

Species	Key legal protection
Great crested newt (<i>Triturus cristatus</i>)	Protected under the <i>Wildlife and Countryside Act</i> and under Annex II and IV(a) of the European Union's <i>Habitats Directive</i> . Under the legal protection afforded great crested newt it is an offence to knowingly kill, harm, injure or disturb a great crested newt or its habitat. It is also an offence to damage, destroy or obstruct access to any structure or place used for shelter protection or breeding by the species; or to disturb it while it is occupying such a structure or place. Where a project or plan has been identified as impacting on great crested newt, the appropriate authority (in England, Natural England) can issue licenses which make otherwise illegal actions lawful. Such licenses can, however, only be issued for "preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment." Likewise, licenses for species such as great crested newt can only be issued if there is no alternative solution.

National Policy

- 13.2.9 Planning Policy Statements (PPS) set out the Government's national policies on different aspects of planning in England. PPS9 sets out planning policies on protection of biodiversity and geological conservation through the planning system. These policies complement, but do not replace or override, other national planning policies and should be read in conjunction with other relevant statements of national planning policy. This PPS replaces Planning Policy Guidance Note 9 (PPG9) on nature conservation published in October 1994.
- 13.2.10 A joint Office of the Deputy Prime Minister (06/2005) and Department of Environment, Food and Rural Affairs (01/2005) Circular is published to accompany PPS9. This sets out the wide range of legislative provisions at the international and national level that can impact on planning decisions affecting biodiversity and geological conservation issues. The presence of a protected species is a material consideration for a local authority dealing with a planning application which would be likely to result in harm to the species or its habitat (paragraph 15 and 16, PPS9).
- 13.2.11 Paragraph 12 of PPS9 notes that "*networks of natural habitats (such as the Crane Corridor) are a valuable resource. Consequently, local authorities should aim to maintain such networks by avoiding or repairing the fragmentation and isolation of natural habitats through policies and plans. In addition, such networks should be protected from development, and, where possible, strengthened by or integrated within it*".
- 13.2.12 As part of its commitment to the Convention on Biological Diversity drawn up at the Earth Summit in Rio de Janeiro in 1992, the government published 'Biodiversity: The UK Action Plan' (DOE 1994). Following this a National Biodiversity Action Plan was produced and Species and Habitat Action Plans (SAPs and HAPs respectively) drawn up for key species and habitats. The SAPs and HAPs set out targets for retention and enhancement of the identified key habitats and species.
- 13.2.13 Many counties now have their own local Biodiversity Action Plans (LBAPs) which set out objectives for their own localities.

Table 13-1 Protected Species Legislation

Species	Key legal protection
Birds	All wild birds, their nests and eggs are, with few exceptions, fully protected by law. In addition, over eighty species or groups of species, are listed under Schedule 1 of the <i>Wildlife and Countryside Act</i> . These species are specially protected by increased penalties and cannot be intentionally disturbed when nesting, with additional protection also provided to species listed in Annex IV of the <i>Habitats Directive</i> .
Bats	All bat species are protected in accordance with Schedule 5 of the <i>Wildlife and Countryside Act (1981, as amended)</i> . This protection extends to both the bats themselves and roost sites. Bat roosts are protected at all times of the year regardless of whether bats are present at the time. In addition, all bats are listed under Annex II of the European Unions <i>Habitats Directive</i> . Bat species have been identified as Biodiversity Action Plan species. Where a project or plan has been identified as impacting on a bat roost, the appropriate authority (in England, Natural England) can issue licenses which make otherwise illegal actions lawful, e.g. closing a roost. Such licenses can, however, only be issued for "preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment." Likewise, licenses for bat species can only be issued if there is no alternative solution and sufficient mitigation is provided to ensure that overall the species will not be subject to any significant adverse impact(s).
Otter (<i>Lutra lutra</i>)	The otter is fully protected under the <i>Wildlife and Countryside Act</i> making it an offence to damage, destroy or obstruct access to any structure or place which is used by otters. Otter is also listed under Annexes II and IV (a) of the European Union <i>Habitats Directive</i> .
Water vole (<i>Arvicola terrestris</i>)	The water vole is now fully protected under the <i>Wildlife and Country Act 1981 (as amended)</i> . The legal protection makes it an offence to intentionally damage, destroy or obstruct access to any structure or place which water voles use for shelter or protection, or to disturb water voles whilst they are using such a place. As of the 6 th April 2008, it is now an offence to intentionally kill, injure or take a water vole.
Reptiles	All native reptiles are listed on Schedule 5 of the <i>Wildlife and Countryside Act</i> and are afforded different levels of protection. For the four most commonly occurring species (adder <i>Vipera berus</i> , grass snake <i>Natrix natrix</i> , slow-worm <i>Anguis fragilis</i> and common lizard (<i>Zootoca vivipera</i>), the protection extends to killing and injury although does not include habitat protection.

13.1 Introduction

13.1.1 This chapter of the Environmental Statement (ES) assesses the potential impacts of the proposed development on Twickenham Railway Station, London Road, Twickenham, TW1 1BD (NGR: TQ 161 738). The Chapter has been written by Wardell Armstrong LLP. For the purposes of this Chapter, the term 'site' is used to refer to the proposed development area.

13.1.2 This chapter aims to:

- Describe the ecological baseline conditions within the proposed development area;
- Identify and evaluate the nature conservation/biodiversity interest present;
- Identify any potential impacts during construction and operational phases;
- Establish the magnitude and significance of those identified impacts;
- Identify mitigation measures to address significant impacts, and
- Assess any residual impacts and the need for any compensation.

Site Description

13.1.3 The site comprises approximately 0.96 hectares of an active railway station, associated hard standing car parking facilities, trees and scrub within a predominantly urban area. The site is restricted to the north by the River Crane and residential buildings. The south is defined by Mary's Terrace residential dwellings and a large office building (Regal House); further east the south is defined by railway lines and residential buildings. The London Road rail bridge and large Royal Mail sorting office defines the western boundary and the east is open to station approach. The site boundary is defined on the Extended Phase 1 Habitat Plan (*Appendix H-1 of ES Volume III*).

13.1.4 The proposed development is restricted to a zone of influence in and adjacent to the site boundary. The zone of influence is defined by IEEM Guidelines for Ecological Impact Assessment (Ref. 13-1) as:

'The areas/resources that may be affected by the biophysical changes caused by activities associated with a project'.

13.1.5 The zone of ecological influence for the site occupies the development boundary, but also extends to the land surrounding the site, to a distance of 30m.

The Development Proposals

13.1.6 The proposed development comprises improvements to the railway station facilities, the construction of approximately 115 residential units and a new pedestrian footpath along the River Crane.

Scoping Stage

13.1.7 As part of the Environmental Impact Assessment (EIA) process, ecological constraints to the development and thus potential impacts were identified during the scoping phase of the project and resulted in the production of a Scoping Report. A baseline description for the site was derived from field survey findings and the acquisition of existing ecological records from a range of sources.

13.2 Planning Policy Context

Legislative Framework

- 13.2.1 Nature conservation policy is implemented by a series of areas, habitats and species designated under legislation from a local to an international level. The key pieces of legislation relevant to the proposed development are discussed below.
- 13.2.2 The Wildlife and Countryside Act 1981 (as amended) remains the primary UK mechanism for statutory site designation and protection, and the protection of individual species. Through it, areas of national or regional conservation value (in terms of their biological or geological interest) can be designated as Sites of Special Scientific Interest (SSSIs). This affords protection by way of limiting the activities which can be carried out on such sites, and imposing penalties for damage or destruction of the special interest. The Wildlife and Countryside Act also contains a number of schedules listing species subject to varying levels of protection. The provisions of the Wildlife and Countryside Act are modified and in some cases replaced by subsequent legislation contained within the Conservation (Natural Habitats &c.) Regulations 1994 and the Countryside and Rights of Ways Act (the 'CRoW Act') 2000.
- 13.2.3 EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna ('the Habitats Directive') was adopted in May 1992. The Annexes to this Directive list species and habitats identified as of 'community interest' and for which the Commission requires the establishment of a network of sites to protect examples of value at European level. These sites, called Special Areas of Conservation (SACs), in conjunction with Special Protection Areas (SPAs) designated under the Birds Directive, form a network of protected sites across Europe referred to as Natura 2000 Network.
- 13.2.4 The Conservation (Natural Habitats, &c.) Regulations 1994 transposed 'the Habitats Directive' into UK law. This legislation was strengthened, in line with the rest of Europe, in 2007 and 2009. Individual habitats and species are protected under these Regulations; those which received protection are listed in Annex I and Annex II of the Habitats Directive with additional bird species also listed in Annex IV of the Habitats Directive and Annex I of the Birds Directive.
- 13.2.5 The Hedgerows Regulations 1997, under Section 97 of the Environment Act 2005. The aim of the Regulations is to protect important hedgerows by controlling their removal through a notification system. To qualify for the regulations a hedgerow must meet the criteria, cultural or ecological, set out within the regulations.
- 13.2.6 The Countryside and Rights of Way Act 2000 strengthens the provisions of the 1981 Wildlife and Countryside Act both in respect of statutory sites such as SSSIs and protected species. It also places a statutory obligation on local authorities and other public bodies to further conservation of biodiversity in the exercise of their functions, thus providing a statutory basis to the Biodiversity Action Plan (BAP) process which begun with the Governments publication of the UK Biodiversity Action plan in 1994.
- 13.2.7 Biodiversity Action Plans – The British government was one of over 150 signatories to the Convention on Biological Diversity at the Earth Summit in Rio de Janero in 1992. Biodiversity: The UK Action Plan in 1994 and subsequent UK Steering Group Report established a national framework for biodiversity but also emphasises the importance of action through biodiversity action plans at a local level. Practical measures to safeguard biodiversity are described in the UK Biodiversity Action Plan (BAP).
- 13.2.8 The key legislation for individual species that are relevant to this project is summarised in Table 13-1.

Regional Policy

The London Plan: Spatial Development Strategy for Greater London 2008

- 13.2.14 The London Plan: Spatial Development Strategy for Greater London (Consolidated with Alterations since 2004) was published in February 2008 by the Greater London Authority. It is the strategic spatial planning document for London and endorses the protection of land of strategic importance for biodiversity. In addition, it stresses the requirement for development proposals to include new or enhanced natural habitats, or design and landscaping that promotes biodiversity, the greening of the built environment and associated provisions for its management.
- 13.2.15 Among the key objectives of the London Plan are to: *"...protect and improve Metropolitan Open Land, other designated open spaces, the Blue Ribbon network and Green Grid"*.
- 13.2.16 Policy 3C.21 concerning walking includes the aim: *"...to identify, complete and promote high quality walking routes including the six strategic walking routes identified in the Mayor's Transport Strategy"*. This links with the proposals from Walk London to develop the Crane Walk as a Strategic Walking Route.
- 13.2.17 Policy 3D.11 on Open Space states that Development Plan Documents (DPDs) should: *"encourage functional and physical linkages within the network of open spaces and to the wider public realm, improve accessibility for all throughout the network and create new links based on local and strategic need" and "identify, promote and protect Green Corridors and Green Chains and include appropriate designations and policies for the protection of local open spaces that are of value, or have the potential to be of value, to local communities"*.
- 13.2.18 Policy 3D.14 regarding Biodiversity and Nature suggests that: *"opportunities should be taken to achieve positive gains for conservation" and "...it is important that biodiversity is protected in areas where habitat restoration and re-creation would be appropriate to achieve the aims of the London HAPs"*.
- "...Where appropriate, measures may include creating, enhancing and managing wildlife habitat and natural landscape and improving access to nature. Priority for both should be given to sites which assist in achieving the targets in Biodiversity Action Plans (BAPs) and sites within or near to areas deficient in accessible wildlife sites"*.
- "...Where development is proposed which would affect a site of importance for nature conservation or important species, the approach should be to seek to avoid adverse impact on the species or nature conservation value of the site, and if that is not possible, to minimise such impact and seek mitigation of any residual impacts. Where, exceptionally, development is to be permitted because the reasons for it are judged to outweigh significant harm to nature conservation, appropriate compensation should be sought"*.
- 13.2.19 Policy 3D.15 on Trees and Woodland states that: *"the Mayor and the boroughs should protect, maintain and enhance trees and woodland in support of the London Tree and Woodland Framework"*.
- 13.2.20 Policy 3D.17 on London's countryside and the urban fringe indicates that: *"the Mayor will and boroughs should support sub-regional and cross-borough boundary urban fringe management through the Green Arc partnership initiatives..."*

13.2.21 Policy 4C.1 The Blue Ribbon Network notes that the Network *“includes the Thames, the canal network, the other tributaries, rivers and streams within London and London’s open water spaces such as docks, reservoirs and lakes. The Mayor will and boroughs should recognise the strategic importance of the Blue Ribbon network when making strategies and plans, when considering planning applications and when carrying out their other responsibilities.”*

13.2.22 Policy 4C.22 regarding Rivers, brooks and streams also states that: *“the Mayor will, and boroughs should, ensure that rivers, brooks and streams of all sizes are protected, improved and respected as part of the Blue Ribbon Network and as valuable entities in themselves. In particular, measures should be taken to improve the habitat and amenity value of such waterways”*.

The Draft Replacement London Plan

13.2.23 A draft replacement Spatial Development for Greater London was published in October 2009. This draft replacement London Plan sets out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. Draft policies of relevance to planning within the context of this development have been considered.

Mayor’s Biodiversity Strategy 2002

13.2.24 The major’s Biodiversity Strategy details the Mayor’s vision for protecting and conserving London’s natural open spaces. The strategy aims to:

- Ensure that people have access to nature by creating new green spaces, improving existing ones and encouraging people to visit less well-known places;
- Protect wildlife habitats, stating that sites which are important for nature conservation should not be built on;
- Encourage businesses to incorporate green design into their development proposals; and
- Protect London’s most vulnerable wildlife, for example, bats and birds.

Local Policy

London Borough of Richmond Upon Thames Local Development Framework

13.2.25 The London Borough of Richmond Upon Thames Local Development Framework (LDF) Core Strategy was adopted on 21st April 2009.

13.2.26 Policy CP4 regarding biodiversity states that: *“the Borough’s biodiversity including the SSSIs and other Sites of Nature Importance will be safeguarded and enhanced. Biodiversity enhancements will be encouraged particularly in areas of deficiency (parts of Whitton, Hampton, Teddington, Twickenham and South Kew), in areas of new development and along wildlife corridors and green chains such as the River Thames and River Crane corridors”*.

“...Weighted priority in terms of their importance will be afforded to protected species and priority species and habitats in the UK, Regional and Richmond upon Thames Biodiversity Action Plans”.

13.2.27 Policy CP10 regarding open land and parks states that: *“The open environment will be protected and enhanced. In particular: The Borough’s ... green chains and green corridors will be safeguarded and improved for biodiversity...”*

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- 13.2.28 Policy CP12 regarding the River Crane Corridor states that: *“The Council will improve the strategic corridor to provide an attractive open space with improvements to the biodiversity. Developments in and adjacent to the River Crane Corridor will be expected to contribute to improving the environment and access, in line with planning guidance”*.

13.3 Survey and Assessment Methodology

- 13.3.1 The methodology described below details the desk study and field surveys and has been reported in accordance with the Institute of Ecology and Environmental Management (IEEM) guidance on Ecological Impact Assessment (EclA). All ecological surveys undertaken for the EclA were carried out by appropriately qualified and experienced Wardell Armstrong ecologists.

Desk Study

- 13.3.2 The desktop study involved conducting database searches for statutory and non-statutory designated sites, legally protected species and features of interest. An area of 5km surrounding the site was searched for internationally designated sites e.g. Special Protection Areas (SPAs) with all other statutory designated sites, non-statutory designated sites and records of protected/notable fauna and flora being searched for within 2km of the site. The central grid reference of the site (TQ: 161 738) was used as the central point for all searches. The baseline conditions were based on a review of existing available information including:

- MAGIC (Multi-Agency Geographical Information for the Countryside) website;
- Ordnance Survey mapping (to identify potentially notable habitats);
- Aerial photography (e.g. google mapping);
- Nature on the Map (Natural England website);
- Richmond Local Biodiversity Action Plan (LBAP);
- UK Biodiversity Action Plan (UKBAP);
- Greenspace Information for Greater London (GiGL).

- 13.3.3 The desktop study also involved consultation with the Planning Services at Richmond upon Thames London Borough Council.

Field Surveys

Phase 1 Habitat Survey

- 13.3.4 An Ecological walkover of the site was initially undertaken in January 2009 by two Wardell Armstrong ecologists; this survey was subsequently updated in June 2010. The area was surveyed to Phase 1 Habitat Survey standard with target notes made as appropriate.

13.3.5 Features of interest were mapped along with the following signs of protected species considered most likely to be found within the area:

- badger activity including setts, snuffle holes and latrines;
- suitable habitat for bats;
- suitable habitats for reptiles;
- invasive plants, such as Japanese knotweed (*Fallopia japonica*);
- signs of breeding birds and suitable nesting habitat;
- signs of water voles including latrines, burrows and feeding stations;
- signs of otters such as holts and spraints; and
- suitable habitat for amphibians, including great crested newts.

13.3.6 Standard survey methodologies were adopted for all ecological surveys, based upon the following publication: Handbook for Phase 1 Habitat Survey: A technique for environmental audit (Ref. 13-2).

Bat Survey

13.3.7 Dusk emergence and dawn re-entry surveys were undertaken within the immediate vicinity of the potential roost sites on 24th/25th June 2010. The emergence survey was undertaken in the evening approximately thirty minutes before sunset and a further two and a half hours after. During the dawn survey the surveyors returned to site (the following morning) approximately ninety minutes before and fifteen minutes after sunrise. The site was also walked to record any bat foraging activity; particularly along the River Crane. A Batbox Duet and Creative Zen mp3 recorder was used to record any bats during the site survey. The recordings were analysed using BatScan V9. Species identification was made on the basis of the characteristics of the call including peak frequency.

Arboricultural Survey

13.3.8 An arboricultural survey was initially undertaken in January 2009 by two Wardell Armstrong ecologists; this survey was subsequently updated in June 2010. The area was surveyed to British Standard 5837 (Ref. 13-3). The survey included consultation and a desktop review. The purpose of the survey is to give detailed, independent, arboricultural advice on the trees present, in the particular context of potential development.

13.3.9 All trees within the site boundary with a stem diameter greater than 75mm at 1.5m from ground level are included within this report. Additionally, tree stumps, hedgerows and shrub masses and trees that are situated adjacent to the site that are within a distance of 12 times their stem diameter (or 10 times base diameter for multi-stemmed trees) are also included.

13.3.10 All inspections were made from ground level, using binoculars where necessary. Height measurements were estimated to the nearest metre, stem diameters were calculated from the stem circumference which was measured using a measuring tape. No digging or drilling was undertaken during this survey. The description of the trees has followed the following terminology:

- **Height** - measured in metres from the stem base. Where the ground has a significant slope the higher ground is selected.
- **Crown height** - measured in metres and is an indication of the average height at which the main crown begins.
- **Stem diameter** - measured in millimetres at 1.5m above the adjacent ground level (upslope on sloping ground) or immediately above the root flare for multi-stemmed trees.
- **Crown spread** - measured in metres and taken at the four cardinal points to derive an accurate representation of the crown.
- **Age class** - described as young, semi-mature, early-mature, mature, or over-mature.
- **Physiological condition** - classed as good, fair, poor, or dead. This is an indication of the health of the tree and takes into account vigour, presence of disease and dieback.
- **Structural condition** - classed as good, fair or poor. This is an indication of the structural integrity of the tree and takes into account significant wounds, decay and quality of branch junctions.
- **Life expectancy** - classed as; less than 10 years (<10), 10-20 years, 20-40 years, or more than 40 years (40+). This is an indication of the number of years before the removal of the tree is likely to be required.

Tree Categorisation

13.3.11 Tree categories (A/B/C & R) are in accordance with BS 5837:2005 Trees in relation to construction. Categorised trees are further sub-divided to depict their value in terms of arboriculture (1), landscape (2) or culture/conservation (3).

13.3.12 **Category A** trees are those for which retention is most desirable. They are identifiable on plans as light green. These trees are of high quality and value with a good life expectancy. They may be further sub-divided as follows:

- **A1** - Trees that are particularly good examples; perhaps rare or unusual species, or forming an essential part of arboricultural features;
- **A2** - Trees, groups or woodlands having a significant landscape impact or with excellent screening properties, or those softening the effect of existing structures;
- **A3** - Trees, groups or woodlands are those having a significant conservation or historical value.

13.3.13 **Category B** trees are those for which retention is desirable. They are identifiable on plans as mid blue. These trees are of moderate quality and value with a significant life expectancy. They may be further sub-divided as follows:

- B1 – Trees that might be included in the high category but are downgraded because of their impaired condition;
- B2 - Trees that are usually present in groups forming distinct landscape features, thereby attracting a higher collective rating than they might as individuals;
- B3 - Trees with clearly identifiable conservational or cultural benefits.

13.3.14 **Category C** trees are those which could be retained. They are identifiable on plans as grey. These trees are of low quality and value, and are currently in adequate condition to remain until new planting could be established. They may be further sub-divided as follows:

- C1 - Trees that do not qualify in the higher categories;
- C2 - Trees that are present in groups or woodlands that do not form a distinct landscape feature;
- C3 - Trees with very limited conservational or other cultural benefits.

13.3.15 **Category R** trees are those recommended for removal. They are identifiable on plans as dark red. These trees are in such a condition that any existing value would be lost within 10 years. This may be due to any of the following:

- Failure is likely due to serious, irredeemable, structural defects;
- Removal of other category R trees will render them exposed and unstable;
- In serious, overall decline or are dead;
- Of low quality and suppressing adjacent trees of better quality;
- Diseases are present which may affect the health of adjacent trees.

13.3.16 These trees should be removed or treated in such a way as to safe-guard public health and structural health and to maintain any ecological value they provide.

Root Protection Area

- 13.3.17 In order to avoid damage to the roots or rooting environment of retained trees, the root protection area (RPA) is plotted around each of the category A, B and C trees. The RPA represents the minimum area which should be left undisturbed around each retained tree.
- 13.3.18 Once determined, the RPA is plotted on the Tree Constraints Plan (TCP) taking full account of the following factors which may change the RPA's shape but not reduce its area; to ensure adequate protection for the root system.
- The likely tolerance of the tree to root disturbance or damage, based on factors such as species, age and condition and presence of other trees. (For individual open grown trees only, it may be acceptable to offset the distance by up to 20% in one direction);
 - The morphology and disposition of the roots, when known to be influenced by past or existing site conditions (e.g. the presence of roads, structures and underground services);
 - The soil type and structure;
 - Topography and drainage; and
 - Where any significant part of a tree's crown overhangs the provisional position of tree protection barriers, these parts may sustain damage during the construction period. In such cases, it may be necessary to increase the extent of tree protection barriers to contain and thereby protect the spread of the crown. Protection may also be achieved by access facilitation pruning. The need for such measures, including the precise extent of pruning, should be assessed by an arboriculturist.

Above Ground Constraints

- 13.3.19 The current and ultimate height of category A, B and C trees is annotated on the TCP where this would cause unreasonable obstruction of sunlight or daylight to the development. This is represented by a segment with a radius from the centre of the stem equal to the height of the tree drawn from due northwest to due east indicating the shadow pattern through the main part of the day.
- 13.3.20 It should be noted that this varies between species and depends on foliage size and density. Additionally, the spatial relationship of the proposed development to the tree(s) affects the amount of sunlight received, the amount of sky visible from the development and the solar gain received by the development.
- 13.3.21 The current and ultimate height and spread of a tree is also a constraint due to its size, dominance and movement in strong winds. For this reason, as well as in relation to shading, the existing spread of branches and the future branch growth is taken into account as a constraint and should be taken into consideration in the design phase.

Tree Constraints Plan

- 13.3.22 The TCP provides information on the influence that trees on and adjacent to the site will have on the site layout design. This is a design tool which illustrates the below ground constraints, represented by the RPA, and the above ground constraints the trees pose by virtue of their size and position. The TCP for Twickenham is presented in *Appendix H-2 of ES Volume III*.
- 13.3.23 Each individual tree or group of trees were allocated a tree reference number. This number is recorded on the TCP. Survey sheets listing all referenced trees are attached as *Appendix H-3 of ES Volume III*.

Presentation of Results

- 13.3.24 This chapter follows the guidance presented in the IEEM guidelines for Ecological Impact Assessment (July 2006). Significance of impacts can be assessed by identifying ecological features, evaluating their importance and defining impacts. The IEEM guidelines define a significant impact as:

'an impact (adverse or positive) on the integrity of a defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, including cumulative impacts.'

- 13.3.25 It, therefore, entails an analysis of the value of ecological features and magnitude of impact on such features.

Determining Value of Ecological Features

- 13.3.26 In order to objectively assess impacts arising from a particular development it is essential to establish the nature conservation value of each ecological feature/receptor likely to be affected by the proposals, both within and adjacent to the development area.

- 13.3.27 The importance of each ecological feature identified through desk study and survey is evaluated according to its importance in a geographical context, each falling into one (or more) of the following categories:

- International (in this case within the EU, unless stated otherwise);
- National (within the UK or England, depending on legislative scope);
- Regional (South East);
- County (London);
- District (Richmond upon Thames);
- Local (Twickenham);
- within zone of influence; or
- of negligible importance.

- 13.3.28 The conservation status of a site is defined in the *EC Directive 92/43/EEC* on the Conservation of Natural Habitats and of Wild Flora and Fauna (1992) as it relates to internationally designated sites. The IEEM guidance modifies the definition in order for it to be applicable to sites, habitats or species within any defined geographical area.

- 13.3.29 When a feature falls into more than one category, the highest level is considered to be the level at which the feature is evaluated. Some features can be readily assigned to one of the above categories, particularly sites that support designations. For example, a site with a designation assigned through European legislation such as a Special Area of Conservation (SAC) would be considered of International significance, an SSSI designated by UK statute would be of National importance and a site designated by a Local Authority would be of County or District importance.

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- 13.3.30 Individual species may be protected under European or National legislation. Legal protection is relevant to the assignment of the value of species, but additional factors, such as population size and the nature of the distribution of the species are also considered within this account.
- 13.3.31 The assignment of undesignated features such as Biodiversity Action Plan habitats and species, or areas of ancient woodland may not fall clearly into the designations as described above. Therefore a number of other criteria are used to assess the nature conservation value of a defined area of land. Accepted criteria are set out in A Nature Conservation Review (Ref. 13-4) and include diversity, rarity, naturalness, intrinsic appeal, typicalness and recorded history.
- 13.3.32 Some features that are currently of no particular ecological interest in themselves may nevertheless perform an ecological function, e.g. because they act as a buffer against negative impacts, or because they enable in some other way the effective conservation of a more valuable feature.
- 13.3.33 Each ecological feature is described and evaluated in the 'Baseline Conditions' section of this Chapter.

Magnitude of Impact

- 13.3.34 Likely impacts on the ecological features occurring within the site have been identified through consideration of the nature of the proposed works. The impacts are characterised with reference to levels of certainty in the prediction of an impact occurring, the extent of the impact, its magnitude, duration of the impact, whether the impact is reversible, its timing and frequency and whether any of the impacts are cumulative in effect.

Evaluation of Significance

- 13.3.35 This comprises analysis of the interaction between the value of the ecological features and the nature and duration of impact. However, this is a complex process because, as indicated in the IEEM guidance, the impact may influence the conservation status and integrity of ecological features.
- 13.3.36 Thus, the definition in relation to habitats is as follows:
'conservation status is determined by the sum of the influences acting on the habitat and its typical species, that may affect its long term distribution, structure and functions as well as the long term survival of its typical species within a given geographical area.'
- 13.3.37 For species, conservation status is as follows:
'determined by the sum of influences acting on the species concerned that may affect the long term distribution and abundance of its populations within a given geographical area.'
- 13.3.38 The level at which an impact is assessed follows the IEEM guidelines but for continuity between chapters, DETR's 'Guidance on the New Approach to Appraisal' (Ref 13-5) has also been taken into consideration. Table 13-2 outlines how the significance of each impact has been described.
- 13.3.39 Any perceived residual impacts are also categorised as follows:
- **Short term:** those considered to be associated with the construction phase;
 - **Medium term:** those considered to be associated with the construction phase;
 - **Long term:** those considered to be associated with the completed, operational development.

Table 13-2 Impact Significance Criteria

Impact Significance	Significance Criteria
Extreme Adverse	Where the proposals may adversely affect the integrity of the site or its features that are of national importance and which, if lost cannot be replaced.
Major Adverse	Where the proposals may adversely affect the integrity of the site, in terms of the coherence of its ecological structure and function that enables it to sustain the habitat/complex of habitats and/or the population levels of species for which it is valued.
Moderate Adverse	Where the site's integrity will not be adversely affected, but the effects on the site is likely to be significant in terms of its ecological objectives (with reference to BAP or Local Plan).
Minor Adverse	If no expected impact does not apply, but some minor negative impact is expected.
Negligible	No expected impact.
Minor Beneficial	Where improvements provide general wildlife gain through, for example new design features (hedges, ponds, green roofing, etc.)
Moderate Beneficial	Where there is an expected net positive wildlife gain at the regional/metropolitan level, for example by significantly aiding the achievement of UKBAP objectives through the provision of sustainable new habitat.
Major Beneficial	Where there is an expected net positive wildlife gain at the national level, for example by significantly aiding the achievement of UKBAP objectives through provision of substantial new habitat.
Extreme Beneficial	Where there is an expected net positive wildlife gain at the international level, for example by significantly aiding the achievement of substantial new habitat and successful colonisation of protected species.

13.4 Baseline Conditions

Statutory Designated Sites

13.4.1 Consultation highlighted two internationally designated sites for nature conservation within 5km of the site boundary and two nationally designated sites for nature conservation within 2km of the site boundary:

- South-West London Water Bodies RAMSAR, Special Protection Area (SPA) comprises a series of embanked water supply reservoirs and former gravel pits that support a range of man-made and semi-natural open water habitats. The reservoirs and gravel pits function as important feeding and roosting sites for wintering wildfowl, in particular Gadwall (*Anas strepera*) and Shoveler (*Anas clypeata*), both of which occur in numbers of European importance. The closest of these reservoirs is situated within Richmond Park approximately 2.1km east of the site boundary.
- Richmond Park is situated approximately 2km east of the site boundary. The park has been designated a Special Area of Conservation (SAC), a Site of Special Scientific Interest (SSSI) and a National Nature Reserve (NNR) owing to its diverse habitats which support a number of rare invertebrates including stag beetles (*Lucanus cervus*).
- Ham Lands Local Nature Reserve (LNR) is situated approximately 650m south east of the site boundary. It has developed into a mosaic of different ecological zones that is important for wildlife and for educational purposes.
- Isleworth Ait LNR is an island in the River Thames, which is situated approximately 2km north east of the site boundary. Isleworth Ait is designated as a LNR owing to its importance for notable birds, invertebrates and molluscs.

Non-statutory Designated Sites

13.4.2 There are nineteen non-statutory Sites of Importance for Nature Conservation (SINC) within 2km of the site:

- Crane Corridor covers approximately 5km and is situated adjacent to the northern border of the site boundary;
- Moormead Park is situated approximately 350m northeast of the site boundary;
- River Thames and tidal tributaries is situated approximately 500m southeast of the site boundary;
- Twickenham Junction Rough is situated approximately 700m southwest of the site boundary;
- River Crane at St Margaret's is situated approximately 900m north of the site boundary;
- Marble Hill Park and Orleans House Gardens are situated approximately 920m east of the site boundary;
- River Crane at St Margaret's (Richmond side) is situated approximately 950m north of the site boundary;
- Duke of Northumberland's River south of Kneller Road is situated approximately 1.3km west of the site boundary;
- Petersham Lodge Wood and Ham House Fields are situated approximately 1.3km southeast of the site boundary;
- Duke of Northumberland's River north of Kneller Road is situated approximately 1.4km northwest of the site boundary;
- Ham Lands is situated approximately 1.5km southeast of the site boundary;
- Mogden Sewage Works is situated approximately 1.5km northwest of the site boundary;
- The Copse, Holly Hedge Field and Ham Avenues are situated approximately 1.6km east of the site boundary;
- Twickenham Road Meadow is situated approximately 1.6km northeast of the site boundary;
- Petersham Meadows is situated approximately 1.8km east of the site boundary;
- Terrace Field and Terrace Garden are situated approximately 2km east of the site boundary;
- Royal Mid-Surrey Golf Course is situated approximately 2km northeast of the site boundary;
- Strawberry Hill Golf Course is situated approximately 2km southwest of the site boundary;
- Teddington Cemetery is situated approximately 2km southwest of the site boundary.

Biodiversity Action Plans (BAPs)

- 13.4.3 The UK Biodiversity Action Plan (UK BAP) and the local Biodiversity Action Plan for Richmond (LBAP) are relevant for this site. A comprehensive list of the habitats and species listed on the Richmond LBAP are shown in Table 13-3.

Table 13-3 Richmond LBAP Habitats and Species

Habitat Action Plans (HAPs)	
Acid grasslands	Ancient parkland and veteran trees
Broad-leaved woodland	Tidal Thames
Reedbeds	
Species Action Plans (SAPs)	
Stag beetle (<i>Lucanus cervus</i>)	Song thrush (<i>Turdus philomelos</i>)
Mistletoe (<i>Viscum album</i>)	Water vole (<i>Arvicola terrestris</i>)
Bats (all species)	Tower mustard (<i>Arabis glabra</i>)

- 13.4.4 There are two areas of UKBAP priority habitat as defined on "Nature on the Map", situated within 2km of the site boundary. There is an area of lowland dry acidic grassland situated approximately 2km east of the site boundary and there is an area of mudflats situated approximately 2km north east of the site boundary.

Protected/Notable Species Records

Avifauna

- 13.4.5 Consultation with Greenspace Information for Greater London (GiGL) provided many records of avifauna within 2km of the site boundary. A summary of these records including the approximate distance of the closest record in relation to the site boundary are shown in Table 13-4. Consultation with the NBN Gateway identified no specific records of avifauna within 2km of the site boundary.

Badger (*Meles meles*)

- 13.4.6 Consultation with GiGL provided thirty five records of badger within 2km of the site boundary; the closest of which is situated approximately 900m south east of the site boundary. Consultation with the NBN Gateway identified no specific records of badger within 2km of the site boundary.

Bats

- 13.4.7 Consultation with GiGL identified four hundred and eighty six records of bats within 2km of the site boundary. A summary of these records including the approximate distance of the closest record in relation to the site boundary are shown in Table 13-5.

Table 13-4 Bird records provided by GiGL

Species	No. of records	Date	Closest record
House sparrow (<i>Passer domesticus</i>)	354	1998-2007	90m SE
Song thrush (<i>Turdus philomelos</i>)	258	1998-2006	300m N
Goldeneye (<i>Bucephala clangula</i>)	15	1987-2001	600m SE
Kingfisher (<i>Alcedo atthis</i>)	10	1987-2005	600m SE
Herring gull (<i>Larus argentatus</i>)	51	1987-2001	600m SE
Bullfinch (<i>Pyrrhula pyrrhula</i>)	11	1997-2006	600m SE
Dunnock (<i>Prunella modularis</i>)	111	1999-2002	900m S
Starling (<i>Sturnus vulgaris</i>)	78	1999-2005	1.1km W
Greylag goose (<i>Anser anser</i>)	1	1987	1.2km S
Smew (<i>Mergus albellus</i>)	1	1987	1.2km S
Hobby (<i>Falco subbuteo</i>)	8	1987	1.2km S
Golden plover (<i>Pluvialis apricaria</i>)	1	1987	1.2km S
Lapwing (<i>Vanellus vanellus</i>)	1	1987	1.2km S
Turtle dove (<i>Streptopelia turtur</i>)	2	1987	1.2km S
Cuckoo (<i>Curculus canorus</i>)	2	1987-1997	1.2km S
Lesser spotted woodpecker (<i>Dendrocopos minor</i>)	18	1987-2001	1.2km S
Skylark (<i>Alda arvensis</i>)	2	1987	1.2km S
Sand martin (<i>Riparia riparia</i>)	1	1987	1.2km S
Tree pipit (<i>Anthus trivialis</i>)	2	1987	1.2km S
Yellow wagtail (<i>Motacilla flava</i>)	2	1987	1.2km S
Fieldfare (<i>Turdus pilaris</i>)	7	1987-2004	1.2km S
Redwing (<i>Turdus iliacus</i>)	5	1987-2007	1.2km S
Reed bunting (<i>Emberzina schoeniclus</i>)	4	1997-2006	1.5km S
Common scoter (<i>Melanitta nigra</i>)	1	1987	1.5km NE
Common tern (<i>Sterna hirundo</i>)	9	1998-2001	1.8km E
Linnet (<i>Carduelis cannabina</i>)	1	2006	1.9km S

Table 13- 5 Bat records provided by GiGL

Species	No. of records	Date	Closest record
Pipistrelle species (<i>Pipistrellus sp.</i>)	177	1985-2007	281m NE
General bats (<i>Vespertilionade sp.</i>)	159	1999-2006	374m SE
Soprano pipistrelle (<i>Pipistrellus pygmaeus</i>)	1	2007	403m S
Noctule bats (<i>Nyctalus noctula</i>)	25	1994-2001	592m SE
Common pipistrelle (<i>Pipistrellus pipistrellus</i>)	23	1994-2007	698m SE
Unidentified bats (<i>Myotis sp.</i>)	39	2001-2006	699m S
Daubentons bats (<i>Myotis daubentonii</i>)	35	1994-2006	700m SE
Natterer's bats (<i>Myotis nattereri</i>)	12	2006	728m S
Nathusius' pipistrelle (<i>Pipistrellus nathusii</i>)	11	2006	821m S
Serotine bats (<i>Eptesicus serotinus</i>)	3	1994-2001	1305m E
Brown long-eared bat (<i>Plecotus auritus</i>)	1	2001	1908m S

- 13.4.8 Consultation with the London Bat Group also provided further information on bat roosts and sightings. A summary of these records including the approximate distance of the closest record in relation to the site boundary are shown in Table 13-6. Consultation with the NBN Gateway identified no records of bats within 2km of the site boundary.

Table 13- 6 Bat records provided by the London Bat Group

Species	No. of records	Roosts	Closest record
Pipistrelle species (<i>Pipistrellus sp.</i>)	76	19	281m NE
General bats (<i>Vespertilionidae</i>)	6		675m SE
Nathusius's bat	9		697m SE
Common pipistrelle	21		698m SE
Natterer's bat	8		728m S
Unidentified bat (<i>Myotis sp.</i>)	24		744m SE
Daubenton's bat	24		751m S
Noctule	21		806m S
Serotine	2		1210m E

Herpetofauna

- 13.4.9 Consultation with GiGL identified several herpetological records within 2km of the site boundary. A summary of these records including the approximate distance of the closest record in relation to the site boundary are shown in Table 13-7. Consultation with the NBN Gateway identified no specific records of amphibians or reptiles within 2km of the site boundary.

Table 13- 7 Herpetofauna records provided by GiGL

Species	No. of records	Date	Closest record
Common frog (<i>Rana temporaria</i>)	247	1999-2002	303m SW
Common toad (<i>Bufo bufo</i>)	10	1999-2002	447m W
Slow worm (<i>Anguis fragilis</i>)	1	1998	1908m S

Invertebrates

- 13.4.10 Consultation with GiGL identified many records of terrestrial invertebrates within 2km of the site boundary. A summary of these records including the approximate distance of the closest record in relation to the site boundary are shown in Table 13-8.

Table 13- 8 Invertebrate records provided by GiGL

Species	No. of records	Date	Closest record
Stag beetle	339	1998-2005	90m SE
White admiral (<i>Ladoga camilla</i>)	5	1999	800m S
Pirate spider (<i>Ero aphana</i>)	1	2007	1.9km S

- 13.4.11 Consultation with the NBN Gateway identified records of stag beetles known within the 100m grid square that encapsulates the western section of the site and cinnabar (*Tyria jacobaeae*) known within the 1km grid square that encapsulates the site.

Water vole (Arvicola terrestris)

- 13.4.12 Consultation with GiGL and the NBN Gateway identified no records of water vole within 2km of the site boundary.

Otter (Lutra lutra)

- 13.4.13 Consultation with GiGL and the NBN Gateway identified no records of otter within 2km of the site boundary.

Common dormouse (Muscardinus avellanarius)

- 13.4.14 Consultation with GiGL identified two records of common dormouse; both situated approximately 1.9km south of the development site. Consultation with the NBN Gateway identified no records of common dormouse within the 2km of the site boundary.

Invasive species

- 13.4.15 Consultation with GiGL and the NBN Gateway identified no specific records of invasive species within 2km of the site boundary.

Wild flora

- 13.4.16 Consultation with GiGL identified records of the following species of wild flora present within 2km of the proposed site. A summary of these records including the approximate distance of the closest record in relation to the site boundary are shown in Table 13-9. Consultation with the NBN Gateway identifies no specific records of wild flora within 2km of the site boundary.

Table 13-9 Wild flora records provided by GiGL

Species	No. of records	Date	Closest record
Mistletoe (<i>Viscum album</i>)	18	1995-2002	530m SW
Bluebell (<i>Hyacinthoides non-scripta</i>)	2	1999	900m E
Autumn squill (<i>Scilla autumnalis</i>)	1	1981	1.6km S
Corn buttercup (<i>Ranunculus arvensis</i>)	1	1982	1.7km S
Black poplar (<i>Populus nigra betulifolia</i>)	2	1995-2002	1.8km S

Trees

- 13.4.17 Consultation with the Planning Services at Richmond upon Thames London Borough Council (undertaken by telephone conversation on 7th July 2010) gave Wardell Armstrong LLP an informal opinion that from their records there appears to be no Tree Preservation Orders in place within the site boundary or the immediate surrounding area.
- 13.4.18 Due to the large potential penalties for illegally carrying out work to protected trees, it is recommended that a further check is carried out prior to any works commencing that may have an adverse impact upon the health of any trees identified in the TCP.

Field Survey

Habitats within the Zone of Influence

- 13.4.19 An Ecological walkover and Arboricultural survey of the site was initially undertaken in January 2009 by two Wardell Armstrong ecologists; these surveys were subsequently updated in June 2010. The main habitats within the survey area are described below. Additional details are shown on the Extended Phase 1 Habitat Plan (*Appendix H-1 of ES Volume III*) and Target Notes are listed in *Appendix H-4 of ES Volume III*. Details of the arboricultural survey are shown on the Tree Constraints Plan (*Appendix H-2 of ES Volume III*) and the Arboricultural Survey Sheets (*Appendix H-3 of ES Volume III*).

Hard standing and buildings

- 13.4.20 Approximately 0.5 hectares of the site comprises buildings, railway lines and car parking facilities (see Plate 13-2) associated with Twickenham Railway Station. The main station building (see Plate 13-1) situated in the south of the development site is brick with a flat felted roof. The footbridges associated with the station comprise brick and corrugated metal sides with an asbestos roof. In addition, there is a small building (see Plate 13-4) and bicycle shelter (see Plate 13-3) situated in the north of the site. The small building is made of brick with a flat felted roof and the bike shelter comprises a metal frame with glass panels.