Significance of Effects

|                            |            | Sensitivity of Receptor/Receiving Environment to Change/Effect |                     |                     |
|----------------------------|------------|----------------------------------------------------------------|---------------------|---------------------|
|                            |            | High                                                           | Medium              | Low                 |
| Magnitude of change/effect | High       | Major/Severe                                                   | Moderate            | Minor               |
|                            | Medium     | Moderate                                                       | Moderate to minor   | Negligible to Minor |
|                            | Low        | Minor                                                          | Negligible to Minor | Negligible          |
|                            | Negligible | Negligible                                                     | Negligible          | Negligible          |

## 14.5 Baseline Conditions

### Designated Heritage Assets

14.5.1 The HEDBA (**Appendix 14-1**) considered the area surrounding the Application Site and found that no designated heritage assets are present within the Application Site, and the majority in

the surrounding area are completely screened by the presence of modern development and other intervening features. It concluded that no effects to their significance would result from the East MRT development, and as such it is not necessary to consider them further here.

- 14.5.2 The one exception is the grade II listed Railway Bridge and attached Accommodation Bridge over the River Kennet (NHLE 1113621, Appendix 14-1, Fig. 3), which lies immediately to the south of the Application Site's southern boundary. The bridge was designed and built by Isambard Kingdom Brunel for The Great Western Railway in 1839-1840, and was widened in 1892, which is likely to be when the accommodation bridge was attached (NHLE). The railway bridge is constructed of red brick and widened with engineering brick with ashlar dressings, while the accommodation bridge is made of steel and timber.
- 14.5.3 The bridge crosses the River Kennet, where the Kennet and the Thames intersect. From the accommodation bridge, views out over the nearby section of the Thames are afforded, although views of the railway bridge are restricted by the accommodation bridge. Views of the railway bridge are afforded by the footpath to the south of the bridge, which connects to the Thames Path. Another railway bridge (not designated) is situated approximately 75m to the south, which dates to the later Victorian period, and with which the bridge has a contextual relationship. These elements, together with the railway which the bridge supports comprise the setting of the bridge.
- 14.5.4 The bridge is of high significance, as set out in **Table 14-2**. The significance of the bridge is derived to a large degree from its considerable historic interest, in particular having been designed by Isambard Kingdom Brunel. In addition, it has architectural merit and also preserves construction techniques from the mid-Victorian period. Finally, its setting also makes a contribution, in particular the association with the other railway bridge to the south with the footpath between the two reinforcing their historical associations. Its continued use as a railway bridge is also key to a continued understanding of the bridge's heritage. Finally, the views from the accommodation bridge over a section of the Thames provide a link to the past use of the Thames Path as a tow path, although this contribution is more modest in relation to the core significance of the bridge.
- 14.5.5 The Application Site forms part of the setting of the bridge, occupying an area which would be seen from the accommodation bridge.

### Non-designated Heritage Assets

- 14.5.6 The HEDBA notes that the HER contained no evidence of any buried archaeological remains of interest being located within the Application Site. Furthermore, archaeological trial trenching has been undertaken within the Application Site in the past (HER ERM1139), at the eastern end of the Application Site, which found only evidence of Post-Medieval finds, with no remains of archaeological significance discovered.
- 14.5.7 Nonetheless, despite the apparent lack of Prehistoric evidence in Reading, the location of the Application Site in proximity to two significant rivers (River Thames and River Kennet) offers an increased potential for the recovery of Prehistoric material, as rivers were commonly exploited by prehistoric people for a food and water resources. Therefore, the potential for some associated finds, such as isolated flint tools, cannot be discounted, however there is no evidence of intact Pleistocene layers within the Application Site. If present, these remains would be of local or Low significance, as defined in **Table 14-2**.
- 14.5.8 Similarly, excavation works undertaken in 1891 50m to the east of the Application Site found the remains of a Saxon cemetery (HER ERM1273). However, the evaluation works undertaken nearby within the Application Site found no evidence that these remains extended to the Application Site. Nonetheless, it is possible that some associated remains may be

present in the easternmost area of the Application Site which, if present, would be of Low to Medium significance, as defined in Table 14-2.

## 14.6 East MRT

### Potential Effects

#### Construction Phase Effects

##### *Designated Heritage Assets*

- 14.6.1 The East MRT development would involve the construction of a new bridge in the vicinity of the grade II listed Railway and Accommodation Bridge over the River Kennet. The construction of the new bridge would change views out from the Accommodation Bridge and impede views to the Thames from there. During construction, the views out from the Accommodation Bridge towards the Thames would be interrupted, and the operation of plant and large machinery would also affect some views of the bridge along the footpath to the south. However, this effect would be relatively short-lived, and would last no more than a year. When considering the effects of the construction of the East MRT development to the significance of the bridge in the round, it is considered that the East MRT development would result in a **low** magnitude of effect, as defined in **Table 14-1**, resulting in a **minor adverse** significance of effect. This effect equates to a low degree of less than substantial harm.

##### **Non-designated Heritage Assets**

- 14.6.2 The construction of the East MRT development would remove any buried archaeological remains which may be present within the Application Site where below ground works are proposed. This would result in a high magnitude of effect, as defined in Table 14-1.
- 14.6.3 In the case of the potential buried Prehistoric remains, this would result in a minor adverse significance of effect.
- 14.6.4 In the case of the potential for buried Saxon remains, this would result in a minor, up to a moderate **adverse** significance of effect.

#### Operation Phase Effects

##### *Designated Heritage Assets*

- 14.6.5 The Proposed East MRT development would involve the construction of a new bridge in the vicinity of the grade II listed Railway and Accommodation Bridge over the River Kennet. Once in operation, the new bridge would change views out from the Accommodation Bridge and impede views to the Thames from there. However, the new bridge design has been developed with the heritage constraints in mind, and with reference to the comments from the RBC Heritage Officer. As a result, the new bridge has been designed so that it would not affect the physical fabric of the bridge, its historic or architectural merit, its association with the other historic railway bridge to the south, nor the setting of the bridge from the south. While the new bridge would obstruct some views to the listed bridge from the Thames Path, more important views from the south would be unaffected. Furthermore, the design of the new bridge is open, and views of the listed bridge would still be afforded from parts of the new footpath.
- 14.6.6 When considering the effects of the Proposed East MRT development to the significance of the bridge in the round, it is considered that the Proposed East MRT development would result

in a **low** magnitude of effect, as defined in **Table 14-1**, resulting in a **minor adverse** significance of effect. This effect equates to a low degree of less than substantial harm.

#### **Non-designated Heritage Assets**

- 14.6.7 During the operation phase, all effects to buried remains will have already occurred and effects would be unchanged from the construction phase.

### **Mitigation and Enhancement**

#### **Designated Heritage Assets**

- 14.6.8 The Proposed East MRT development has been designed with reference to the heritage constraints associated with the listed bridge, and as a result the overall effect of the Proposed East MRT development would be low. No additional mitigation is proposed beyond these design responses.

#### **Non-designated Heritage Assets**

- 14.6.9 The archaeological interest of the identified archaeological remains could be secured by a programme of archaeological works. This could comprise a staged programme of works to excavate and record these remains, and produce a report and archive to disseminate the results. The works would provide benefits by providing additional information in relation to the archaeology of the area. This programme of works could be secured via a suitably worded condition attached to the planning permission should this be granted.

### **Residual Effects**

#### **Designated Heritage Assets**

- 14.6.10 The residual effect to the listed Railway Bridge would be unchanged at **minor adverse**.

#### **Non-designated Heritage Assets**

- 14.6.11 The programme of archaeological works would provide benefits which would serve to mitigate much of the loss of the remains. The loss of any Prehistoric remains would be offset by the increased knowledge of this period which would be gained for the wider area should such remains be encountered. As such in this instance the residual effect would be **negligible**, with potential to be slightly beneficial.
- 14.6.12 Should remnants of the Saxon remains be present in the easternmost part of the Application Site the programme of archaeology works would serve to mitigate their loss and add to knowledge of Saxon and early Medieval history of the area. This would result in a residual **negligible to minor adverse** significance of effect.

## **14.7 Combined Site (East MRT and TVP P&R)**

#### **Designated Heritage Assets**

- 14.7.1 The permitted TVP P&R development is a considerable distance to the east of the listed railway bridge, and would not affect its significance. As such the Combined Site would have no further effects than those identified for the Proposed East MRT development.

#### **Non-designated Heritage Assets**

- 14.7.2 The permitted TVP P&R development would result in the loss of some limited buried archaeological remains, in particular the potential remnants of the Saxon remains known just

to the east of the Application Site. Depending on the extent of any remnants, the Combined Site could have the effect of resulting in the removal of a wider area of remains than the Proposed East MRT development, however the significance of the buried resource within the Combined Site would not be higher than within the Application Site, as it is known that any remains are likely to be fragmentary as opposed to a well-defined resource. No further mitigation beyond the programme of archaeological works which will be undertaken before the implementation of the permitted TVP P&R development is required.

## 14.8 Cumulative Effects

- 14.8.1 A search has been undertaken for recent planning applications within the last 3 years using a 1km radius of the proposed East MRT development. Major development has been investigated including residential and substantial commercial applications. The results of the search are set out in Chapter 5.

### Designated Heritage Assets

- 14.8.2 The list of committed developments has been reviewed and no development is located within 0.5km of the listed railway bridge, nor would they affect its significance. As such, no further effects to the listed bridge would result beyond those identified in this chapter and no cumulative effects would result.

### Non-designated Heritage Assets

- 14.8.3 The list of committed developments in the wider area has been reviewed and the closest applications which could affect a shared archaeological resource are situated 0.2km to the south, however these are on a business part where archaeological remains have already been removed. The other applications are situated sufficiently far such that no shared buried archaeological resources would be affected. As such no cumulative effects would result.

## 14.9 Summary

- 14.9.1 This chapter has identified the heritage receptors which would be affected by the proposed East MRT development and has assessed the significance of the effects the East MRT development would have on these.
- 14.9.2 The baseline assessments have confirmed the extent and character of the non-designated buried archaeological heritage assets within the Application Site, as well as their significance. This includes evidence of a potential Prehistoric artefacts of low sensitivity, and potential remnants of Saxon remains of low to medium sensitivity. With the implementation of an appropriate mitigation strategy the residual effects of the proposed East MRT development to these assets would in no instance be more than **negligible to minor adverse**, and no significant effects would result from the proposed East MRT development. The effect of the Combined Site, with the permitted TVP P&R development was also considered, and with archaeological mitigation the Combined Site would not result in a higher significance of effect than the proposed East MRT development.
- 14.9.3 This chapter has also assessed the effect of the proposed development to the significance of relevant built heritage assets in the surrounding area. The proposed development would not result in any significant effects to designated heritage assets, such as listed buildings, with only a **minor adverse** significance of effect identified to the listed Railway Bridge and Accommodation Bridge, and no other effects above negligible. The cumulative effect of the proposed East MRT development was considered together with the permitted TVP P&R

development (the Combined Site) and other developments in the wider area, and no significant cumulative effects would result from these.

## **14.10 References**

- Childs, W. M., 1905, The Story of the Town of Reading.
- Clark, G., 2009, Down by the River: The Thames and Kennet in Reading.
- Orion Heritage Ltd 2016. East Reading Mass Rapid Transit Scheme – Historic Environment Desk Based Assessment
- WSP 2016. Thames Valley Park & Ride, Wokingham – Historic Environment Desk-Based Assessment

## 15 Impact Interactions and Summary

### 15.1 Introduction

- 15.1.1 Environmental effects can result from incremental changes caused by the interactions between effects resulting from a project. For the purpose of this assessment, the interactions between effects associated with the proposed development are defined as ‘combined effects’.
- 15.1.2 The direct and indirect effects of the proposed development have been assessed within the relevant topic chapters of the ES prepared by suitable technical specialists. Environmental effects are assessed relative to the topic under consideration. This approach can lead to the interaction of effects being reported in separate chapters but the collective effect on the same environmental resource(s) not being considered.
- 15.1.3 This chapter therefore considers the principal findings of each topic chapter of the ES to enable assessment of the potential for impact interactions. This chapter also therefore provides a summary of the likely significant environmental effects identified throughout the ES.

### 15.2 Methodology

- 15.2.1 The assessment methodology for combined effects involves the identification of impact interactions associated with both the construction and operational phases of the proposed development upon one or more environmental resources. This is undertaken using a qualitative appraisal process.
- 15.2.2 This approach has been used by PBA for numerous EIAs and draws upon the following guidance:
- Institute of Environmental Management and Assessment, (2004), Guidelines for Environmental Impact Assessment (IEMA);
  - Hyder, (1999), Final Report on the Study on the Assessment of Indirect and Cumulative Impacts, as well as Impact Interactions within the Environmental Impact Assessment (EIA) Process NE80328/D3/2, European Commission Directorate General XI, Environment, Nuclear Safety and Civil Protection; and
  - mitigation measures are identified in each of the topic chapters, and have been used to inform the assessment presented in this chapter.
- 15.2.3 The assessment of the significance of effects has been based on the generic significance criteria provided in **Table 5.1, Chapter 5**.

### 15.3 Construction Effects – East MRT

- 15.3.1 Sensitive design and sound environmental management during the construction works means that the majority of the residual effects of the construction of East MRT will not be significant.
- 15.3.2 The local community will experience negligible to major-severe adverse effect on local views. It should be recognised however that the design of the development and provision of landscaping has minimised the extent to which views of the development will be significantly affected. Local people will also experience a minor beneficial effect as a result of job opportunities and resultant economic benefits during the construction works. As a result of

careful construction management there are unlikely to be any significant impact interactions on the local community.

- 15.3.3 With regards to environmental receptors, there will be a negligible to major adverse effect on local landscape, although as noted with regards to views the design of the development has minimised the extent of landscape effects. There will also be a minor beneficial effect on surface water quality as a result of the management of potential contamination during construction and a minor adverse effects on The Coal, Kennetmouth & Kings Meadow East LWS, bats and reptiles.

## **15.4 Operation Effects – East MRT**

- 15.4.1 The proposed development is designed to improve accessibility in east Reading and provide a faster, safer and more reliable connection for users of public transport, as well as pedestrians and cyclists. It will therefore provide major beneficial effects on bus users, severance and pedestrian and cyclist delay and amenity, plus minor beneficial effects in relation to fear and intimidation and accidents and road safety. The local community will also experience negligible to major-severe adverse effect on local views and a minor beneficial through support to local jobs.
- 15.4.2 Given that the visual effects of the development have been localised by sensitive design and landscaping, while the beneficial effects on accessibility will affect a much wider area of East Reading, the proposed development is considered to have a moderate beneficial effect on local people.
- 15.4.3 With regards to environmental receptors, there will be a negligible to moderate adverse effect on the local landscape the extent of which has been minimised through the design process. There will be minor beneficial effects on surface water and groundwater quality, and on the ecological value of the Coal, Kennetmouth & Kings Meadow East LWS. There will also be a minor adverse effect on listed Railway Bridge.

## **15.5 East MRT and TVP P&R**

- 15.5.1 There are no further significant impact interactions from the combined development in addition to those noted above for East MRT in isolation.

## 16 Glossary of Terms

|                     |                                                                                                             |
|---------------------|-------------------------------------------------------------------------------------------------------------|
| 1D-2D               | a one-dimensional model (in-channel) linked with a two-dimensional element (floodplain)                     |
| ABSORPTION CAPACITY | Economic appraisal method to establish if available labour supply is sufficient for the project requirement |
| AADT                | Annual Average Daily Traffic                                                                                |
| AOD                 | Above Ordnance Datum                                                                                        |
| AQAP                | Air Quality Action Plan                                                                                     |
| AQMA                | Air Quality Management Area                                                                                 |
| AURN                | Automatic Urban and Rural Network                                                                           |
| BGL                 | Below Ground Level                                                                                          |
| BSI                 | British Standards Institution                                                                               |
| BTEX                | Benzene, Toluene, Ethylbenzene and Xylene                                                                   |
| CEMP                | Construction Environmental Management Plan                                                                  |
| CIRIA               | Construction Industry Research and Information Association                                                  |
| CLR                 | Contaminated Land Report                                                                                    |
| CS                  | Characteristic Situation                                                                                    |
| CSM                 | Conceptual Site Model                                                                                       |
| CWG                 | Criteria Working Group                                                                                      |
| DCLG                | Department for Communities and Local Government                                                             |
| DEFRA               | Department of Environment, Food and Rural Affairs                                                           |
| DIFFUSION TUBE      | A passive sampler used for collecting NO <sub>2</sub> in the air                                            |
| EA                  | Environment Agency                                                                                          |
| EC                  | European Commission                                                                                         |
| EFT                 | Emission Factor Toolkit                                                                                     |
| EIA                 | Environmental Impact Assessment                                                                             |
| EPUK                | Environmental Protection UK                                                                                 |
| ES                  | Environmental Statement                                                                                     |
| FRA                 | Flood Risk Assessment                                                                                       |
| GLA                 | Greater London Authority                                                                                    |

|                                        |                                                                                                                                                                                                  |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GP3                                    | Groundwater Pollution Prevention Principles                                                                                                                                                      |
| GPLC                                   | Guiding Principles for Managing Land Contamination                                                                                                                                               |
| GQA                                    | General Quality Assessment                                                                                                                                                                       |
| GWD                                    | Groundwater Directive 1980                                                                                                                                                                       |
| GWDD                                   | Groundwater Daughter Directive 2006                                                                                                                                                              |
| HDV                                    | Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes<br>Includes Heavy Goods Vehicles (HGV) and buses                                                               |
| HMWB                                   | Heavily Modified Water Body                                                                                                                                                                      |
| IAQM                                   | Institute of Air Quality Management                                                                                                                                                              |
| JK                                     | Japanese Knotweed                                                                                                                                                                                |
| LAQM                                   | Local Air Quality Management                                                                                                                                                                     |
| LBTH                                   | London Borough of Tower Hamlets                                                                                                                                                                  |
| LLFA                                   | Lead Local Flood Authority                                                                                                                                                                       |
| LPA                                    | Local Planning Authorities                                                                                                                                                                       |
| m AOD                                  | metres Above Ordnance Datum                                                                                                                                                                      |
| MRT                                    | Mass Rapid Transit                                                                                                                                                                               |
| NAQO                                   | National Air Quality Objective as set out in the Air Quality Strategy and the Air Quality Regulations                                                                                            |
| NO <sub>2</sub>                        | Nitrogen Dioxide                                                                                                                                                                                 |
| NO <sub>x</sub>                        | Nitrogen oxides, generally considered to be nitric oxide and NO <sub>2</sub> . Its main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles             |
| NPPF                                   | National Planning Policy Framework                                                                                                                                                               |
| OS                                     | Ordnance Survey                                                                                                                                                                                  |
| PM10                                   | Small airborne particles less than 10µm in diameter                                                                                                                                              |
| PM2.5                                  | Small airborne particles less than 2.5 µm in diameter                                                                                                                                            |
| PBA                                    | Peter Brett Associates LLP                                                                                                                                                                       |
| PPG                                    | Planning Practice Guidance                                                                                                                                                                       |
| PERSON YEAR OF CONSTRUCTION EMPLOYMENT | Construction job lasting one year                                                                                                                                                                |
| PRODUCT 4                              | EA supplied detailed Flood Risk Assessment Map, including flood zones, defences and storage areas, areas benefiting from flood defences, statutory main river designations, historic flood event |

|           |                                                                                                                                                                  |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           | outlines and more detailed information from computer river models (including model extent, information on one or more specific point, flood levels, flood flows) |
| PRODUCT 5 | EA supplied reports, including flood modelling and hydrology reports and modelling guidelines                                                                    |
| PRODUCT 7 | EA supplied Calibrated and Verified Model Input Data (CaVMID), including Product 5.                                                                              |
| P&R       | Park and Ride                                                                                                                                                    |
| PFRA      | Preliminary Flood Risk Assessment                                                                                                                                |
| PAH       | Poly Aromatic Hydrocarbons                                                                                                                                       |
| PID       | Photo-ionisation Detector                                                                                                                                        |
| PPE       | Personal Protective Equipment                                                                                                                                    |
| PPM       | Parts Per Million                                                                                                                                                |
| PSC       | Potential Sources of Contamination                                                                                                                               |
| RBC       | Reading Borough Council                                                                                                                                          |
| RBMP      | River Basin Management Plans.                                                                                                                                    |
| RECEPTOR  | A location where the effects of pollution may occur                                                                                                              |
| RTD       | River terrace deposits                                                                                                                                           |
| SAC       | Special Areas of Conservation - strictly protected sites designated under the EC Habitats Directive                                                              |
| SFRA      | Strategic Flood Risk Assessment                                                                                                                                  |
| SHWL      | Standard Head Water Level                                                                                                                                        |
| SPA       | Special Protection Area - strictly protected sites classified in accordance with Article 4 of the EC Birds Directive                                             |
| SPZ       | Source Protection Zone                                                                                                                                           |
| SRS       | Site Remedial Services Ltd                                                                                                                                       |
| SuDS      | Sustainable Drainage Systems                                                                                                                                     |
| TPH       | Total Petroleum Hydrocarbon                                                                                                                                      |
| TVP       | Thames Valley Park                                                                                                                                               |
| USEPA     | United States Environmental Protection Agency                                                                                                                    |
| UXO       | Unexploded Ordnance                                                                                                                                              |
| UVF       | Ultraviolet Fluorescence Spectroscopy                                                                                                                            |

|     |                                 |
|-----|---------------------------------|
| VOC | Volatile Organic Compound       |
| WBC | Wokingham Borough Council       |
| WFD | Water Framework Directive       |
| XRF | X-ray Fluorescence Spectroscopy |