HNLAP4A – HNL MEICA Appraisal Package
Mereway Sluice - Alternative Fish Pass Options

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Preliminary Ecological Appraisal

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Contents

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1. Introduction

1.1 Background

1.1.1 The scheme forms part of an Environment Agency (EA) appraisal package to upgrade and refurbish existing weir and sluices and part of this package includes Mereway Sluice. The sluice is located on the River Crane at its confluence with the Duke of Northumberland River (DNR) and controls flows in these two watercourses to prevent flooding and to maintain sufficient flow in the DNR to feed various water abstractions.

1.1.2 Part of the appraisal is to upgrade the existing Mereway Sluice, by replacing the existing tilting weir with a new one, and to include options to create a new fish and eel pass. Various options have been put forward to aid fish passage. At the time of survey, the current preferred option is to create a new water channel that connects the River Crane to the DNR.

1.1.3 Proposed works also include the relocation of stop logs. The current stop logs are stored 60m away from the sluice structure in an EA compound. At present, installation of the stop logs requires them to be moved from the compound, across the bridge and then to the right bank of the weir structure before they can be placed in position. This operation is a health and safety risk to the public and requires the closing of Mereway Road near the sluice and the adjacent footpath, inconveniencing the public. The preferred option is to create a new stop log storage area closer to the sluice on the left bank of the River Crane together with improvements to the current stop log installation access on the right bank, such as appropriate surface strengthening for cranage.

1.1.4 A construction compound consisting of storage and welfare facilities will be required for the duration of the works. The location of this is subject to landowner discussion but is currently proposed to be located on the triangle of land to the north of Mereway Sluice. Where space allows the existing area of hard-standing where stoplogs are currently stored will be utilised for construction purposes. Access to these areas will be via the road bridge on Mereway Road.

1.1.5 The works will require planning permission from London Borough of Richmond-Upon-Thames and will not fall under EA permitted development rights.

1.2 Scope of the report

1.2.1 This Preliminary Ecological Appraisal (PEA) report will focus on the proposed works located at and adjacent to Mereway Sluice (referred as 'the survey area' within this report).

1.2.2 The information provided in this report forms the basis for any further ecological surveys and impact assessments carried out for the site; provides information on key ecological constraints; and, summarises the requirements for further surveys and mitigation measures. This PEA report has also been prepared to provide information, where possible, to inform the design of the proposed works to the sluice and fish passage.

1.2.3 The aim of the PEA is to obtain information on existing ecological conditions, and to conduct a preliminary assessment of the likely ecological impacts on the proposed development sites. To achieve this, the following steps were taken:

- The desk study area and field survey area (including the 'zone of influence' of the scheme) have been identified.
- A desk study has been undertaken, comprising the use and reproduction of data from the Greenspace Information for Greater London (GIGL). Due to copyright restrictions, not all received information has been reproduced in full.
- Baseline information on the site and surrounding area has been recorded through an 'Extended Phase 1 Habitat Survey' (referred to from hereon in simply as 'P1HS') (JNCC, 2010) and obtaining further details in relation to notable or protected habitats and species.
- The ecological features present within the survey area have been evaluated, where possible.
- Invasive non-native species (INNS) of plants and animals (such as those listed on Schedule 9 of the Wildlife & Countryside Act [WCA]) have been described.
- Potential constraints to the proposed development have been identified.
- Recommendations for further survey have been made.
- Mitigation recommendations have been provided based on current information.

1.2.4 This PEA follows guidance published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2017). P1HS maps, with supporting target notes, are included in Appendix A and C. Photographs of the survey areas are presented in Appendix B. A description of relevant legislation, planning policy, and nature conservation status' are included in Appendix D. Appendix E contains protected and notable species and INNS records that are relevant to the proposed works.

1.3 Site location and context

1.3.1 The survey area is in Twickenham, Greater London. The scheme is located around the existing Mereway Sluice which is located to the north of Mereway Road. The survey area is located on the River Crane at its confluence with the DNR and adjacent areas within Kneller Park. The centre national grid reference for the survey area is TQ 14970 73345, nearest postcode is TW2 7SZ.

1.3.2 Part of the survey area is within Mereway Nature Park. The nature park is within the River Crane Corridor, which is a stretch of river corridor habitat that includes the River Crane and adjacent riparian habitat. The River Crane Corridor is also designated as a non-statutory designated site within Greater London.

1.3.3 The nature park is owned by the London Borough of Richmond and is managed by local interest groups and partnerships, namely the Crane Valley Partnership and Friends of the River Crane Environment (FORCE).

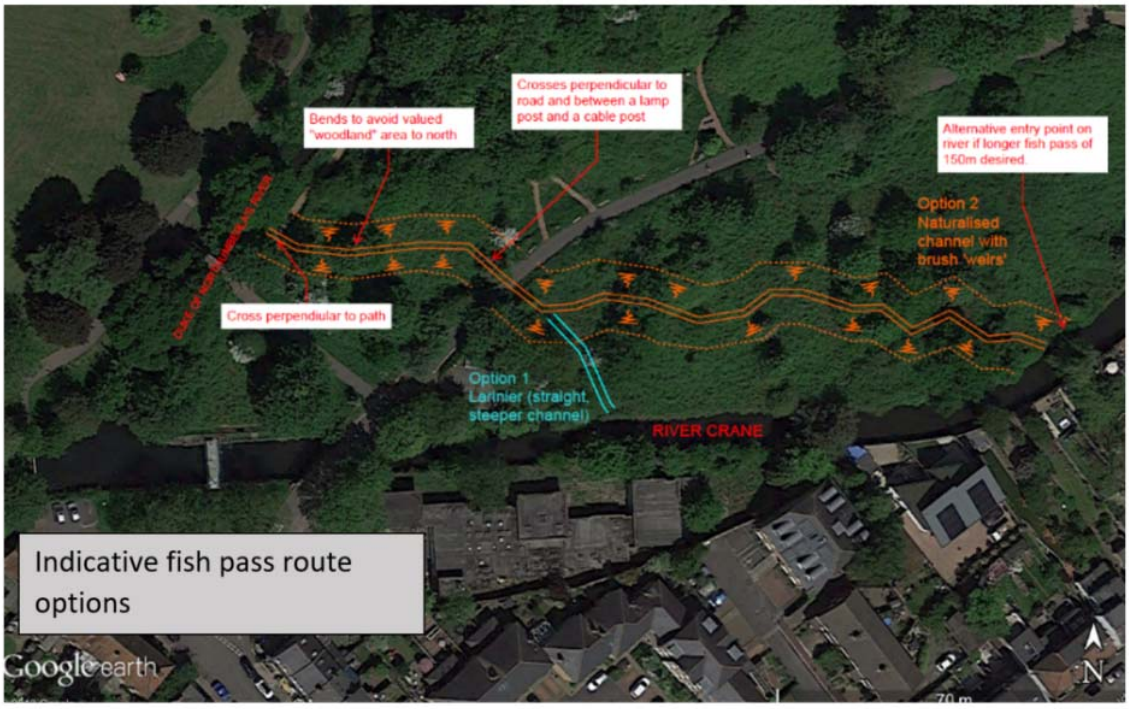
1.4 Scheme description

1.4.1 At present, fish and eels cannot pass further up and down stream of the River Crane and into the DNR due to the existing sluice that is blocking passage.

1.4.2 The proposed work will consist of building a new fish pass from the River Crane to connect to the DNR allowing fish and eels to pass freely into both watercourses. There are currently two options being considered (see Figure 1.1.). Option 1 consists of a shorter length of channel with a Larinier pass feeding in to the River Crane. Option 2 consists of a longer section of naturalised channel with brush weirs.

1.4.3 The banks of the new water channel will be landscaped with planting to improve visual amenity.

Figure 1.1: Indicative location of fish pass options



2. Methodology

2.1 Desk study and consultation

2.1.1 An ecological desk study was carried out for the survey area. A search for designated conservation sites within 2km of the site was carried out.

2.1.2 Ecological records, including protected and notable species, species included under Section 41 of Natural Environment and Rural Communities (NERC) Act 2006, and INNS, was also carried out for a 2km radius of the survey area.

2.1.3 Environmental information for the survey area was obtained from the following sources:

- MAGIC GIS database; and
- Greenspace Information for Greater London (GIGL).

2.2 Extended Phase 1 Habitat Survey

Habitats and flora

2.2.1 The P1HS was undertaken on 10th January 2019 by Gary Noble MCIEEM, GBV Ecologist. The survey methods were based on the Phase 1 Habitat Survey methodology (JNCC, 2010) and the *Guidelines for Preliminary Ecological Appraisal* (CIEEM, 2017).

2.2.2 All land parcels were mapped according to JNCC P1HS habitat types with target notes taken, as appropriate, to provide supplementary information on habitat conditions, features too small to map, species composition, structure and management.

Protected and notable species

2.2.3 During the survey, habitats were also assessed for their suitability to support protected and notable species, and field signs indicating their presence or absence recorded.

Invasive non-native species

2.2.4 The distribution and extent of widespread, visible INNS were also noted where found. A systematic survey for INNS was not conducted as part of the P1HS.

2.3 Assessment of ecological value

2.3.1 An indication of the ecological value of habitats and features identified during the appraisal which could be affected by the development, has been provided based on the *Guidelines for Ecological Impact Assessment* (CIEEM, 2018).

2.3.2 Each of the identified statutory and non-statutory sites, habitat types and associated species/populations has been attributed a biodiversity value reflecting their geographic significance; examples are provided below:

- **International** e.g. biodiversity feature that is designated or warrants designation as a Special Area of Conservation (SAC), Special Protection Area (SPA), or Ramsar site.
- **National** e.g. biodiversity feature that is designated or warrants designation as a Site of Special Scientific Interest (SSSI) or National Nature Reserve (NNR).

- **Regional** e.g. biodiversity feature which is one of the best examples of its type within London or Surrey.
- **Borough**, e.g. biodiversity feature that is designated or warrants designation as a Local Nature Reserve (LNR) or a Site of Nature Conservation Importance (SNCI), or other feature which is one of the best examples of its type within the Borough.
- **Local**, e.g. biodiversity feature which is one of the best examples of its type within a local context (i.e. within ~1km of the scheme extent).
- Biodiversity features of value **within the zone of influence** (site plus approximately 250m buffer).
- Biodiversity features of **negligible** value.

2.3.3 Biodiversity values have also been based upon the following factors:

- Presence of sites or features designated for their nature conservation interest. Examples include internationally, nationally or locally designated sites.
- Size of habitat or species population, habitats or species which are rare, species rich assemblages, species which are endemic or on the edge of their range, large populations or concentrations of uncommon or threatened species and/or plant communities that are typical of valued natural/semi-natural vegetation types.
- Secondary and supporting value, for example, habitats or features which provide a buffer to valued features or which serve to link otherwise isolated features.
- Presence of legally protected sites or species.
- Presence of UK habitats of principal importance and species (Section 41 of the NERC Act).

2.4 Limitations

2.4.1 No access was obtained for private gardens or businesses. Not all areas of the survey area were accessible due to thick vegetation cover. These areas included the eastern part of option 2 for the new channel and the southern part for option 1 in the area for the Larinier channel. Aerial maps were used to assess the habitats in these areas and does not significantly affect the results of the assessment, given the relatively small areas that could not be accessed.

2.4.2 The survey undertaken for this report does not comprise a full list of plants and animals that may be present within the survey area. The survey was undertaken in January outside the optimal period to record habitats and species. The optimal period is considered to be between April and September. However, given the habitats present within the survey area, this does not significantly affect the results of the assessment.

2.4.3 Information obtained during a desk study is dependent upon people and organisations having made and submitted records for the area of interest. As such, a lack of records for a habitat or species does not necessarily mean that the habitats or species do not occur in the study areas. Likewise, the presence of records for habitats and species does not automatically mean that these still occur within the area of interest or are relevant in the context of the proposed development.

2.4.4 The protected species appraisal provides a preliminary view of the likelihood of protected species occurring at the site. It should not be taken as providing a full and definitive survey of any protected species group.

3. Results and Evaluation

3.1 Desk study

Designated sites

3.1.1 Table 3-1 provides details of the designated nature conservation sites within 2km of the site, including their reasons for notification.

Table 3-1: Designated nature conservation sites within 2 km of the survey area

Designated Site Name	Distance from Survey area (approx.)	Reasons for Notification and integral value
Statutory Sites		
Ham Lands Local Nature Reserve (LNR)	1.2km south-east of site	Extensive area of grassland and scrub habitats. Area was once excavated for gravel and backfilled with a variety of soils creating a unique mosaic of different vegetation. Site supports good numbers of flowering plants and birds. **Borough Value**
Crane Park Island LNR	2km west of site	Once the old Hounslow Gunpowder Mills, this island is now a wildlife haven surrounded by the River Crane. Habitats include grassland, wet woodland, reedbed and a pond. Animals include kingfishers, water voles and common frog. **Borough Value**
Non-statutory Sites		
River Crane Corridor Site of Nature Conservation Importance (SNCI)	0km from site	A tributary of the River Thames running through West London. Important large wildlife corridor running through an urban environment. Comprises a wide variety of habitats including the river, marginal wetland, scrub and woodland supporting a range of protected and notable species. **Regional Value**
Duke of Northumberland River SNCI	0km from site	Artificial watercourse which draws water from the River Crane at Kneller Gardens. River corridor habitat within an urban environment. **Borough Value**
Twickenham Junction Rough SNCI	0.58km east from site	Parkland habitat. **Local Value**
River Crane at St Margaret's SNCI	0.9km east from site	River corridor habitat. **Borough Value**
River Thames and Tidal Tributaries SNCI	1.25km east from site	Section of the River Thames, important wildlife corridor stretching through the centre of London. **Regional Value**
Ham Lands SNCI	1.33km east from site	Extensive area of grassland and scrub habitats. **Borough Value**

Designated Site Name	Distance from Survey area (approx.)	Reasons for Notification and integral value
Marble Hill Park and Orleans House Gardens SNCI	1.91km east of site	Landscaped gardens with meadows, woodland and old trees. **Local Value**
Moor Mead Recreation Ground SNCI	1.5km east from site	Parkland habitat adjacent to the River Crane. **Local Value**
Mogden Sewage Works SNCI	1.35km north of site	Large sewage plant surrounded by scrub and woodland habitat. Duke of Northumberland River runs through the centre of the site. **Borough Value**
Twickenham Cemetery SNCI	1.1km west of site	Cemetery containing woodland and mature trees supporting protected species. **Local Value**
Hounslow, Feltham and Whitton Junctions SNCI	1.48 west of site	Wildlife corridor along existing railway sidings. **Local Value**
Fulwell and Twickenham Golf Course SNCI	1.37km south-west of site	Golf course within an urban environment. **Borough Value**
Strawberry Hill Golf Course SNCI	1.08km south of site	Golf course within an urban environment **Borough Value**
Teddington Cemetery SNCI	1.41km south of site	Cemetery containing woodland and mature trees supporting protected species. **Local Value**

Protected and notable species

3.1.2 Desk top details of species records are provided in Appendix E and included in species accounts in Section 3.2 below.

3.2 Field survey & extended phase 1 habitat survey

3.2.1 The following sections detail the findings of the P1HS and the desk based study, which included mapping all habitats and an assessment of suitability of habitats to support protected and notable species. The P1HS plans and target notes (TN) providing supplementary information are included in Appendix A and C. Photographs of key features are included in Appendix B.

3.2.2 Habitats of principal importance have also been identified and included within the appraisal. UK habitats of principal importance are those that have were identified as being the most threatened and requiring conservation action under Section 41 of the NERC Act 2006.

3.3 Habitats and flora

Dense scrub

3.3.1 Dense scrub habitat has formed in the eastern part of the survey area from the disused abandoned allotments. Scrub habitat is dominated by bramble *Rubus fruticosus* scrub. Mixed in amongst the bramble scrub is hawthorn *Crataegus monogyna,* young and scattered trees that have self-seeded from sycamore *Acer pseudoplatanus* and oak trees. Within the scrub are small open patches of unmanaged areas that contain

common species such as nettle *Urtica dioica*, docks and common cleaver *Galium aparine*.

Amenity grassland

3.3.2 Amenity grassland is the dominant habitat type within Kneller Park. The grassland is managed through regular mowing and kept as amenity grassland. On the edges of the managed grassland areas are scattered semi-mature beech *Fagus sylvatica,* sycamore, and species of maple and oak trees.

Standard trees

3.3.3 Numerous trees are scattered amongst the survey area. These include semi mature trees on the edges of the amenity grassland areas and mature oak and willow trees that are adjacent to the rivers. There are also semi mature trees that line the access road that separates the two areas of dense scrub habitat. FORCE[1] have identified a large walnut *Juglans regia* tree located on the banks of the River Crane.

Rivers

3.3.4 The River Crane and the DNR diverge within the survey area, ranging in width from 5 to 10m. There is very little aquatic and marginal vegetation along the rivers in the survey area and adjacent riparian habitat is scrub, amenity grassland and scattered trees. The River Crane and DNR, in other locations, have been noted for supporting a diverse mix of aquatic and marginal plants, including at least four species of pondweed, bur-reeds and regionally uncommon plants.

Evaluation

3.3.5 The trees, amenity grassland and scrub habitats within the survey area range in ecological value from **negligible** to **local.** These habitats are common and widespread within the area and have limited ecological value. However, it must be noted that the bramble scrub is particularly important for supporting a range of breeding birds, including some notable species, so this increases the ecological value of the scrub habitat to **local** value.

3.3.6 The presence of two rivers within the survey area increases the ecological value as rivers are classed as habitats of principal importance under S41 of the NERC Act. These habitats act as important wildlife corridor linking up aquatic and riparian habitats across a large area of Greater London.

3.3.7 Overall the survey area and habitats within it are considered to be of **local** ecological value.

3.4 Protected, notable and species of principal importance

Bats

3.4.1 All bats are protected against killing, injury, disturbance, obstruction, or damage to breeding sites or resting places by the Wildlife and Countryside Act (WCA) and Habitat Regulations.

[1] www.force.org.uk

3.4.2 GIGL have various records of bats within the survey area. Species include the more common bat species such common pipistrelle *Pipistrellus* and soprano pipistrelle *Pipistrellus pygmaeus,* which have been recorded close to the proposed working area. Within the search area there are also records of Daubenton's bat *Myotis daubentonii*, noctule *Nyctalus noctule* and Leisler's bat *Nyctalus leisleri*, but these have not been recorded close to the survey area.

3.4.3 There are mature oak and willow trees that border the rivers (refer to target notes within Phase 1 habitat plan) within the survey area that have low to moderate bat roost potential and these trees will be close to the working area. Bats will be using the river corridor and adjacent areas for foraging and commuting.

3.4.4 The survey area contains a mosaic of habitats that is likely to support roosting, commuting and foraging bats. Overall, the survey area is considered to be of **local** value for roosting, foraging and commuting bats.

Reptiles

3.4.5 Reptiles have legal protection against killing and injury under the WCA and are Species of Principal Importance under S41 of the NERC Act.

3.4.6 The desk study found three reptile species recorded within the 2km search area; slow worm *Anguis fragilis,* grass snake *Natrix helvetica* and adder *Vipera berus.* None of these records are located within 1km of the survey area. The scrub and unmanaged habitats within the survey area however, has good potential to support reptiles.

3.4.7 Small numbers of reptiles are likely to be using the site and the survey area is likely to be of value **within the zone of influence** only for reptiles.

Badger

3.4.8 Badgers *Meles* are protected from disturbance whilst occupying a sett, through the Protection of Badgers Act 1992.

3.4.9 No badger setts or signs were recorded during the survey. The survey area is generally suitable to support badgers for sett creation and foraging. Badgers are a common species and protected against persecution only. Overall, the site is considered to have **local** value for badgers in the context of the surrounding landscape.

Birds

3.4.10 All birds, their nests and eggs are protected under Sections 1-8 of the WCA making it an offence to damage or destroy the nest of a wild bird whilst breeding. Certain species of bird receive additional protection under Schedule 1 of the WCA (Schedule 1 birds), which affords them protection against disturbance.

3.4.11 Desk study found numerous records of bird species within the search area. These include Schedule 1 species, species of principal importance and species listed on the RSPB red and amber lists birds of conservation concern (Eaton *et al*, 2015). Species of note include Schedule 1 species such as kingfisher *Alcedo atthis* and fieldfare *Turdus pilaris.* Other notable species include house sparrow *Passer domesticus*, song thrush *Turdus philomelos* and dunnock *Prunella modularis.*

3.4.12 The mosaic of habitats, particularly the bramble scrub, within the survey area has a high potential to support a range of breeding birds. It is considered that the survey area is of **local** ecological value for breeding birds.

Great crested newts (GCN)

3.4.13 GCN *Triturus cristatus* are protected against killing, injury, disturbance, obstruction, or damage to breeding sites or resting places by the WCA and Habitat Regulations.

3.4.14 There are no records of GCN using GIGL data. The waterbodies within the survey area, such as the rivers, are not suitable waterbodies to support GCN as they are flowing rivers and contain fish. Using OS mapping, there are no known ponds or waterbodies within a 500m radius of the survey area.

3.4.15 Additionally, the survey area is in a highly urbanised area and roads and railways lines, as well as the rivers, will act as significant barriers to dispersal to the survey area.

3.4.16 As there are no records of GCN in the survey area and there is no suitable aquatic habitat, such as ponds, it is considered likely that this species is absent from the survey area. As such, the survey area is considered to be of **negligible** value for GCN.

Water vole

3.4.17 Water voles *Arvicola amphibious* are protected under the WCA where it is an offence to intentionally damage or obstruct access to water vole burrows. They are also a Species of Principal Importance under S41 of the NERC Act.

3.4.18 Water voles are known to be present further up the River Crane corridor within and close to Crane Park LNR. There are also known small populations of water vole located on the DNR.

3.4.19 The river banks within the survey area are mostly unsuitable for water voles as the banks are lined with wooden planks or concrete which would prevent water voles from creating burrows. However, not all areas of the river banks could be accessed to look for the potential for water vole due to thick vegetation cover within some areas of the river banks.

3.4.20 As there are limited opportunities for water voles to create burrows, it is considered that the sections of the watercourses in the survey area is considered to be of **negligible** value for water vole. This could increase to **local** value following more detailed surveys if suitable habitat is identified.

Otter

3.4.21 Otter *Lutra* are protected against killing, injury, disturbance, obstruction, or damage to breeding sites or resting places by the WCA and Habitat Regulations.

3.4.22 There are no records of otter using GIGL data. However, otter are known to present on the River Thames and its tributaries. Otters have large territories and they could use the rivers within the survey area to move across the wider landscape. The adjacent terrestrial habitats next to the rivers in the survey area have a low potential to support otter holts.

3.4.23 It is considered that the survey area is of value **within the zone of influence** only for otter.

Terrestrial invertebrates

3.4.24 Some invertebrate species are protected under the Habitat Regulations and the WCA or are listed as notable species within Red Data Books as Nationally Rare or Scarce. Some species are also listed under S41 of the NERC Act as Species of Principal Importance.

3.4.25 The mosaic of habitats within the survey area have the potential to support a range of invertebrate species. From GIGL, there are numerous records of invertebrate species within the search area, which includes many records of stag beetle *Lucanus cervus,* which have been recorded close to the survey area. Within the survey area, suitable habitat exists from available dead wood associated with adjacent mature and semi mature trees. Stag beetles are a species protected under the WCA and a species of principal importance under S41 of the NERC Act.

3.4.26 Other invertebrate groups include Hymenoptera (bees & wasps), Lepidoptera (butterflies & moths), Diptera (flies) and Coleoptera (beetles) which have been recorded, most noticeably in Crane Park, located over 1km from the survey area.

3.4.27 As there is suitable habitat within the survey area for invertebrates and records of protected and notable species of invertebrates within the search area, it is considered that the survey area is of **local** ecological value for invertebrates.

Other species of principal importance

3.4.28 There are records of western European hedgehog *Erinaceus europaeus* within the survey area which are species of principal importance. The mosaic of habitats within the survey is highly suitable to support hedgehogs. It is considered that the survey area is of **local** ecological value for hedgehogs.

3.4.29 There are numerous records of fish associated with the adjacent River Crane which include more common species such as bullhead *Cottus gobio* and chub *Squalius cephalus.* There are records of European eel *Anquilla anguilla* within the survey area, which is a species of principal importance under S41 of the NERC Act.

3.4.30 It is considered that the survey area is of **local** ecological value for fish.

3.5 Invasive non-native species

3.5.1 There are desk study records of Himalayan balsam *Impatiens glandulifera* within the survey area. This species is likely to be widespread within the survey area as this is common and regularly grows along river banks. There are also records of Japanese knotweed *Fallopia japonica* and orange balsam *Impatiens capensis* within the search area which are both species listed on Schedule 9 of the WCA.

3.5.2 No systematic search was made for INNS during the P1HS. It is likely that the current data set for INNS is not a complete and reliable list of all INNS currently within the study area. Given the nature of the site (heavily disturbed, urban-rural environment), the risk of INNS being more widespread than currently recorded or additional unrecorded species being found is considered to be high, including in the aquatic environment.

4. Discussion and recommendations

4.1 Introduction

4.1.1 The results of the desk study and P1HS have identified the following potential ecological features which may be affected (directly or indirectly) from the scheme proposals as they are currently known, in the absence of mitigation and reasonable avoidance measures. Possible effects are discussed below, along with any required further survey work and /or measures to be employed to mitigate for the potential effects of the scheme on the identified ecological receptors. This assessment of impacts and recommendations should be reviewed as design is developed.

4.2 Designated sites

4.2.1 There are no statutory designated sites within 2km of the survey area and none will be affected by proposed works. Two non-statutory designated sites are in the survey area located close to proposed works. The two non-statutory sites are primarily designated for river habitat and associated riparian habitats. There should be no impacts to the non-statutory designated sites, provided that best practice is followed in relation to pollution prevention during construction to prevent any impacts to water quality adjacent and further downstream of the survey area.

4.3 Habitats and flora

4.3.1 There will be a partial loss of scrub habitat as described in section 3.3 and the removal of young trees will be required to carry out the proposed works. There will only be a small loss of the scrub habitat compared to the scrub habitat that will be retained. However, the scrub habitat within the survey area supports and has the potential to support a range of protected species, most noticeably a range of breeding birds.

4.3.2 The scrub habitats within the survey area should be retained and protected adjacent to the construction footprint to minimise the amount of the scrub habitat removal.

4.4 Protected and notable species

Bats

4.4.1 Bats are likely to be present and using the survey area due to habitat features within and adjacent to the site that would be used for roosting, commuting and foraging. Any loss of trees with bat roost potential as a result of the works, will require further inspections and potentially surveys to determine if bat roosts are present. Similarly, if works are considered likely to cause any significant noise and/or light impacts, which would have the potential to disturb bats roosting in trees (if present), further surveys should be undertaken.

4.4.2 Any further surveys or inspections that are required should be carried out in line with best practice survey methodologies, (Bat Conservation Trust, 2016).

Reptiles

4.4.3 The survey area, particularly in the unmanaged scrub habitats, has potential to support low numbers of reptiles and vegetation will need to be removed sensitively.

4.4.4 Before the proposed works proceed, the habitat suitable for reptiles will need to be removed sensitively to discourage reptiles from the working area. Where works are small-scale and habitat manipulation is considered likely to be effective, clearance of scrub and unmanaged grassland should be undertaken in two stages over two consecutive days to allow reptiles to disperse into the adjacent scrub habitat. This can only be undertaken in mild weather conditions (and between April and October) when reptiles are active i.e. when the temperature does not fall below 9 degrees centigrade overnight (Langton *et al.*, 2001) and where suitable adjacent habitat is retained.

Badger

4.4.5 No badger setts were recorded during the P1HS. The habitats within 30m of works, storage and access areas should be re-assessed prior to construction to confirm the absence/presence of badger setts. Badgers are protected whilst occupying a sett and mitigation may be required if an active sett(s) is discovered. The works are not anticipated to have a significant impact on wider badger territory.

Birds

4.4.6 Vegetation removal for the scheme to allow for the proposed works will have the potential to impact on breeding birds using the habitats within the survey area.

4.4.7 Vegetation clearance (e.g. trees and scrub) should be undertaken outside of the peak bird breeding season (March to September inclusive). If clearance is required during this period, nesting bird checks should be undertaken by a suitably qualified ecologist prior to clearance. If an active nest is identified, work must cease until the young have fledged.

4.4.8 Scrub habitat should be retained and protected adjacent to the proposed works to limit the amount of habitat removal.

Great crested newt

4.4.9 Great crested newts (GCN) are considered very unlikely to be present within the survey area considering the general lack of ponds and no desk study records. The recommendations outlined above for reptiles will also help to reduce the small risk of impacts upon other more common amphibians within the survey area.

4.4.10 If GCN are encountered works should stop, and suitable mitigation should be put in place, which may include working under a European Protected Species (EPS) licence.

Aquatic species

4.4.11 Works next to the river to follow the latest pollution prevention guidelines to prevent any impacts to water quality: Pollution prevention for businesses' (DEFRA, 2016) and the Construction Industry Research and Information Association (CIRIA) guidance on the control of water pollution from construction sites (CIRIA, 2001). Environment Agency Fisheries team should be contacted to confirm any requirement for mitigation in relation to fish.

4.5 Invasive non-native species

4.5.1 There are limited records of INNS within the search area. Himalayan balsam is likely to be present along the river banks. However, not all areas of the survey area could be accessed to determine the location of INNS. Given the nature of the site, heavily disturbed and within an urban environment, the likelihood of INNS being present within the survey area is likely to be high.

4.5.2 It is recommended that pre-construction checks are carried out within the survey area for presence of INNS. A Biosecurity Method Statement should be prepared to ensure no spread in or out of the site of INNS, including aquatics which are widespread in the catchment.

5. Biodiversity Enhancement

5.1.1 The proposed works have the opportunity to increase the biodiversity value of the site:

- The banks of the new water channel to be planted with aquatic and marginal planting to increase the botanical interest of the survey area and increase habitat for protected species such as water voles;
- Vegetation management to enhance existing habitats. Scrub management to open up the scrub areas to create a mosaic of habitats;
- Erection of bird and bat boxes within suitable locations to encourage a range of species; and
- Management of any invasive species.

6. Conclusions

6.1.1 No statutory designated sites will be affected by the proposed works. Works will take place adjacent to two non-statutory SNCI sites. There should be no impacts to the non-statutory designated sites, provided that best practice is followed in relation to pollution prevention during construction to prevent any impacts to water quality.

6.1.2 The dominant habitat types within the survey area are trees, scrub, amenity grassland and river habitats. These habitats combined are considered to have local ecological value. The current design is likely to predominantly effect scrub habitat.

6.1.3 The survey area supports and has the potential to support protected species, which includes bats, badger, reptiles, water voles, breeding birds and invertebrates. Further surveys and work are recommended for the following:

- Bat surveys are required if any mature trees suitable for bat roosts are to be affected by proposed works. Trees with bat roost potential have been identified on the banks of the rivers as shown on the accompanying Phase 1 Habitat map; Appendix A)
- Further surveys to establish the potential for water voles in areas that could not be accessed during the PEA survey in areas of potential disturbance;
- Pre-construction check for the presence of non-native plant species within the area of proposed works;

- Pre-construction checks for the presence of badger setts or activity within the area of proposed works;

- Arboricultural survey to BS5837:2012 guidelines to determine root protection zones of mature trees and develop a arboricultural method statement and tree protection plan; and

- If possible, any vegetation clearance should be undertaken in September when there is a lower risk of nesting birds being present and any reptiles are still active. If vegetation removal is required during the nesting bird season (typically considered as March to September inclusive) then it should be monitored under an ecological watching brief. If any nests are found, works must cease until the young have fledged.

7. References

7.1 Documents

Name of document

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Eaton, M.A., Aebischer, N.J., Brown, A., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A., & Gregory, R.D. (2015). Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. *British Birds*, 108: 708-746.

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Langton T, Beckett C and Foster J (2001). *Great Crested Newt Conservation Handbook.* Froglife, Suffolk.

7.2 Datasets

Name of dataset

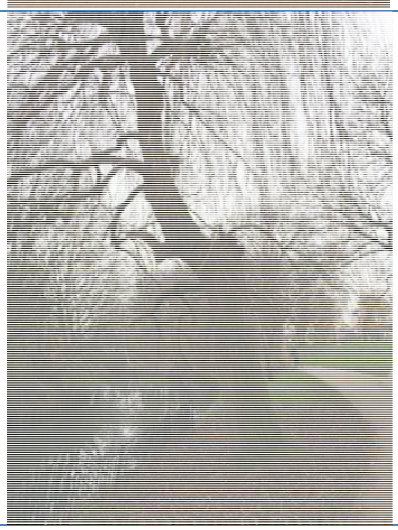
- Greenspace Information for Greater London (GIGL). Data sets for non-statutory designated sites, Surrey rare records and protected species

8. Appendices

Appendix A: Extended Phase 1 Habitat Map

Figure number	Description of figure
122749_BVL_Z0_320-DR-1-00001	Phase 1 Habitat Plan

Appendix B: Photographs

Photograph 1: Oak tree with bat roost potential (TN1) adjacent to the Duke of Northumberland River	
Photograph 2: Oak tree with bat roost potential (TN2) adjacent to the Duke of Northumberland River	
Photograph 3: Willow tree with bat roost potential (TN3) adjacent to the River Crane	

Photograph 4: Open area of managed amenity grassland associated with Kneller Park (TN4). The edges of the amenity grassland contain scattered semi mature standard trees such as beech, sycamore and oak.	
Photograph 5: Bank of Duke of Northumberland River lined with scrub habitat showing bank lined with wooden planks	
Photograph 6: Bank of Duke of Northumberland River bank lined with wooden planks (TN5)	
Photograph 7: area of dense bramble scrub with young trees (TN6)	

Photograph 7: area of dense bramble scrub with young trees (TN7)	
Photograph 8: section of River Crane showing scrub habitat and concrete lined banks (TN8)	
Photograph 9: existing sluice on River Crane showing concrete lined banks	

Appendix C: Phase 1 Habitat Target Notes (TN)

TN No.	Target Notes
1	Oak tree with bat roost potential
2	Oak tree with bat roost potential
3	Willow tree with bat roost potential
4	Open area of managed amenity grassland associated with Kneller Park. The edges of the amenity grassland contain scattered semi mature standard trees such as beech, sycamore and oak.
5	Duke of Northumberland River. Section in survey area tree lined on left bank and scrub habitat on right bank. Wooden planks line the river bank in this section.
6	Area of dense bramble scrub with young sycamore and oak trees growing amongst the bramble scrub.
7	Area of dense bramble scrub with young sycamore and oak trees growing amongst the bramble scrub.
8	River Crane. Section in survey area that is lined by scrub habitat on both banks. Banks are concrete lined.

Appendix D: Legislation, Planning Policy & Conservation Status

Note that the details provided in this appendix are for general guidance only, and should not be relied upon as a definitive statement of the law. The legislation is only applicable in Britain only (i.e. not the Isle of Man, Northern Island, the Republic of Ireland or the Channel Islands.). Only legislation applicable to this scheme is provided here.

National and European Legislation Afforded to Habitats

International Statutory Designations

Special Protection Areas (SPAs) are sites of European importance and are designated under the EC Birds Directive 2009/147/EC on the conservation of wild birds respectively. They form part of the wider Natura 2000 network across Europe.

SPAs are classified under Article 2 of the EC Birds Directive both for rare bird species (as listed on Annex I) and for important migratory species.

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. The Convention covers all aspects of wetland conservation and recognises the importance of wetland ecosystems in relation to global biodiversity conservation. The Convention refers to wetlands as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres" however they may also include riparian and coastal zones. Ramsar sites are statutorily protected under the Wildlife & Countryside Act 1981 (as amended) with further protection provided by the Countryside and Rights of Way (CRoW) Act 2000. Policy statements have been issued by the Government in England highlighting the special status of Ramsar sites. The Government in England has issued policy statements which ensure that Ramsar sites are afforded the same protection as areas designated under the EC Birds as part of the Natura 2000 network (e.g. SPAs).

National Statutory Designations

Sites of Special Scientific Interest (SSSI) are designated by nature conservation agencies in order to conserve key flora, fauna, geological or physiogeographical features within the UK. The original designations were under the National Parks and Access to the Countryside Act 1949 but SSSIs were then re-designated under the Wildlife & Countryside Act 1981 (as amended). As well as reinforcing other national designations (including National Nature Reserves), the system also provides statutory protection for terrestrial and coastal sites which are important within the European Natura 2000 network and globally. Further provisions for the protection and management of SSSIs have been introduced by the Countryside and Rights of Way Act 2000.

Local Statutory Designations

Local authorities in consultation with the relevant nature conservation agency can declare ***Local Nature Reserves (LNRs)*** under the National Parks and Access to the Countryside Act 1949. LNRs are designated for flora, fauna or geological interest and are managed locally to retain these features and provide research, education and recreational opportunities.

Non- Statutory Designations

All non-statutorily designated sites are referred to as ***Local Wildlife Sites (LWS) or Sites of Interest for Nature Conservation (SINC),*** and can be designated by the local authority for supporting local conservation interest. Combined with statutory designation, these

sites are considered within Local Development Frameworks under the Town and Country Planning system and are a material consideration during the determination of planning applications. The protection afforded to these sites varies depending on the local authority involved.

National and European Legislation Afforded to Species

The EC Habitats Directive aims to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those species of European importance. The Directive is transposed into UK law by The Conservation of Habitats and Species Regulations (amended) 2011 (the Habitat Regulations) and the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended). The following notes are relevant for all species protected under the EC Habitats Directive:

In the Directive, the term 'deliberate' is interpreted as being somewhat wider than intentional and may be thought of as including an element of recklessness.

The Habitat Regulations do not define the act of 'migration' and, therefore, as a precaution, it is recommended that short distance movement of animals for e.g. foraging, breeding or dispersal purposes are also considered.

In order to obtain a European Protected Species Mitigation licence, the application must demonstrate that it meets all of the following three 'tests':

- the action(s) are necessary for the purpose of preserving public health or safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequence of primary importance for the environment;
- there is no satisfactory alternative; and
- the action authorised will not be detrimental to the maintenance of the species concerned at a favourable conservation status in their natural range.

The Wildlife and Countryside Act 1981 (as amended) is the principle mechanism for the legislative protection of wildlife in Great Britain. It does not extend to Northern Ireland, the Channel Islands or the Isle of Man. This legislation is the means by which the Convention on the Conservation of European Wildlife and Natural Habitats (the 'Bern Convention') and the European Union Directives on the Conservation of Wild Birds (79/409/EEC).

The WCA 1981 has been subject to a number of amendments, the most important of which are through the Countryside and Rights of Way (CRoW) Act (2000) and Nature Conservation (Scotland) Act 2004.

Other legislative Acts affording protection to wildlife and their habitats include:

- Deer Act 1991
- Natural Environment & Rural Communities (NERC) Act 2006
- Protection of Badgers Act 1992
- Wild Mammals (Protection) Act 1996

Badgers

Badgers *Meles meles* are protected under The Protection of Badgers Act 1992 which makes it an offence to:

- Wilfully kill, injure, take, or attempt to kill, injure or take a badger
- Cruelly ill-treat a badger, including use of tongs and digging
- Possess or control a dead badger or any part thereof
- Intentionally or recklessly damage, destroy or obstruct access to a badger sett[2] or any part thereof
- Intentionally or recklessly disturb a badger when it is occupying a badger sett
- Intentionally or recklessly cause a dog to enter a badger sett
- Sell or offers for sale, possesses or has under his control, a live badger

Impacts of legislation on development works

A development licence will be required from the relevant countryside agency for any development works liable to affect an active badge sett, or to disturb badgers whilst they occupy a sett. Guidance has been issued to define what would constitute a licensable activity[3]. It is not possible to obtain a licence to translocate badgers.

Birds

With certain exceptions, all birds, their nests and eggs are protected under Sections 1-8 of the WCA. Among other things, this makes it an offence to:

- Intentionally (or recklessly in Scotland) kill, injure or take any wild bird
- Intentionally (or recklessly in Scotland) take, damage or destroy (or, in Scotland, otherwise interfere with) the nest of any wild bird while it is in use or being built
- Intentionally take or destroy an egg of any wild bird
- Sell, offer or expose for sale, have in his possession or transport for the purpose of sale any wild bird (dead or alive) or bird egg or part thereof

Certain species of bird, for example the barn owl, bittern and kingfisher receive additional protection under Schedule 1 of the WCA and Annex 1 of the European Community Directive on the Conservation of Wild Birds (2009/147/EC) and are commonly referred to as "Schedule 1" birds. This affords them protection against:

- Intentional or reckless disturbance while it is building a nest or is in, on or near a nest containing eggs or young
- Intentional or reckless disturbance of dependent young of such a bird

Impacts of legislation on development works

Works should be planned to avoid the possibility of killing or injuring any wild bird, or damaging or destroying their nests. The most effective way to reduce the likelihood of nest destruction in particular is to undertake work outside the main bird nesting season which typically runs from March to August. Where this is not feasible, it will be necessary to have any areas of suitable habitat thoroughly checked for nests prior to vegetation clearance.

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[2] A badger sett is defined in the legislation as *"any structure or place which displays signs indicating current use by a badger"*. This includes seasonally used setts. Natural England (2009) have issued guidance on what is likely to constitute current use of a badger sett: www.naturalengland.org.uk/Images/WMLG17_tcm6-11815.pdf

[3] For guidance on what constitutes disturbance and other licensing queries, see Natural England (2007) Badgers & Development: A Guide to Best Practice and Licensing. www.naturalengland.org.uk/Images/badgers-dev-guidance_tcm6-4057.pdf, Natural England (2009) Interpretation of 'Disturbance' in relation to badgers occupying a sett www.naturalengland.org.uk/Images/WMLG16_tcm6-11814.pdf,

Schedule 1 birds are additionally protected against disturbance during the nesting season. Thus, it will be necessary to ensure that no potentially disturbing works are undertaken in the vicinity of the nest. The most effective way to avoid disturbance is to postpone works until the young have fledged. If this is not feasible, it may be possible to maintain an appropriate buffer zone or standoff around the nest.

Herpetofauna (amphibians and reptiles)

The great crested newt *Triturus cristatus* receives full protection under the Habitat Regulations through their inclusion on Schedule 2. Regulation 41 prohibits:

- Deliberate killing, injuring or capturing of Schedule 2 species

With the exception of the pool frog, these species are also listed on Schedule 5 of the WCA and they are additionally protected from:

- Intentional or reckless disturbance (at any level)
- Intentional or reckless obstruction of access to any place of shelter or protection
- Selling, offering or exposing for sale, possession or transporting for purpose of sale.

Other native species of herpetofauna are protected solely under Schedule 5 of the WCA. Species such as the adder *Vipera berus*, grass snake *Natrix*, common lizard *Zootoca vivipara* and slow-worm *Anguis fragilis* are listed in respect to Section 9(1) & (5). For these species, it is prohibited to intentionally (or recklessly in Scotland) kill or injure these species

Impacts of legislation on development works

A European Protected Species Mitigation (EPSM) Licence issued by the relevant countryside agency (e.g. Natural England) will be required for works liable to affect the breeding sites or resting places amphibian and reptile species protected under Habitat Regulations. A licence will also be required for operations liable to result in a level of disturbance which might impair their ability to undertake those activities mentioned above (e.g. survive, breed, rear young and hibernate). The licences are to allow derogation from the relevant legislation, but also to enable appropriate mitigation measures to be put in place and their efficacy to be monitored.

Although not licensable, appropriate mitigation measures may also be required to prevent the intentional killing or injury of adder, grass snake, common lizard and slow worm, thus avoiding contravention of the WCA.

Water voles

The water vole *Arvicola amphibius* fully protected under Schedule 5 of the WCA. This makes it an offence to:

- Intentionally kill, injure or take (capture) water voles
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection
- Intentionally or recklessly disturb water voles while they are occupying a structure or place used for shelter or protection

Impacts of legislation on development works

If development works are liable to affect habitats known to support water voles, the relevant countryside agency must be consulted. It must be shown that means by which the proposal can be re-designed to avoid contravening the legislation have been fully

explored e.g. the use of alternative sites, appropriate timing of works to avoid times of the year in which water voles are most vulnerable, and measures to ensure minimal habitat loss. Conservation licences for the capture and translocation of water voles may be issued by the relevant countryside agency (e.g. Natural England) for the purpose of development activities if it can be shown that the activity has been properly planned and executed and thereby contributes to the conservation of the population. The licence will then only be granted to a suitably experienced person if it can be shown that adequate surveys have been undertaken to inform appropriate mitigation measures. Identification and preparation of a suitable receptor site will be necessary prior to the commencement of works.

Otters

Otters *Lutra* are fully protected under the Habitat Regulations through their inclusion on Schedule 2. Regulation 41 prohibits:

- Deliberate killing, injuring or capturing of Schedule 2 species
- Damage or destruction of a breeding site or resting place

Otters are also currently protected under the WCA through their inclusion on Schedule 5. Under this Act, they are additionally protected from

- Intentional or reckless disturbance (at any level)
- Intentional or reckless obstruction of access to any place of shelter or protection

Impacts of legislation on development works

An EPSM Licence issued by the relevant countryside agency (e.g. Natural England) will be required for works liable to affect otter breeding or resting places (often referred to as holts, couches or dens) or for operations likely to result in a level of disturbance which might impair their ability to undertake those activities mentioned above (e.g. survive, breed, and rear young). The licence is to allow derogation from the relevant legislation but also to enable appropriate mitigation measures to be put in place and their efficacy to be monitored

Bats

All species are fully protected by Habitat Regulations 2010 as they are listed on Schedule 2. Regulation 41 prohibits:

- Deliberate killing, injuring or capturing of Schedule 2 species (e.g. all bats)
- Deliberate disturbance of bat species as:
- to impair their ability:
    - to survive, breed, or reproduce, or to rear or nurture young;
    - to hibernate or migrate
    - to affect significantly the local distribution or abundance of the species
- Damage or destruction of a breeding site or resting place

Bats are afforded the following additional protection through the WCA as they are included on Schedule 5:

- Intentional or reckless disturbance (at any level)
- Intentional or reckless obstruction of access to any place of shelter or protection

Impacts of legislation on development works

Works which are liable to affect a bat roost or an operation which are likely to result in an illegal level of disturbance to the species will require an EPSM licence. The licence is to allow derogation from the legislation through the application of appropriate mitigation measures and monitoring.

White clawed crayfish

The white clawed crayfish *Austropotamobius pallipes* receives protection under Schedule 5 of the WCA in respect of Sections 9(1) and 9(5). This makes it an offence to intentionally take (capture) or buy or sell white-clawed crayfish.

Impacts of legislation on development works

The relevant countryside agency will need to be consulted about development which could impact on a watercourse or wetland known to support white clawed crayfish. Conservation licences for the capture and translocation of crayfish can be issued if it can be shown that the activity has been properly planned and executed and thereby contributes to the conservation of the population. The licence will only be granted to a suitably experienced person if it can be shown that adequate surveys have been undertaken to inform appropriate mitigation measures. Identification and preparation of a suitable receptor site will be necessary prior to the commencement of the works.

Wild Mammals (Protection Act) 1996

All wild mammals are protected against intentional acts of cruelty under the above legislation. This makes it an offence to mutilate, kick, beat, nail or otherwise impale, stab, burn, stone, crush, drown, drag or asphyxiate any wild mammal with intent to inflict unnecessary suffering.

To avoid possible contravention, due care and attention should be taken when carrying out works (for example operations near burrows or nests) with the potential to affect any wild mammal in this way, regardless of whether they are legally protected through other conservation legislation or not.

Legislation Afforded to Plants

With certain exceptions, all wild plants are protected under the WCA. This makes it an offence for an 'unauthorised' person to intentionally (or recklessly in Scotland) uproot wild plants. An authorised person can be the owner of the land on which the action is taken, or anybody authorised by them.

Certain rare species of plant, for example some species of orchid, are also fully protected under Schedule 8 of the Wildlife and Countryside Act 1981 (as amended).

In addition to the UK legislation outlined above, several plant species are fully protected under Schedule 5 of Habitat Regulations 2010. These are species of European importance.

Invasive non-native species

Part II of Schedule 9 of the WCA lists invasive non-native plant species for which it is a criminal offence in England and Wales to plant or cause to grow in the wild due to their impact on native wildlife. Species include Japanese Knotweed *Fallopia japonica*, giant Hogweed *Heracleum mantegazzianum* and Himalayan Balsam *Impatiens glandulifera.*

Impacts of legislation on development works

It is not an offence for plants listed in Part II of Schedule 9 of the WCA 1981 to be present on the development site however it is an offence to cause them to spread. Therefore, if any of the species are present on site and construction activities may result in further spread (e.g. earthworks, vehicle movements) then it will be necessary to design and implement appropriate mitigation prior to construction commencing.

Injurious weeds

Under the Weeds Act 1959 any land owner or occupier may be required prevent the spread of certain 'injurious weeds' such as Spear Thistle *Cirsium vulgare*, Creeping Thistle *Cirsium arvense*, Curled Dock *Rumex crispus*, Broad-leaved Dock *Rumex obtusifolius*, and Common Ragwort *Senecio jacobaea*. It is a criminal offence to fail to comply with a notice requiring such action to be taken. The Ragwort Control Act 2003 establishes a ragwort control code of practice as common ragwort is poisonous to horses and other livestock. This code provides best practice guidelines and is not legally binding.

C.2 PLANNING POLICY

Fifty-six habitats and 943 species of principal importance are included on the S41 list. These are all the habitats and species in England that were identified as requiring action in the UK Biodiversity Action Plan and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework.

The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the Natural Environment and Rural Communities Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions (e.g. consideration of Planning Applications).

Appendix E: Selected GIGL desk study results for Protected and Notable Species

Species Name	Relevant Legal protection and conservation status
Daubenton's Bat	HabDir-A4 HabReg-Sch2 WACA-Sch5 NERC-S41
Common pipistrelle bat	HabDir-A4 HabReg-Sch2 WACA-Sch5 NERC-S41
Soprano pipistrelle bat	HabDir-A4 HabReg-Sch2 WACA-Sch5 NERC-S41
Noctule bat	HabDir-A4 HabReg-Sch2 WACA-Sch5 NERC-S41
Leisler's bat	HabDir-A4 HabReg-Sch2 WACA-Sch5 NERC-S41
Western European hedgehog	NERC-S41
Water vole	WACA-Sch5 NERC-S41
Herptiles	
Slow worm	WACA-Sch5 NERC-S41
Grass snake	WACA-Sch5 NERC-S41
Adder	WACA-Sch5 NERC-S41
Common frog	WACA-Sch5 NERC-S41
Common toad	WACA-Sch5 NERC-S41
Notable Birds	
Kingfisher	WACA-Sch1 BOCC Amber
Fieldfare	WACA-Sch1 BOCC Red
Song Thrush	WACA NERC-S41 BOCC Red
House sparrow	WACA NERC-S41 BOCC Red
Dunnock	WACA BOCC Amber

Species Name	Relevant Legal protection and conservation status
Starling	WACA BOCC Red
Invertebrates	
Stag beetle	HabReg-Sch2 WACA-Sch5 NERC-S41
Fish	
European eel	NERC-S41

HabDir – Habitats Directive, HabReg – Habitat Regulations, WACA – Wildlife & Countryside Act, NERC – Natural Environment & Rural Communities Act, BOCC – Birds of Conservation Concern (RSPB)