

East West Rail Phase 2

Compound A1: Land northeast of Charbridge Lane

Environmental Appraisal Report

Appendix C – Ecological Impact Assessment

Network Rail

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Contents

Section	Page
1. Introduction	4
1.1 Terms of Reference	4
1.2 The Site	4
1.3 Scope of the Assessment	5
2. Methodology	6
2.1 Ecological Zone of Influence	6
2.2 Desk Study	6
2.3 Ecological Surveys	6
2.4 Temporal Scope	7
2.5 Nature Conservation Evaluation and Impact Assessment	8
2.6 Mitigation Hierarchy	8
3. Existing Baseline Conditions	9
3.2 Designated Sites and Priority Habitats	9
3.3 Main Habitats	10
3.4 Protected and Notable Species	10
3.5 Non-native Invasive Plant Species	14
4. Evaluation of Ecological Features	15
4.1 Final Ecological Zone of Influence	15
4.2 Evaluation of Ecological Features	17
4.3 Determination of Important Ecological Features	17
5. Impact Assessment, Agreed Mitigation Measures and Significance of Residual Effects	19
5.2 General Mitigation Measures	19
5.3 Construction Impacts, Mitigation and Residual Effects	20
5.4 Operational Impacts, Mitigation and Residual Effects	21
6. Conclusion	22

Tables

Table 3-1	Designated Sites within 2 km of the Site	9
Table 3-2	Priority Habitats within 500 m of the Site	9
Table 3-3	Main Habitats within Site	10
Table 3-4	Main Habitats outside of the Site but within the Survey Area	10
Table 3-5	Protected and Notable Species within Site and/or initial EZol	11
Table 4-1	Ecological Zone of Influence for Impact Assessment on Protected and Notable Species	16
Table 4-2	Evaluation of Ecological Features within the Final EZol	17

Appendices

	Page	
Appendix A.	Site Location Plan and Site Drawing	23
Appendix B.	Methodology of Assessment	24
Appendix C.	Extended Phase 1 Habitat Survey Plan	32
Appendix D.	Phase 2 Survey Results	33
Appendix E.	Designated Sites Location	36

1. Introduction

1.1 Terms of Reference

- 1.1.1 The East West Rail Alliance (The Alliance) has produced this Ecological Impact Assessment (EclA) as part of an Environmental Assessment Report (EAR) in connection with a planning application for the construction of Compound A1 (hereafter referred to as the Site). The Site lies on the northern side of the EWR railway line (Oxford Branch (OXD) line), approximately 2 km east of the centre of Bicester, as identified by the planning red line boundary on Drawing No. DWG 133735_2A-EWR-OXD-XX-DR-L-019011 in **Appendix A** (hereafter referred to as the Site).
- 1.1.2 This EclA has been undertaken with reference to current good practice¹ and forms part of the technical information lodged with the planning application submission.

1.2 The Site

- 1.2.1 The Site is located at Ordnance Survey Grid Reference SP 6029 2313 and is in an agricultural area. The Site is approximately 4.1 ha and is located within an existing pasture field. The Site is accessed via Bicester Road to the west.
- 1.2.2 Within the field and around the field boundaries are a number of scattered trees. The eastern and western boundaries of the Site are species-rich hedgerows including trees, with scattered scrub bordering to the south. The northern boundary of the Site is pasture field, with the Site occupying only part of the field. Beyond the boundary to the west is Bicester Road and allotments; to the east are agricultural fields; to the south is the OXD line with agricultural fields beyond; north is the field boundary hedgerow and associated stream with agricultural fields beyond.
- 1.2.3 The Site is detailed in Section 1 and 2 of EAR and shown on the Site Design (Drawing 133735_2A-EWR-OXD-XX-DR-L-019011 in **Appendix A**) provided with the planning application submission.
- 1.2.4 Site access will be from Bicester Road to the west of the Site via the removal of a small stretch of hedgerow and will be constructed along with the compound. Access to the railway from the compound will be via the south-west corner where a new access will be created by the removal of a stretch of scrub.
- 1.2.5 The site will include 42 units for office accommodation and welfare facilities in fourteen, three storey structures as well as car parking spaces for staff and operatives. Excavated topsoil and subsoil from the compound site will be stored in the southern part of the site, with the laydown area for construction materials and plant in the lower, southern part of the site, closest to the railway.
- 1.2.6 The HGV route to the compound will be from the A4421 onto Bicester Road, along which there is no requirement for any highways improvement works associated with this proposal.
- 1.2.7 The preliminary works that could be undertaken from this compound, in advance of the East West Rail 2 Transport and Works Act Order (EWR2 TWAO) being made, are:
- Vegetation clearance along the railway, where this has not already been undertaken as part of recent maintenance, if seasonally appropriate and in accordance with relevant protected species licences;
 - Repair works to culverts;
 - Environmental mitigation works where required; and
 - Temporary highway works.
- 1.2.8 The activities expected within the compound to support these would be:
- Office operation and staff commuting;

¹ CIEEM (September, 2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Chartered Institute of Ecology and Environmental Management, Winchester.

- Workers using welfare facilities;
- Delivery and movement of construction materials to undertake maintenance works;
- Sorting and storage of materials arising from the preliminary works, to enable efficient re-use within the Project or removal from site if unusable; and
- Compound lighting outside daylight hours between 7am and 6pm (8am and 4pm on Saturdays); security lighting overnight.

- 1.2.9 During compound construction and use, environmental mitigation measures will be implemented as stated in the Code of Construction Practice (CoCP) in Appendix A of EAR.
- 1.2.10 Following the five years of use currently proposed for the compound, the Site will be reinstated to the existing conditions so there will be no long-term impacts from the works.

1.3 Scope of the Assessment

- 1.3.1 This report presents ecological information obtained during the surveys undertaken, between 2017 and 2018, as part of the Environmental Statement (ES) for the EWR TWAO production², and additional information obtained from surveys in 2018 since the submission of the ES.
- 1.3.2 This EclA describes the ecological baseline and evaluates the nature conservation value of ecological features present within the Ecological Zone of Influence (EZOI) for the Site (see Section 2.3 for further details), characterises the impacts and the effects (both positive and negative) of the Site on Important Ecological Features³, sets out agreed avoidance, mitigation, compensation and enhancement measures, and assesses the significance of the residual effects (both positive and negative) of the Site on the Important Ecological Features.

² The Network Rail (East West Rail Bicester to Bedford Improvements) Order Environmental Statement, July 2018

³ See **Appendix B** for more information on Important Ecological Features.

2. Methodology

2.1 Ecological Zone of Influence

- 2.1.1 The Ecological Zone of Influence (EZol) is an area defined by the assessment in which there may be ecological features subject to impacts and subsequent effects (both positive and negative) as a result of the Site. The EZol is determined through an assessment of many interacting factors (see **Appendix B** for more details).
- 2.1.2 The EZol of the Site during both construction and operation has been determined at two stages of the assessment. The first stage (initial EZol) is to determine the geographical area for obtaining ecological data through desk and field-based studies based on the potential impacts and effects of the Site on ecological features. The second stage (final EZol) is to determine the geographical area for assessing the impacts and subsequent effects (both positive and negative) of the Site on important ecological features based on all the available information.
- 2.1.3 The initial EZol is detailed in **Appendix B**. The final EZol is detailed in Section 4.1.

2.2 Desk Study

- 2.2.1 A desk study was undertaken in November 2017 as part of the ES. Relevant data from the ES has been used to inform this EclA, including records of statutory and non-statutory designated sites and protected and notable species within the initial EZol of the Site.
- 2.2.2 A review of local planning policy relevant to the Site was undertaken as part of the planning application and are detailed in the Planning Statement.
- 2.2.3 Full details of the desk study methodology are provided in **Appendix B**.

2.3 Ecological Surveys

Extended Phase 1 Habitat Survey

- 2.3.1 An ecological walkover survey of areas within and adjacent to the Site, including land up to 50 m from the Site boundary where access was allowed (the Survey Area), was undertaken on 31 May 2018 broadly following the Phase 1 habitat survey methodology⁴. The walkover survey records information on the habitats within the Survey Area and was extended to include a search for evidence of the presence of, and an assessment of the potential of each habitat to support, notable and protected species as recommended by CIEEM⁵.
- 2.3.2 Full details of the extended Phase 1 habitat survey methodology are provided in **Appendix B**. The results of the extended Phase 1 habitat survey are provided in **Appendix C**.

Phase 2 Surveys

- 2.3.3 As part of the ES, or based on the results of the desk study and extended Phase 1 habitat survey, the following Phase 2 ecological surveys were undertaken to support this EclA:
- Aquatic species: Aquatic invertebrate sampling, aquatic macrophyte and fish surveys on Langford Brook were undertaken in September 2017;
 - Great crested newts (*Triturus cristatus*):
 - Habitat Suitability Index (HSI) assessments were undertaken between 26 March 2018 and 11 June 2018;
 - presence/likely absence surveys of suitable ponds within 500 m of the Site were undertaken between 26 March 2018 and 21 June 2018;

⁴ Joint Nature Conservation Committee (2010). *Handbook for Phase 1 habitat survey - a technique for environmental audit*.

⁵ Chartered Institute of Ecology and Environmental Management (2017). *Guidelines for Preliminary Ecological Assessment 2nd edition*.

- Breeding birds: breeding bird surveys were undertaken as part of the ES in a survey area which included the compound area (Breeding Bird Survey Area BB_2A_001) between the 25 April and 11 Jul 2018;
- White-clawed crayfish (*Austropotamobius pallipes*):
 - White-clawed crayfish habitat assessment was undertaken on 28 May 2018;
 - White-clawed crayfish presence/likely absence survey was undertaken on 21 August 2018;
- Otter (*Lutra lutra*) and water vole (*Arvicola amphibius*):
 - Otter and water vole habitat assessment survey of the watercourse to the north of the Site was undertaken on 11 July 2018;
 - Otter presence/likely absence survey of the watercourse to the north of the Site was undertaken on 11 July 2018;
- Wintering birds: wintering bird surveys were undertaken as part of the ES in a survey area which included the compound area (Wintering Bird Survey Area WB_2Ai) between 22 January and 14 March 2018;
- Bat:
 - Potential bat roosting assessments (PBRA) of trees, within 100 m of the Site where access allowed, was undertaken on 10 January 2018;
 - Aerial (tree climbing) survey, of any trees with potential identified during the PBRA surveys, undertaken on 12 July and 3 September 2018.

2.3.4 Further details regarding methodology of these surveys are provided in **Appendix B**.

Survey Limitations

- 2.3.5 Only five breeding bird surveys were completed between April and July 2018, as the sixth visit could not be carried out due to land access constraints. As the visit missed was the late July visit and no breeding individuals were identified in the first five it is not considered to be a significant limitation.
- 2.3.6 The list of invasive plant species included on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) is extensive and these plants are found in a range of different habitats, including aquatic habitats. The extended Phase 1 habitat survey checked for the presence of Japanese knotweed, giant knotweed, hybrid knotweed, giant hogweed, Himalayan balsam, rhododendron and cotoneaster species. Other invasive species, in particular those associated with aquatic habitats, may not have been recorded, but it is considered that this survey is sufficient to identify any constraints posed by invasive species.
- 2.3.7 Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. The ecological surveys undertaken to support this EclA have not therefore produced a complete list of flora and fauna and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, the results of these surveys have been reviewed and are considered to be sufficient to undertake this EclA.

2.4 Temporal Scope

- 2.4.1 Potential impacts on ecological features have been assessed in the context of how the predicted baseline conditions within the EZoI might change between the surveys and the start of construction.
- 2.4.2 The assessment has assumed that the compound construction will start around September 2019. Once construction is complete the assessment has assumed that the operational phase of the development will last for approximately five years.

2.5 Nature Conservation Evaluation and Impact Assessment

- 2.5.1 The methodology for assessing the nature conservation value of an ecological feature, and the assessment of impacts and effects (including both positive and negative effects and cumulative impacts and effects) of the Site are provided in **Appendix B**.

2.6 Mitigation Hierarchy

- 2.6.1 The principles of the mitigation hierarchy^{6,7} have been adopted and used when considering impacts and subsequent effects on ecological receptors within the EZoI.
- 2.6.2 The principles of the mitigation hierarchy are that in order of preference impacts on biodiversity should be subject to:
- Avoidance;
 - Mitigation; and
 - Compensation.

⁶ Ministry of Housing, Communities and Local Government (2019). National Planning Policy Framework, para 175. <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

⁷ CIEEM (September, 2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, Paragraph 1.19*. Chartered Institute of Ecology and Environmental Management, Winchester.

3. Existing Baseline Conditions

3.1.1 Sections 3.1 to 3.4 below summarise the ecological baseline relevant to the Site recorded during the desk and field-based studies undertaken to inform this EIA.

3.2 Designated Sites and Priority Habitats

3.2.1 **Table 3-1** and **Table 3-2** summarise the designated sites (within 2 km of the Site) and priority habitats⁸ (within 500 m). Designated sites and priority habitats are shown on **Figure E-1** provided in **0**.

Table 3-1 Designated Sites within 2 km of the Site

Designated Site	Location of Designated Site ⁹	Features of Interest as described in site citations
Stratton Audley Quarries Site of Special Scientific Interest (SSSI)	1.5 km north	This site is a partially restored quarry / inert landfill with two remaining voids (now water filled) and naturally developed open land, scrub, tall ruderal and wetland habitats
Bicester Airfield Local Wildlife Site (LWS)	620 m north	Airfield and surrounding areas of species-rich grassland and scrub. Supports a range of Section 41 and red data book species and birds of conservation concern (BoCC).
Gavray Drive Meadows LWS	720 m south-west	Meadows forming mosaic of small damp fields with ponds, divided by thick hedges and old trees. Supports Section 41 and nationally scarce species and BoCC.
Meadows NW of Blackthorn Hill LWS	1.3 km south	Group of ridge and furrow meadows. Supports Section 41 and red data book species and BoCC.
Cutter's Brook Meadows LWS	1.7 km south	Two unimproved hay meadows on the River Ray floodplain. Supports Section 41 and GB red list species and BoCC.

Table 3-2 Priority Habitats within 500 m of the Site

Priority Habitat ¹⁰	Location of Priority Habitat ¹¹
One traditional orchard (low level of confidence)	120 m south
Five blocks of broadleaved deciduous woodland (low level of confidence)	Closest 330 m west

⁸Priority habitats are taken as principal habitats for the conservation of biodiversity listed under Section 41 of the Natural Environment and Rural Communities Act 2006.

⁹Where designated sites are situated outside of the Site boundary, the distance and direction is given at the closest point of the designated site from the Site

¹⁰ Records of priority habitats collected from the Priority Habitat Inventory (PHI) (England). Habitats of 'low confidence' are habitats that need confirmation of status by field studies after being identified as priority habitat based on a desk-based aerial assessment.

¹¹Where priority habitats are situated outside of the Site boundary, the distance and direction is given at the closest point of the ancient woodland from the Site

3.3 Main Habitats

- 3.3.1 **Table 3-3** details the main habitats situated within the Site. **Table 3-4** details the main habitats situated outside of the Site but within the Survey Area.
- 3.3.2 All of the main habitats are indicated on the extended Phase 1 habitat survey plan (Drawing No. 133735_RW-EWR-XX-XX-DR-LE-010865 **Appendix C**).

Table 3-3 Main Habitats within Site

Habitat Type	Summary Description of Habitat	Area of Habitat/ Distance of Linear Feature	
		Area (ha) / Length (m)	% of Site
Improved grassland	Pasture field with sheep	3.76 ha	92
Trees	Two oak (<i>Quercus sp</i>) trees	N/A	-
Species-rich hedgerow with trees	Wooded hedgerow boundary with fence line and a ditch running under vegetation in northern part	193 m	-
Neutral semi-improved grassland	Perennial rye grass (<i>Lolium perenne</i>), dock (<i>Rumex sp</i>), buttercup (<i>Ranunculus sp</i>), soft rush (<i>Juncus effusus</i>), teasel (<i>Dipsacus fullonum</i>), creeping thistle (<i>Cirsium arvense</i>), nettle (<i>Urtica dioica</i>) and spear thistle (<i>Cirsium vulgare</i>), Dominated with tall ruderal species in patches.	0.35 ha	48

Table 3-4 Main Habitats outside of the Site but within the Survey Area

Habitat Type	Summary Description of Habitat	Location of Habitat ¹²
Running water	Watercourse with a small pool area used as access for farmer to pass through.	Along northern boundary of field
Species-rich hedgerow with trees	Hedgerow with fence line and trees.	Surrounding field to east and west
Scattered scrub	Scrub along southern boundary adjacent to railway containing bramble (<i>Rubus fruticosus agg</i>), nettle, willow (<i>Salix sp</i>), hawthorn (<i>Crataegus sp</i>), dock and elder (<i>Sambucus nigra</i>)	Along southern boundary

3.4 Protected and Notable Species

- 3.4.1 The results of the desk study and field surveys (including the extended Phase 1 habitat survey) undertaken for protected and notable¹³ species are detailed below in **Table 3-5** and shown on Drawing 133735_RW-EWR-XX-XX-DR-LE-010865 in **Appendix C** and **Figure D-1** in **Appendix D**.
- 3.4.2 A more detailed summary of the Phase 2 species survey results is provided in **Appendix D**. A summary of the extended Phase 1 habitat survey and Phase 2 species survey methodologies is provided in **Appendix B**.

¹²The distance and direction is given at the closest point of the main habitat from the Site

¹³Notable species are taken as principal species for the conservation of biodiversity listed under Section 41 of the Natural Environment and Rural Communities Act 2006; any species listed in an IUCN Red Data Book.

Table 3-5 Protected and Notable Species within Site and/or initial EZoI

Species or Species Group	Desk Study Records ¹⁴	Field Survey Results ¹⁵
Aquatic species	<p>There are no recent records of any aquatic species within 2 km of the Site.</p> <p>There is one watercourse running along the northern field boundary 90 m north of Site.</p>	<p>Aquatic invertebrates</p> <p>Aquatic invertebrate sampling of Langford Brook in September 2017, which is located immediately adjacent to the north boundary of the field (100 m from Site) indicates that the watercourse suffers from ecological stress because of poor water quality (as inferred from the low Average Score Per Taxon (ASPT) scores). No notable¹⁶ aquatic invertebrates were recorded and the Proportion of Sediment-sensitive Invertebrates (PSI)¹⁷ score indicates that the river bed is sedimented at the sampling site which is likely to account, in part, for the low taxon richness recorded. The Lotic Invertebrate Flow Evaluation (LIFE)¹⁸ score indicates that the community present exhibits a moderate sensitivity to reduction in flow.</p> <p>Aquatic macrophytes</p> <p>Macrophyte survey conducted on the Langford Brook in September 2017, has identified the presence of a species-poor assemblage, represented by the presence of only three truly aquatic moss taxa. Abundance was also low, with none of the species recorded exceeding a cover value of greater than 2.5% of the surveyed channel area.</p> <p>Fish</p> <p>A fish survey of the Langford Brook in September 2017, yielded a total of four minor species¹⁹, including three-spined stickleback (<i>Gasterosteus aculeatus</i>), nine-spined stickleback (<i>Pungitius pungitius</i>), stone loach (<i>Barbatula barbatula</i>) and bullhead (<i>Cottus gobio</i>), of which bullhead were the most abundant (66 individuals recorded, equates to 28.8 individuals per 100 m²). All species are commonly occurring species of lowland stream systems and exhibit a low (bullhead) to high (stickleback) tolerance to environmental disturbance²⁰.</p>

¹⁴Only recent records of species are provided here, where recent is taken to be in the last 10 years

¹⁵Further details are provided in **Appendix D**

¹⁶ As defined by the Community Conservation Index, or CCI, which is used to assess community conservation value and highlights specific species of conservation importance based on the Joint Nature Conservation Committee (JNCC) threat categories.

¹⁷ The Proportion of Sediment-sensitive Invertebrates, or PSI, score is a metric developed for the assessment of the effects of fine sediment accumulation on the bed of watercourses on aquatic invertebrate community structure.

¹⁸ The Lotic Invertebrate Flow Evaluation, or LIFE, score is a metric developed as a means of assessing flow as a stressor on the aquatic invertebrate community of watercourses.

¹⁹ Minor fish species are defined as small bodied fish that often occur in high abundance: Environment Agency, 2014. Flow and Level Criteria for Coarse Fish and Conservation Species. Science Report SC020112/SR.

²⁰ UKTAG Rivers Assessment Methods Fish Fauna (Fisheries Classification Scheme 2 (FCS2)) by Water Framework Directive - United Kingdom Technical Advisory Group (WFD-UKTAG).

Species or Species Group	Desk Study Records ¹⁴	Field Survey Results ¹⁵
		<p>Despite being a species listed as a Habitats Directive Annex II species²¹, the bullhead is considered as being well distributed throughout the watercourses in the region, based on Environment Agency data and the fact that bullhead have been recorded in all positive catch returns from field surveys undertaken across the Route Sections.</p> <p>White-clawed crayfish</p> <p>Evidence of signal crayfish was identified during the presence/likely absence survey undertaken in August 2018 and no white-clawed crayfish were found.</p> <p>As such, all aquatic species surveyed above have been scoped out of further evaluation as the brook is 100 m from Site and will not be impacted.</p>
Otter and water vole	There are no recent records of otter and or water vole within 2 km of the Site.	<p>The watercourse was surveyed on 11 July 2018 for habitat suitability and scoped out for water vole potential due to low water levels and lack of suitable vegetation for cover and food source but was scoped in for otter.</p> <p>Otter presence/likely absence survey of the watercourse was undertaken on 11 July 2018 and evidence of otter (spraints, prints and lying up sites) along the entire watercourse was identified. The closest evidence was a spraint approximately 90 m from the Site boundary.</p>
Bats	<p>There are 176 bat records within 10 km of the Site, with common pipistrelle (<i>Pipistrellus pipistrellus</i>), soprano pipistrelle (<i>Pipistrellus pygmaeus</i>), serotine (<i>Eptesicus serotinus</i>), noctule (<i>Nyctalus noctula</i>), barbastelle (<i>Barbastella barbastellus</i>), Natterer's bat (<i>Myotis nattereri</i>), whiskered/ Brandt's bat (<i>Myotis mystacinus/brandtii</i>), Daubenton's bat (<i>Myotis daubentonii</i>) and Bechstein's bat (<i>Myotis bechsteinii</i>) amongst those recorded</p> <p>The nearest confirmed roost is a long-eared species and pipistrelle species roost approximately 2 km west of the Site.</p>	<p>The predominant habitat on Site is pasture and is unlikely to form an important local foraging resource for bats due to its intensively managed and homogenous nature resulting in a reduction in prey abundance and diversity.</p> <p>The hedgerows and scrub adjacent to the Site have potential to support a limited abundance of invertebrate prey, due to the small amount of habitat present, and as such are likely to be a locally important foraging resource.</p> <p>However, these small areas are unlikely to have importance in a wider context. They may also form part of a local commuting route for bats, as part of the adjacent linear habitats.</p> <p>There are two trees that have bat roosting potential within the Site (both with high potential 137.7_BT1_F004 and F005). In addition, there are six additional trees and one bridge with bat potential within 100 m. Bat surveys have been undertaken on some of these (see Appendix D).</p> <p>There are no confirmed bat roosts within 100m.</p>

²¹ Annex II species as listed under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora. [online] Available at < <http://jncc.defra.gov.uk/protectedsites/sacselection/species.asp?FeatureIntCode=S1163>> [Accessed 18 January].

Species or Species Group	Desk Study Records ¹⁴	Field Survey Results ¹⁵
Hazel dormouse (<i>Muscardinus avellanarius</i>)	No records of hazel dormouse have been identified within 2 km of the Site.	Surveys along the EWR 2A route section adjacent to the Site have found no evidence of the presence of hazel dormouse. The woodland, hedgerow and railway corridor scrub adjacent to the Site have potential to support this species. Taking into account the lack of evidence of hazel dormouse in habitats along the EWR 2A route section, it is unlikely this species is present within hedgerows surrounding the Site and they are scoped out of further assessment.
Great crested newts	<p>There are eight recent records of great crested newt within 2 km of the Site. The closest of these records is 820 m to the southwest of the Site.</p> <p>There are ten waterbodies situated within 500 m of the Site (waterbodies 002-005, 465-467, 555, 607 and 976 as shown on).</p>	<p>One waterbody (555) has been screened out as it is located over 400 m from the Site with more suitable habitat near, a flowing stream barrier and limited connectivity.</p> <p>Two waterbodies have been scoped out as they have been recorded, during HSI assessments, as flowing water (002) and dry (976).</p> <p>Of the remaining seven, three were subjected to presence/likely absence surveys, one dried after two completed visits (005) and the remaining two found great crested newts to be likely absence (004 and 465).</p> <p>The remaining four have not been assessed due to restricted access permission and it has therefore been assumed that a medium sized population of great crested newts is present (003, 466, 467 and 607).</p> <p>The Site comprises a large pasture field which is of low suitability for great crested newts. The hedgerows and scrub are considered likely to support great crested newts if present.</p>
Reptiles	<p>There are six recent records of reptile within 2 km of the Site (common lizard (<i>Zootoca vivipara</i>), grass snake (<i>Natrix natrix</i>) and slow-worm (<i>Anguis fragilis</i>)) with the closest record a grass snake 480 m north-east.</p> <p>Common lizard and grass snake have been recorded, during surveys to inform the ES, in association with the scrub and grassland immediately north of the Site, forming part of the railway corridor.</p>	The homogenous habitat structure of the intensively grazed pasture field present within the Site provides limited habitat suitability for reptiles. However, there are two small sections of hedgerow and scrub that may support refuge/hibernation opportunities in the Site and the adjacent railway corridor habitats and hedgerows offer suitability for dispersal/refuge for common species of reptile.
Birds	There are 1099 recent records for 16 notable ²² bird species within 5 km of the Site. These include eight species listed	Breeding birds – The majority of the Site is pasture so has limited value. The trees, hedgerows and scrub within, and adjacent to

²² Notable bird species are taken as those listed: on Annex I of the EC Birds Directive (2009/147/EC); on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended); as Species of Principal Importance (SPI) for the Conservation of Biodiversity in England listed in Section 41 of the Natural Environment and Rural Communities Act 2006; as Red or Amber in the Birds of Conservation Concern (BoCC) 4 (Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708-746). Farmland birds are priority species in Buckinghamshire (Berks., Bucks. & Oxon. Wildlife Trust, Buckinghamshire County Council, Milton Keynes Council, Natural England and Buckinghamshire & Milton Keynes Environmental Records Centre (2014). Biodiversity and Planning in Buckinghamshire.) and are taken to be notable species for this assessment.

Species or Species Group	Desk Study Records ¹⁴	Field Survey Results ¹⁵
	<p>on Annex I of the EC Birds Directive, plus species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), Species of Principal Importance (SPI), species on the Birds of Conservation Concern 4 (BoCC4) Red list and Amber list. The records also include notable species of farmland bird that are priority species in Oxfordshire and Buckinghamshire</p> <p>There are three recent records of barn owl (<i>Tyto alba</i>) identified within 5 km of the Site.</p>	<p>the Site is of limited value in comparison to the amount of similar habitat in the wider landscape so it is considered unlikely that any significant numbers of such species would be present. No breeding birds were identified within the Site during surveys.</p> <p>Wintering birds – no wintering birds were identified within the Site during surveys.</p> <p>Barn owls - No suitable nesting/roosting opportunities are present on Site. The pasture within the Site is of negligible value for foraging barn owl whilst the railway corridor habitat and adjacent hedgerow and narrow margins are of low value. Due to the lack of suitable roosting habitat and the Site being of negligible value to barn owl, this species has been scoped out of this assessment</p>
Terrestrial Invertebrates	<p>Sixteen recent records of notable terrestrial invertebrates have been recorded within 2 km of the Site, comprised of large heath (<i>Coenonympha tullia</i>), brown hairstreak (<i>Thecla betulae</i>) and black hairstreak (<i>Satyrion pruni</i>) butterflies.</p>	<p>The Site is predominantly pasture and is unlikely to support any notable species. The hedgerows and scrub may have food species of notable species including black hairstreak, though these habitats are common in the wider area so the small section to be removed is unlikely to support a notable population.</p>
Badger (<i>Meles meles</i>)		

3.5 Non-native Invasive Plant Species

- 3.5.1 The extended Phase 1 habitat survey checked for the presence of Japanese knotweed, giant knotweed, hybrid knotweed, giant hogweed, Himalayan balsam, rhododendron and cotoneaster species.
- 3.5.2 No evidence of these species was recorded within the Survey Area.

4. Evaluation of Ecological Features

4.1 Final Ecological Zone of Influence

- 4.1.1 Once the data gathering exercises from both the desk study and field surveys were completed and Site details were available, the initial EZoI was finalised for both the construction and operational phases of the Site, as detailed below.

Designated Sites

- 4.1.2 Owing to the scale and generally localised nature and level of the impact of the construction and operational works, it was considered appropriate to assess impacts only on those designated sites which are present within or directly adjacent to the Site. In setting the EZoI for designated sites it has been assumed that the guidance for pollution prevention (GPPs) or pollution prevention guidelines (PPGs) to prevent impacts to the nearby waterbody²³ and the Construction Industry Research and Information Association (CIRIA) guidance on the control of water pollution from construction sites²⁴ will be implemented to prevent any impacts on watercourses or notable aquatic habitats. With suitable pollution measures in place, direct impacts will only result where any in-channel works are required. It is further assumed that any in-channel works will be confined within the Site boundary and therefore no impact is anticipated on any designated sites.

Main Habitats

- 4.1.3 Owing to the scale and nature of the Site proposals and the predicted level of the impact of the construction and operational works, it was considered appropriate to assess impacts only on those main habitats which are present within or directly adjacent to the Site.

Protected and Notable Species

- 4.1.4 The final EZoI for protected and notable species either recorded within, or considered likely to be present within, the Site has been defined on a species-specific basis based on the likely effects of the Site as detailed in Table 4-1 below (distances are taken from the Site boundary).

²³ All PPGs that were previously maintained by the Environment Agency are currently under review and a new set of guidance notes are presently being issued by the Scottish Environmental Protection Agency, The Northern Ireland Environment Agency and Natural Resources Wales as GPP documents. While these are not produced by the Environment Agency they provide good practice advice which will help minimise any impacts on the surrounding aquatic habitats. Particular attention should be given to GPP5 for works and maintenance in or near water (which replaces PPG5 - works near or liable to affect watercourses) and GPP21 for pollution incident response planning (which replaced PPG21 – pollution incident response planning) that form a key point of reference for the proposed works. In the absence of a complete set of new GPP documents the existing PPGs should also be used as a source of information on good practice. It is recommended that all works also adhere to PPG1 (understanding your environmental responsibilities); PPG3 (use and design of oil separators in surface water drainage systems); PPG6 (working at construction and demolition sites). Each guidance note is targeted at a particular type of business or activity and covers environmental good practice to minimise pollution. PPGs and GPPs also make reference to environmental legal obligations. The PPGs are available from <http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx> and GPPs are available from <http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series>. Additional information is provided by Natural England and is available at <https://www.gov.uk/guidance/pollution-prevention-for-businesses>

²⁴ The CIRIA documents are a series of publications developed by the CIRIA. Each document is targeted at a particular type of business or activity and covers environmental good practice to minimise pollution. Particular attention should be given to CIRIA C532 (Control of water pollution from construction sites, 2001). The CIRIA publications also make reference to environmental legal obligations and are available from: http://www.ciria.org/CIRIA/Resources/Resource_overview/Resources/Resource_overview.aspx?hkey=a80608d2-a045-4d72-8bb9-5ecf23f8d761

Table 4-1 Ecological Zone of Influence for Impact Assessment on Protected and Notable Species

Species	Distance from the Site boundary		Justification
	Construction	Operation	
Great crested newt	250 m	Site boundary	Although great crested newts can use suitable terrestrial habitat within 500 m of a breeding pond, there is usually a decrease in newt abundance beyond 250 m from a breeding pond ²⁵ . Due to the limited habitat available on site it is therefore considered that the Site has the potential to affect populations of great crested newts using ponds located within 250 m of the Site only (GCN_002, 004 and 465 – all of which have been scoped out or identified as great crested newts likely absent so great crested newts are scoped out of further assessment).
Badgers	30 m	Site boundary	Badger sett tunnels typically extend up to 20 m from the sett entrance ²⁶ . Vibrations from heavy machinery and excavation of soils within 30 m of a sett entrance may cause the collapse of tunnels. While there are no known setts adjacent to the Site there is potential for badgers to move in. As such, significant impacts from the proposed works on a sett beyond 30 m from the Site are not anticipated.
Reptiles	Site boundary	Site boundary	Impacts on reptiles could occur through habitat loss and potential harm from vegetation clearance. Given that suitable habitat will still be maintained in the surrounding area as part of the Site it is not anticipated that the proposed works will result in impacts on reptiles beyond the Site boundary.
Bats	100 m	50 m	Although bats are known to commute large distances between roosts and foraging habitat, direct construction impacts are only likely to occur on commuting, foraging and roosting habitat within 30 m of the Site boundary. However, due to the potential for indirect impacts on known roosts in the local area, the EZoI was extended to 100 m during construction. Operation has the potential to cause small-scale disturbance to bats foraging and commuting within 50 m of the Site.
Terrestrial invertebrates	Site boundary	Site boundary	Impacts on terrestrial invertebrates will be from direct habitat loss only of semi-neutral grassland, hedgerows and arable margins.
Birds	50 m	50 m	Potential foraging and nesting habitat would be lost during construction. Additional disturbance on surrounding hedgerows and fields could affect nesting or foraging birds during construction and operation.
Otter	50 m	50 m	Although otters have a large home range ²⁷ , direct construction impacts on watercourses and any associated otter holts are likely to occur only within the Application Site. Impacts from disturbance on any holts or foraging and commuting otters are only likely to occur within 50 m of the Application Site.

²⁵ English Nature (2004). *An assessment of the efficiency of capture techniques and the value of different habitats for the great crested newt* (ENRR576) <http://publications.naturalengland.org.uk/publication/134002>

²⁶ English Nature (2002). *Badgers and development*. http://www.badgerland.co.uk/help/en_badgers_development.pdf

²⁷ Natural England (2014). Standing Advice (Otters) <https://www.gov.uk/otters-protection-surveys-and-licences>

4.2 Evaluation of Ecological Features

- 4.2.1 All of the ecological features present or considered likely to be present within the final EZol of the Site have been valued according to the criteria outlined in **Appendix B**.
- 4.2.2 Features outside the final EZol will not be affected by any activities or processes involved in the Site and are therefore not considered further in this EclA.

Table 4-2 Evaluation of Ecological Features within the Final EZol

Ecological Feature(s)	Nature Conservation Value	Rational for Valuation
Species-rich hedgerow with trees and scattered scrub	Local	These habitats are common and widespread across the local area. However, in the absence of detailed field survey data on species that may use or be reliant on them, a precautionary approach has been applied as they may contain small populations of notable and/or protected species.
Improved grassland, trees, neutral semi-improved grassland	Site	These habitats are common and widespread across the local area and offer negligible suitability to support protected and notable species. The Site has potential to support ground nesting birds, however this habitat is common in the wider area so is unlikely to have a value above Site level.
Bats	County	Bats are European protected species listed under the Conservation of Habitats and Species Regulations 2017 Reg 43 and a species of principal importance in the England Biodiversity List. They are all notable species in Buckinghamshire. Two roosting opportunities are present on Site and a number of trees with potential roosting opportunities exist within 100m of the Site. Adjacent scrub, hedgerow and railway corridor offer commuting and foraging opportunities for the local population. While the Site is of low potential, the adjacent hedgerows and railway line may support species of County importance. As such a precautionary value of County has been given.
Reptiles	Site	All reptiles are species of principal importance on the England Biodiversity List and are notable species in Buckinghamshire. The Site is unlikely to support more than low numbers of reptiles and as such these species have been give importance at Site level.
Birds	Site	The Site has potential to support low numbers of common birds and is unlikely to be of importance to these species above Site level.
Terrestrial Invertebrates	Local	The hedgerows and scrub within, and adjacent to the Site have potential to support low numbers of notable species. As these habitats are common in the wider landscape it is considered it is considered the Site is only important at a local level for terrestrial invertebrates
Badger	Site (non-conservation)	Badgers are protected by law for welfare reasons. They are not rare or declining either locally or nationally.

4.3 Determination of Important Ecological Features

- 4.3.1 Habitats, species and species groups that are considered to have a nature conservation value in the context of the Site and its immediate environs are not considered important ecological

features²⁸ in the context of this EclA. Any impact on such a feature as a result of the Site is considered unlikely to have a significant effect on the conservation status of such habitats or species on a local, regional, national or international scale.

4.3.2 Therefore, features of nature conservation value in the context of the Site, or those considered to have negligible nature conservation value, have been scoped out of the ecological impact assessment in Section 5. These features are as follows:

- Improved grassland, trees, neutral semi-improved grassland;
- Badger;
- Birds;
- Reptiles.

4.3.3 Some of the species listed above, or scoped out due to the EZoI distances are protected and will, therefore, require mitigation if present. Such measures are employed through the application of CoCP in Appendix A of the EAR

²⁸ See **Appendix B** for more information on important ecological features.

5. Impact Assessment, Agreed Mitigation Measures and Significance of Residual Effects

- 5.1.1 This Section characterises the impacts and the subsequent effects (both positive and negative) of the Site on the important ecological features within the final EZoI, sets out agreed avoidance, mitigation, compensation and enhancement measures, and assesses the significance of the residual effects (both positive and negative) of the Site on these features.
- 5.1.2 The general mitigation measures identified in Section 5.1 onwards will be incorporated into the detailed design proposals for the Site and implemented as part of the overall development of the Site.

5.2 General Mitigation Measures

Construction and Operation Mitigation Measures

- 5.2.1 The following avoidance, mitigation and/ or compensation measures will be implemented during the construction phase of the Site to comply with national and local planning policy, current legislation and good practice:
- General measures to avoid or alleviate negative impacts upon ecological receptors including following the suitable pollution prevention (PPG's, GPP's and CIRIA guidance);
 - Measures to protect trees and retained hedgerows within and immediately adjacent to the Site boundary²⁹. During construction, measures to protect retained habitats will be employed through the application of the Code of Construction Practice (CoCP). See Appendix A of the Compound A4 EAR for more details of the CoCP;
 - An Ecological Clerk of Works (ECoW) will be employed for the duration of construction of the Site and for pre-construction site clearance works to ensure that measures to avoid or alleviate impacts on nature conservation receptors are implemented;
 - While surveys to date have found no evidence of presence of great crested newts, reptiles, hazel dormouse and badgers within the vicinity of the Site, and they are unlikely to be present, due to mobility of this species there is potential for them to colonise suitable habitat within and adjacent to the Site or make occasional use of the habitat within the working area for foraging or dispersal. Only very small-scale clearance of hedgerows are required as part of the works. All works will be covered under a Precautionary Method of Working document which will detail the signs to look for and suitable methods to prevent harm in the unlikely event of their presence.
 - Where possible, tree felling and vegetation clearance (including the arable land for ground nesting birds) will be minimised and undertaken outside the core bird nesting season (which is before 1st March and after 31st August, though it should be noted that variation in dates is possible, for example from geographical variations in climate, or due to a particularly mild winter) to avoid damage or destruction of occupied nests or harm to breeding birds. If this cannot be achieved, works within the core bird nesting season will require an inspection of vegetation to be cleared for breeding birds and their occupied nests by a suitably qualified ecologist no more than 24 hours prior to any works being undertaken. If any nesting birds are identified during the survey they will be left *in situ* for their entire nesting period and alternative approaches to the work proposed. This may include leaving an exclusion zone around the nests to avoid disturbance.

²⁹ British Standards Institution (2012). *Guide for Trees in relation to design, demolition and construction: recommendations*. BS 5837:2012.

5.3 Construction Impacts, Mitigation and Residual Effects

Main Habitats

- 5.3.1 The means of access to the Site will be via an access point to the west via an existing gap in the hedgerow which will need to be widened by the removal of small section of hedgerow to facilitate access to the Site and the access to the railway to the south will require the removal of a section of hedgerow (approximately 100 m in total).
- 5.3.2 Adjacent habitats such as scrub and hedgerow may also experience degradation during construction by the increase in potential damage from road vehicles and proximity to the works but will not be directly removed.
- 5.3.3 The compound will be removed following completion of the EWR2 Project. Following this, any hedgerow and scrub lost will be reinstated with a mix of native species of local provenance such as hawthorn, blackthorn and elm³⁰. Broadleaved woodland and scrub will be compensated for as part of the wider scheme.
- 5.3.4 Considering the agreed mitigation measures detailed above, the construction of the Site is not expected to result in a significant residual effect on these habitats.

Notable Species

Terrestrial Invertebrates

- 5.3.5 Most of the Site is pasture and not considered suitable to support important populations of terrestrial invertebrates. The habitat (hedgerow, scrub and semi-natural grassland) with potential to support notable species is considered common in the wider landscape and as such, the temporary loss of this habitat is unlikely to impact the species.
- 5.3.6 During construction, measures to protect retained habitats will be employed through the application of the CoCP in Appendix A of EAR.
- 5.3.7 As such, taking into account the habitat being retained adjacent to the site and in the wider area, and the small amount of suitable habitat being lost, it is considered unlikely to result in a negative effect on the conservation status of terrestrial invertebrates.

Bats

- 5.3.8 The trees within the Site have potential to support roosting bats. They will be retained during the works, but if bats are roosting in them they will be subject to significant disturbance and likely roost abandonment. As such, prior to the works, surveys will be completed on these trees to identify if there are roosts present. If roosts are present, then a Natural England licence will be required for the works. If no roosts are present, the trees will be retained so will be available for the use by roosting bats following the completion of the works.
- 5.3.9 Any trees adjacent to the Site which have potential to support roosting bats will be retained and are unlikely to be directly impacted by the construction of the compound. Some of the potential roosts are within 20 m of the border of the Site. These trees may experience noise and light disturbance from the works.
- 5.3.10 Due to the temporary nature of the compound, the above impacts are reversible but may impact the local population of species present throughout the duration of the construction (and operation) in the absence of mitigation.
- 5.3.11 This will be mitigated through a detailed lighting plan and will include limiting night working where possible and the use of directional lighting into the site to limit light spill on adjacent habitats. Lighting will not be permitted to directly illuminate trees with bat roosting potential or the hedgerow to the east of the Site.

³⁰ This will be hybrid elm which is resistant to Dutch elm disease

- 5.3.12 Considering the agreed mitigation measures detailed above, the construction of the Site is not expected to result in a significant residual effect on bats.

5.4 Operational Impacts, Mitigation and Residual Effects

- 5.4.1 No operational impacts are predicted on terrestrial invertebrates or any habitats that haven't been detailed in the construction impact section.

Bats

- 5.4.2 During the compound use (operation) it is possible that the introduction of artificial lighting could affect commuting and roosting bats.
- 5.4.3 This will be mitigated through a detailed lighting plan and will include limiting night working where possible and the use of directional lighting into the site to limit light spill on adjacent habitats. Lighting will not be permitted to directly illuminate trees with bat roosting potential or the hedgerow to the east of the Site.
- 5.4.4 During operation, measures will be employed through the application of CoCP in Appendix A of EAR.
- 5.4.5 Considering the agreed mitigation measures to be implemented, it is not expected that the use of the compound for works will have a significant residual effect on bats.

6. Conclusion

- 6.1.1 This EclA is based on a desk study and ecological surveys undertaken between January 2018 and July 2018. The scope of the surveys was based on the wider EWR Scheme, with additional surveys undertaken with regards to the initial EZol of the Site where required, and included an extended Phase 1 habitat survey, breeding and wintering bird surveys, white-clawed crayfish surveys, bat surveys, aquatic surveys, otter and water vole surveys and great crested newt surveys. The ecological features present within the Survey Area are shown in Drawing No 133735_RW-EWR-XX-XX-DR-LE-010865 in **Appendix C** and in **Appendix D**. Once all relevant available information was obtained, the final EZol of the Site was determined and the significance of impacts and subsequent effects (both positive and negative) on important ecological features at this Site was assessed.
- 6.1.2 The avoidance and mitigation measures identified in Section 5.1 above will be implemented as part of the overall development of the Site.
- 6.1.3 Taking avoidance and mitigation measures into account, the Site conforms in respect of biodiversity to the National Planning Policy Framework (NPPF)³¹ Section 15 (*Conserving and enhancing the natural environment*), Cherwell Local Plan 1996 (C2, C4 and C5), Non-statutory Cherwell Local Plan 2011 (EN1, EN24 and EN25) and Cherwell Local Plan 2011-2031 Part 1 (ESD 10 and ESD 13) which are detailed in the Planning Statement.
- 6.1.4 Impacts from the construction or operational phases of the Site are not predicted to result in any significant negative residual effects within the final EZol as a result of:
- Undermining of the conservation objectives or condition of designated sites and their features of interest;
 - A change in ecosystem structure and function; and,
 - A threat to the conservation status of undesignated habitats or protected and notable species.

³¹ Ministry of Housing, Communities and Local Government (2019). *National Planning Policy Framework*.

Appendix A. Site Location Plan and Site Drawing

A.1. Drawing 133735_2A-EWR-OXD-XX-DR-L-019011

Appendix B. Methodology of Assessment

B.1. Ecological Zone of Influence

B.1.1. Data Gathering (initial EZol)

The first stage (initial EZol) is to determine the geographical area for obtaining ecological data through desk and field-based studies based on the potential impacts and effects of the Site on ecological features. The initial EZol was based on the Site design, construction and operation information available at the time and an initial review of the Site conditions and the surrounding landscape using publicly accessible aerial imagery.

The constituent distances that inform the initial EZol are detailed below in Sections B.2 (desk study), B.3 (extended Phase 1 habitat survey) and B.4 (Phase 2 surveys).

B.1.2. Impact Assessment (final EZol)

The EZol was reviewed and amended once all field surveys were completed and records were received from the desk study.

The final EZol determines the geographical area for assessing the impacts and subsequent effects (both positive and negative) of the Site on important ecological features based on all the available information.

B.2. Desk Study

- In November 2017 the Buckinghamshire and Milton Keynes Environmental Records Centre and Thames Valley Environmental Records Centre was contacted to obtain the following ecological data as part of the larger, associated TWAO ES³² production. This provided records of:
- Non-statutory designated sites within 2 km of the Site boundary;
- Legally protected and notable species (fauna and flora) within 10 km of the Site boundary, including *Species of Principal Importance for the Conservation of Biodiversity* listed under Section 41 of the Natural Environment & Rural Communities Act 2006 in the *England Biodiversity List*³³.

The Multi-Agency Geographic Information for the Countryside (MAGIC) website (www.magic.gov.uk) was reviewed for information on designated sites of nature conservation importance (statutory sites only) within 2 km of the Site. This was extended to 10 km for internationally designated sites; these being Special Protection Areas (SPAs), Wetlands of International Importance (Ramsar sites) and Special Areas of Conservation (SACs).

As part of the TWAO ES production, waterbodies along the entire route were identified from Ordnance Survey maps and aerial mapping within 500 m of the TWAO boundary. Those within 500 m of the Site were identified from this dataset as part of this EclA, in order to establish if the land within and immediately surrounding the Site could be used as terrestrial habitat for great crested newts. This species typically uses suitable terrestrial habitat up to 500 m from a breeding pond. However, there is a notable decrease in great crested newt abundance beyond a distance of 250 m from a breeding pond³⁴.

A review of local planning policy relevant to the Site was also undertaken as part of the desk study and is detailed in the Planning Document.

B.3. Extended Phase 1 Habitat Survey

The extended Phase 1 habitat survey was undertaken on 31 May 2018 broadly following the Phase 1 habitat survey methodology as set out in Joint Nature Conservation Committee guidance (JNCC, 2010)⁴. All land within and adjacent to the Site, including land up to 50 m from the Site boundary where access allowed (the

³² The Network Rail (East West Rail Bicester to Bedford Improvements) Order Environmental Statement, July 2018

³³ Section 40 of the Natural Environment & Rural Communities Act 2006 requires that every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity. The Secretary of State, has drawn up, in accordance with Section 41 of the Act and in consultation with Natural England, a list of habitats and species of principal importance for the purpose of conserving biodiversity in England that is known as the *England Biodiversity List*

³⁴ Natural England (2004). *An assessment of the efficiency of capture techniques and the value of different habitats for the great crested newt (ENRR576)*. <http://publications.naturalengland.org.uk/publication/134002>.

Survey Area), was surveyed according to CIEEM guidance³⁵. Plant names recorded in this survey follow Stace (2010)³⁵.

This survey method records in particular:

- Potential roosting sites for bats within trees and structures (identification of suitable cracks and crevices) - survey undertaken from ground only. The assessment of potential value of the trees and structures for roosting sites for bats were categorised based on good practice guidance as detailed in **Appendix 0.1.1**;
- Assessing the potential of terrestrial and aquatic habitats to support great crested newts. Aquatic habitat was assessed for its suitability to support great crested newts using the Habitat Suitability Index assessment as detailed in **Appendix B.4.2**;
- Searching for signs of badger activity including setts, tracks, snuffle holes and latrines;
- Assessing the suitability of habitats for nesting birds (including any old nests);
- Assessing the suitability of habitats for common species of reptile (adder, grass snake, slow worm and common lizard);
- Assessing the suitability of watercourses for water vole, otter and white-clawed crayfish;
- Assessing the suitability of habitats for hazel dormouse;
- Assessing the suitability of habitats for notable invertebrates; and,
- Evidence of the presence of certain invasive plants listed on Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended) and subject to strict legal control (Japanese knotweed, giant knotweed, hybrid knotweed, giant hogweed, Himalayan balsam, rhododendron and cotoneaster species).

B.4. Phase 2 Surveys

B.4.1. Bats

All bat surveys detailed below have been undertaken in accordance with good practice guidance³⁶ and CIEEM competencies for undertaking bat surveys³⁷.

B.4.1.1. Roost Potential Assessment

A bat roost potential assessment of trees was undertaken on 10 January 2018.

The extent of the assessment was based on the predicted EZoI for this species group and included all trees within the Site and a 50 m buffer extending out in all directions from the Site boundary where access allowed (the Bats Survey Area).

Visual examinations of trees were undertaken from the ground, during daylight hours and were aided with the use of binoculars and a bright torch. The searches looked for features such as woodpecker holes and rot holes, cracked limbs, dense ivy and flaking bark.

The assignment of bat roost potential was carried out according to good practice guidance³⁸, which assigns each feature either Negligible, Low, Moderate or High suitability for roosting bats.

B.4.1.2. Aerial tree-climbing inspection

Based on the results of the PBRAs, trees within the Bat Roost Survey Study Area that were assessed as having moderate or high potential to support roosting bats and considered safe to ascend were subject to

³⁵ Stace, C. E. (2010). *New Flora of the British Isles, 3rd edition*. Cambridge University Press.

³⁶ Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edition). The Bat Conservation Trust, London.

³⁷ CIEEM (April, 2013) *Competencies for Species Survey: Bats*.

³⁸ Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edition). The Bat Conservation Trust, London.

aerial tree-climbing inspections in 2018 according to good practice guidance³⁹. See Appendix D for specific trees and results.

Each tree feature was inspected for evidence of bats such as individual bats, droppings, staining, odour or modified substrate and assessed for its potential to support roosting bats. The climbed inspections were aided by the use of an endoscope and high-powered torch.

All confirmed and potential roost features were recorded on a survey form and photographed with a description provided for each feature.

All trees within 2 m of potential hazards (e.g. roads, railways, deep water, construction sites or power lines) were considered unsafe to climb and were instead subject to emergence/re-entry surveys under the following circumstances:

- Where the tree was safe to climb; and
- Where the tree was easily accessible.

Trees with moderate potential were climbed twice within the optimal survey season (May – August/September), while trees with high potential were climbed three times within the same period. If the first climbed tree inspection was undertaken during the optimal survey season and in the same survey season as the remainder of the surveys, then the results were considered valid as part of the suite of surveys (aerial tree-climbing inspections and emergence/re-entry surveys) required to identify the presence of a roost.

If roosts were identified during any of the aerial tree-climbing inspections and it was not clear how many bats or what species were present, an emergence/re-entry survey was carried out to supplement the existing information, confirm the species present and provide a roost count.

B.4.2. Great Crested Newt

All great crested newt surveys detailed below have been undertaken in accordance with good practice guidance⁴⁰ and CIEEM competencies for undertaking great crested newt surveys⁴¹.

B.4.2.1. Habitat Suitability Index Assessment

A Habitat Suitability Index (HSI) assessment was undertaken on 26 March 2018 (004 and 005), 24 April 2018 (976) and 11 June 2018 (002) in accordance with good practice guidance⁴².

The extent of the HSI assessment was based on the predicted EZoI for this species and included all water bodies within the Site and a 500 m buffer extending out in all directions from the Site boundary where access allowed (the Great Crested Newt Survey Area).

The HSI is quantitative measure of habitat quality for great crested newts. The HSI is a numerical index between 0 and 1, derived from an assessment of ten habitat variables known to influence the presence of newts such as geographic location, waterbody size and permanence, the presence of predatory fish and wildfowl, availability of suitable terrestrial habitat and proximity to other waterbodies, and scores each factor based on its level of suitability. An HSI of 1 is optimal habitat (high probability of occurrence), while an HSI of 0 is very poor habitat (minimal probability of occurrence). The HSI is calculated on a single waterbody basis but takes into account surrounding terrestrial habitat and local waterbody density. If a waterbody has a very low HSI score (<0.5) then there would typically be a minimal chance of great crested newt presence.

³⁹ Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edition). The Bat Conservation Trust, London.

⁴⁰ Great Crested Newt Mitigation Guidelines (English Nature, 2001)

⁴¹ CIEEM (April, 2013) *Competencies for Species Survey: Great Crested Newt*.

⁴² Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*) *Herpetological Journal* 10 (4), 143-155 (2000). Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. The great crested newt Habitat Suitability Index (HSI) is a quantitative measure of aquatic habitat quality for great crested newt. The HSI is a number between 0 and 1, derived from an assessment of ten habitat variables known to influence the presence of newts.

B.4.2.2. Environmental DNA (eDNA)

The eDNA survey involved the collection of water samples from suitable waterbodies within the Great Crested Newt Survey Area to be tested for the presence of great crested newt DNA, which would indicate the species is present in a particular waterbody.

eDNA water sampling was undertaken on a single visit to all suitable waterbodies on 21 May 2018 (465) by suitably trained and experienced great crested newt surveyors.

The sampling methodology followed an approved methodology⁴³, recognised by Natural England that minimises cross contamination. Field sampling equipment was supplied as sterile kits by the laboratory that was to carry out the DNA analysis. In total, 20 water samples were collected from each waterbody sampled. Areas that may be used by great crested newts for displaying or egg-laying were selected for sampling and the sampling was carried out in daylight hours, and in dry weather. The surveyors held great crested newt survey licences from Natural England. Following completion of the sampling the collected water samples were stored under suitable conditions before being sent to the laboratory for testing.

B.4.2.3. Presence / likely absence surveys

Presence/likely absence surveys for great crested newts were carried out between 26 March 2018 and 21 June 2018.

Four presence/ likely absence surveys were carried out on each suitable waterbody⁴⁴ within the Great Crested Newt Survey Area utilising the following standard survey techniques:

- **Torching:** This involved two ecologists walking the circumference of each waterbody shining a high powered torch (one million candlepower) into the water to record the number of great crested newts (and other amphibian species) present;
- **Bottle Trapping:** This survey technique involved placing specifically made bottle traps around the margins of each waterbody. The traps were set quite late in the evening and then retrieved early the following morning and any trapped great crested newts (and other amphibian species) were counted and sexed;
- **Egg Searching:** This survey technique involved searching the live and dead submerged vegetation present within each waterbody for great crested newt eggs (and other amphibian species);
- **Netting:** Using a sturdy dip-net with a 2-4mm mesh the surveyors worked around the perimeter of the waterbody along 2m lengths of shoreline agitating the net through aquatic vegetation;
- **Refuge searching:** Terrestrial searches around the waterbody under suitable refuge materials such as rocks, logs, moss and discarded debris.

B.4.3. White-clawed Crayfish

White-clawed crayfish presence absence surveys were carried out on 21 August 2018.

The extent of the survey was based on the EWR2 ES requirements and included Langford Brook. The surveys were undertaken according to good practice guidance⁴⁵ and CIEEM competencies for undertaking white-clawed crayfish surveys⁴⁶.

The White-clawed crayfish Survey Area was surveyed using manual survey techniques. The survey was undertaken by an ecologist with suitable experience of this species.

⁴³ Biggs, *et al* (2014) Technical Advice Note for Field and Laboratory Sampling of Great Crested Newt eDNA in *Analytical and methodological development for improved surveillance of the Great Crested Newt*. Defra Project WC1067. Appendix 5. Freshwater Habitats Trust, Oxford

⁴⁴ Waterbodies are considered suitable where either the HSI score and other supporting evidence such as historical records of great crested newt presence indicates that great crested newt presence is likely

⁴⁵ Peay S. (2003) *Monitoring the White-clawed Crayfish Austroptamobius pallipes Conserving Nature 2000 Rivers Monitoring Series No. 1*. English Nature, Peterborough.

⁴⁶ CIEEM (April, 2013) *Competencies for Species Survey: White-clawed Crayfish*.

For manual searches a standardised manual survey of 5 habitat patches of 10 good refuges was undertaken.

Appropriate biosecurity measures were implemented where necessary (i.e. when surveying new sites on a new/ non-connected watercourse or on an upstream reach of the same watercourse) with Virkon aquatic disinfectant being used or sun drying being employed between surveys where necessary.

B.4.4. Otter

Otter presence /likely absence surveys were carried out on 11 July 2018.

The extent of the survey was based on the EWR2 ES requirements and included Langford Brook.

The surveys were undertaken following Atkins developed methodologies based on guidance set out in the *Design Manual for Roads and Bridges* (DMRB)⁴⁷, and CIEEM competencies for undertaking otter surveys⁴⁸.

The following evidence of otter activity was looked for during these surveys:

- Holts: a cavity or hole in a river bank, in the ground, under tree roots, within rocks or caves where the back cannot be readily seen. If active this will usually contain field evidence such as spraints;
- Hovers: a bolt hole or ledge that will afford an otter temporary cover or a place to feed on captured prey. The back of the hover can usually be seen. If active there may be footprints, feeding evidence or spraints);
- Couches: above ground where an otter can lie up or groom; these may take the form of a simple swirl or depression in tall grasses where the otter has laid, or may be covered in a vegetated grass or reed ‘roof’);
- Spraints (droppings);
- Feeding remains;
- Paths and slides (defined otter paths on watercourse banks and mud slides evident of where the animal regularly enters the watercourse);
- Footprints; and,
- Grooming hollows.

B.4.5. Wintering Birds

A wintering bird survey was undertaken between 22 January 2018 and 14 March 2018.

The extent of the survey was undertaken as part of the ES in a survey area which included the compound area (Wintering Bird Survey Area WB_2Ai) and as such followed the methodology as set out in the ES, which has been replicated below.

“Six survey visits were undertaken during the wintering season (October 2017 to April 2018 inclusive). Where access allowed, the visits were as evenly spaced as possible throughout the survey period.

Following a non-breeding CBC methodology, surveyors conducted a walkover of each site within the Wintering Birds Field Survey Study Area. The surveyors walked a transect route largely following existing hedgerows/field margins (to avoid walking over and damaging winter-sown crops) whilst ensuring comprehensive survey coverage. The surveyors, with the aid of binoculars, recorded all bird contacts by walking the transect at a slow and steady pace. The positions of the recorded birds were plotted on to a suitably scaled map using standard BTO codes and symbols to plot bird activity.

The transect route was walked at a fixed-speed and the direction of the transect route alternated between survey visits to minimise any bias in bird detection along points of the transect.

Bird contacts were also recorded immediately outside of the Wintering Birds Field Survey Study Area to ensure that any such species that are in proximity to the Wintering Birds Field Survey Study Area (in particular scarce species), and therefore may be impacted by the Project, can be assessed.”

⁴⁷ *The Design Manual for Roads and Bridges DMRB Volume 10, Section 1 Part 9 HA 81/99 Chapter 7, Grogan*

⁴⁸ CIEEM (April, 2013) *Competencies for Species Survey: Eurasian Otter*.

B.4.6. Breeding Birds

A breeding bird survey was undertaken between 25 April 2018 and 11 July 2018.

The extent of the survey was undertaken as part of the ES in a survey area which included the compound area (Breeding Bird Survey Area BB_2A_001) and as such followed the methodology as set out in the ES, which has been replicated below.

“Six survey visits will be undertaken during the bird breeding season (April to July inclusive) to ensure that both resident and migratory breeding species can be identified. Where access allows, the visits will be as evenly spaced as possible throughout the survey period.

The surveys will broadly follow an adapted version of the Common Birds Census (CBC) method^{49,50}. The surveyor, with the aid of binoculars, will record all contacts with birds either by sight or sound by walking the transect at a slow and steady pace. The positions of the recorded birds will be plotted as accurately as possible on a suitably scaled base map, i.e. a ‘visit map’. Standard British Trust for Ornithology (BTO) codes and symbols will be used for mapping species/status (including sex and age e.g. juvenile, immature or adult) and bird activity (including singing, alarm-calling, nest building and location, carrying food or faecal sacs, territorial disputes and copulation).

Bird contacts will also be recorded immediately outside of the Breeding Birds Field Survey Study Area to ensure that any such species whose territories may overlap the Breeding Birds Field Survey Study Area (in particular scarce species), and therefore may be impacted by the Project, can be assessed.

Non-nesting behaviour, such as over-flying the site will also be noted, together with the direction of movement.

Emphasis will be placed on minimising surveyor bias on bird detection by carrying out the surveys using a systematic and standardised approach. Survey visits will be commenced within an hour of sunrise and undertaken in fair weather conditions (i.e. not in heavy rain, poor visibility or wind greater than Beaufort Scale 4). The transect route will be walked at a fixed-speed and the direction of the transect route alternated between survey visits to minimise any bias in bird detection along particular points of the transect.

In areas of woodland and scrub and other enclosed habitats, where access allows surveyors will aim to approach to within 50 m of every point within each survey area. In more open habitats such as arable fields or open expanses of grassland, all linear field boundaries will be walked to provide visibility across the Breeding Birds Field Survey Study Area to identify birds located within areas of open habitat.

If appropriate, one of the six survey visits will be conducted in the evening at sites where this would enhance the detectability of crepuscular species such as barn owl and woodcock (*Scolopax rusticola*).

Where suitable habitat exists, data on Schedule 1 species will be collected during the breeding bird surveys to identify potential nest locations, for example areas of woodland suitable for breeding red kite (*Milvus milvus*). Survey methods will adopt best practice guidance where available, for example Gilbert et al (1998)⁵¹ and Hardey et al (2013)⁵².

A Natural England licence is required where surveys are likely to disturb Schedule 1 species. In the vast majority of cases, it is considered unlikely that surveys following the CBC method or specified best practice guidance would constitute a legal offence. Where required, survey and transect routes have been modified to limit the potential for disturbance to Schedule 1 species whilst nesting. In instances where individual surveys have been assessed as being likely to cause disturbance, appropriately licenced staff have been provided.”

⁴⁹ Marchant, J.H. (1983): Common birds census instructions, BTO, Tring

⁵⁰ Gilbert, G., Gibbons, D.W. and Evans, J (1998) Bird Monitoring Methods, RSPB, Sandy

⁵¹ Hardey J., Crick H., Wernham C., Riley H., Etheridge B. & Thompson D. (2013). Raptors: A Field Guide to Survey and Monitoring, 3rd Edition. TSO, Edinburgh

⁵² Pollit, M.S., Hall, C., Holloway, S.J., Hearn, R.D., Marshall, P.E., Robinson, J.A., Musgrove, A., Robinson, J. & Cranswick, P.A. (2003). The Wetland Bird Survey 2000- 2001: Wildfowl and Wader Counts. Slimbridge

B.4.7. Badger

A badger survey was carried out on 31 May 2018 alongside the Phase 1 habitat survey in accordance with good practice guidance⁵³ and CIEEM competencies for undertaking badger surveys⁵⁴.

The extent of the badger survey was based on the predicted EZol for this species and included all land within the Site and a 50 m buffer extending out in all directions from the Site boundary where access allowed (the Badger Survey Area).

The Badger Survey Area was inspected for evidence of badger activity including setts, latrines, paw prints, snuffle holes (created when foraging), track-ways, hairs (caught on fencing) and scratching posts.

B.5. Nature Conservation Evaluation

A number of criteria have become accepted as a means of assessing the nature conservation value of a defined area of land which are set out in *A Nature Conservation Review* (Ratcliffe, 1977) and include diversity, rarity and naturalness.

The nature conservation value or potential value of an ecological feature is determined within the following geographic context:

- **International** (such as Special Areas of Conservation, Special Protection Areas, Ramsar sites);
- **National** (such as Sites of Special Scientific Interest);
- **Regional** for example, Environment Agency regional biodiversity indicators, important features in Natural England Natural Areas;
- **Metropolitan, County, Vice-County or Other Local Authority-wide Area** (such as Local Nature Reserves, Sites of Importance for Nature Conservation, ancient woodlands);
- **Local (parish)** (undesigned ecological features such as old hedges, woodlands, ponds);
- The **Site and its immediate environs** e.g. poor semi-improved grassland, arable and species-poor hedgerow; and,
- **Negligible** e.g. areas of hardstanding and amenity grassland.

B.6. Impact Assessment

The assessment of the potential effects of the Site takes into account both on-site effects and those that may occur to adjacent and more distant ecological features. Impacts can be permanent or temporary and can include:

- Direct loss of wildlife habitats;
- Fragmentation and isolation of habitats;
- Disturbance to species from noise, light or other visual stimuli;
- Changes to key habitat features; and,
- Changes to the local hydrology, water quality and / or air quality.

Effects are unlikely to be significant where features of low value or sensitivity are subject to small or short-term impacts. However, where there are a number of small scale effects that are not significant alone, the assessor may determine that, cumulatively, these may result in an overall significant effect. Significant effects have been determined as being either negative or positive.

For designated sites, effects are considered significant when a project and associated activities is likely to either undermine or support the conservation objectives or condition of the site(s) and its features of interest.

For ecosystems, effects are considered significant when a project and associated activities is likely to result in a change in ecosystem structure and function.

⁵³ Harris, C., *et al* (1989) Surveying Badgers, *Mammal Society*.

⁵⁴ CIEEM (April, 2013) *Competencies for Species Survey: Badger*.

Consideration is given to whether:

- Any processes or key characteristics will be removed or changed;
- There will be an effect on the nature, extent, structure and function of component habitats; and,
- There is an effect on the average population size and viability of component species.

Functions and processes acting outside the formal boundary of a designated site has also been considered, particularly where a site falls within a wider ecosystem e.g. wetland sites.

Some ecosystems can tolerate a degree of minor changes, such as localised or temporary disturbance or changes in physical conditions, without such changes harming their function or value. For this EclA, ecological effects have been considered in the light of any information available about the capacity of ecosystems to accommodate change.

The conservation status of undesignated habitats and species within a defined geographical area has been used in this assessment to determine whether the effects of the proposals are likely to be significant:

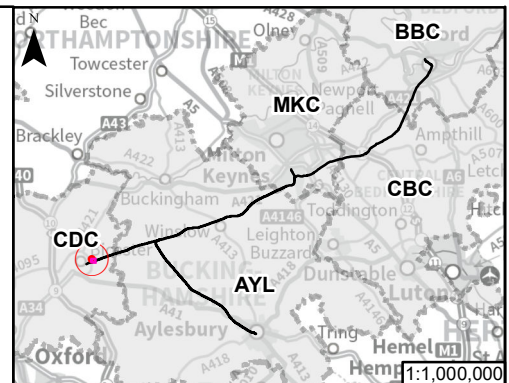
- For habitats, conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area; and,
- For species, conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

When assessing potential effects on conservation status, the known or likely background trends and variations in status have been taken into account. The level of ecological resilience or likely level of ecological conditions, that would allow the population of a species or area of habitat to continue to exist at a given level or continue to increase along an existing trend or reduce a decreasing trend, has been estimated where appropriate to do so.

The avoidance, mitigation and/or compensation measures described within the EclA have been incorporated into the design and operational phasing programme and taken into account in the assessment of the significance of effects. These mitigation measures include those required to achieve the minimum standard of established good practice together with additional measures to further reduce any negative impacts of the Site. The mitigation measures include those required to reduce or avoid the risk of committing legal offences.

Appendix C. Extended Phase 1 Habitat Survey Plan

C.1. Drawing 133735_RW-EWR-XX-XX-DR-LE-010865



— PROJECT EXTENTS
 LOCAL AUTHORITY
 APPLICATION SITE BOUNDARY
 NEUTRAL GRASSLAND - SEMI-IMPROVED
 IMPROVED GRASSLAND
 RUNNING WATER (AQUATIC FEATURE CODE 6)
 HEDGEROW WITH TREES - NATIVE SPECIES-RICH
 SCRUB - SCATTERED
 TREE

0 60 Meters

P01	15/03/19	FOR PLANNING	NJ	AR	
Rev	Date	Description of Revisions	Dsnd	Chkd	Appr
Status	WIP - APPROVE				S0



Project
**EAST WEST RAIL WESTERN SECTION
 PHASE 2**

Drawing Title
**PHASE 1 HABITAT SURVEY PLAN
 LAND OFF BICESTER ROAD**

Designed	Natalie Jordan	Signed	<i>Natalie Jordan</i>	Date	19/03/2019
Drawn	Natalie Jordan	Signed	<i>Natalie Jordan</i>	Date	19/03/2019
Checked	Anna Rowlands	Signed	<i>Anna Rowlands</i>	Date	19/03/2019
Approved		Signed		Date	19/03/2019

Scale(s)	1:1,500	ELR & Project Chainage	N/A
Design Package Risk Classification	NORMAL	Sheet	1 of 1
Alternative Reference	Alternative_Ref	Revision	P01
Drawing Number	133735_RW-EWR-XX-XX-DR-LE-010865		

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Appendix D. Phase 2 Survey Results

D.1. Bats

The bat tree survey results are summarised in Table D1 below

Table D1: Bat tree assessment survey results

Bat feature code	Species	PBRA date	Roosting potential	Aerial tree climb v1 date	Change in assessment	Aerial tree climb v2 date	Final result ⁵⁵
173.5_BT1_F001	Common ash	10/01/18	Moderate	22/03/18	Moderate	-	Moderate (incomplete)
173.5_BT1_F002	Common ash	10/01/18	Moderate	22/03/18	Moderate	-	Moderate (incomplete)
173.5_BT1_F010	Common ash	10/01/18	Moderate	22/03/18	Low	N/A	Low (completed surveys)
173.7_BT1_F001	Pedunculate oak	10/01/18	Moderate	12/07/18	Low	N/A	Low (completed surveys)
173.7_BT1_F002	Field maple	10/01/18	Moderate	12/07/18	Moderate	03/09/18	Moderate (completed surveys)
173.7_BT1_F003	Pedunculate oak	10/01/18	Low	-	-	03/09/18	High (incomplete)
173.7_BT1_F004	Pedunculate oak	10/01/18	Moderate	12/07/18	Moderate	03/09/18	High (incomplete)
173.7_BT1_F005	Pedunculate oak	10/01/18	Moderate	12/07/18	Moderate	03/09/18	High (incomplete)

D.2. Great Crested Newts

The great crested newt survey results are summarised in table D2 below.

Table D2: Presence/ absence survey results

Waterbody Ref	HSI Survey Date	HSI Score	P/A Survey Dates	P/A Survey Methodology ⁵⁶	P/A GCN Results	Other Amphibian Species Recorded ⁵⁷ ⁵⁸	Population Size Class Assessment
GCN_002	11/06/2018	Flowing	-	-	-	-	Scoped out

⁵⁵ If surveys could not be completed following good practice guidance (i.e. 2 surveys undertaken for high potential tree) an incomplete survey result is noted here

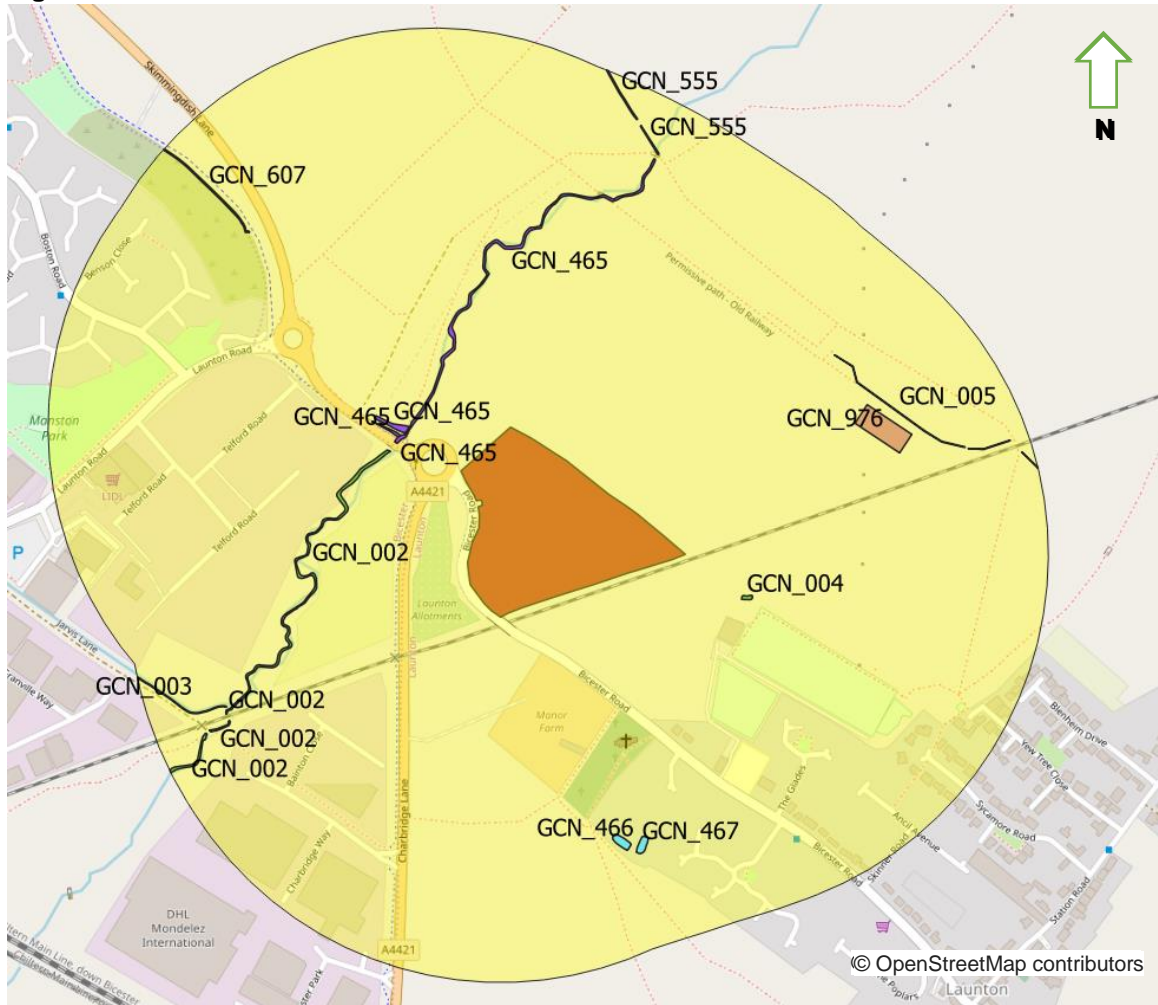
⁵⁶ T = torching; B = bottle trapping; E = egg search; R = refuge search; N = netting. Where method was only undertaken on some of the survey visits these have been detailed (v1, 2, 3, 4), if no visit numbers provided then method used on all visits

⁵⁷ GCN – great crested newt, SN – smooth newt, PN – Palmate newt, CT – common toad, CF – common frog, m – male great; f = female, imm = immature

⁵⁸ The peak count from the surveys is provided for each species found

GCN_003	-	-	-	-	-	-	Assumed medium
GCN_004	26/03/2018	0.68 Avg	26/03/18 - 09/05/18	PA - B (v1, 3, 4), T, E, R	Likely absent	CF (1), CT (1)	-
GCN_005	26/03/2018	0.64 Avg	26/03/18 - 30/04/18	PA - B (v1), T, E, R	Likely absent (dry v3)	-	Scoped out
GCN_465	21/05/2018	0.59 Below Avg	21/05/18 21/05/18 - 21/06/18	eDNA PA - B, T, E	Likely absent	-	-
GCN_466	-	-	-	-	-	-	Assumed medium
GCN_467	-	-	-	-	-	-	Assumed medium
GCN_555	N/A	Screened out	-	-	-	-	Scoped out
GCN_607	-	-	-	-	-	-	Assumed medium
GCN_976	24/04/2018	Dry	-	-	-	-	Scoped out

Figure D-1 Waterbodies within 500m



Appendix E. Designated Sites Location

Figure E-1 Designated sites within 2 km (orange = LWS; purple = BNS)

