

9. Biodiversity

Introduction

- 9.1 This Chapter reports the outcome of the assessment of likely significant environmental effects arising from the Proposed Scheme in relation to Biodiversity.
- 9.2 The Chapter describes the consultation that has been undertaken during the EIA, the scope of the assessment and assessment methodology, and a summary of the baseline information that has informed the assessment.
- 9.3 A number of effects have been avoided in advance of the assessment and where relevant these are clearly stated. The assessment reports on the likely significant environmental effects, the further mitigation measures required to prevent, reduce or offset any significant adverse effects, or further enhance beneficial effects. The conclusions are provided both in terms of the residual effects and whether these are considered significant.
- 9.4 This Chapter, and its associated figures and appendices, is intended to be read as part of the wider ES with particular reference to the introductory chapters of this ES (**Chapters 1 - 5**), as well as the Design and Construction Lighting Mitigation Strategy set out within the EIA Scoping Report (**Appendix 2.1**).
- 9.5 In addition, this Chapter should be read in conjunction with **Chapter 13 – Cumulative Effects Assessment**.

Legislative Framework and Guidance

- 9.6 The following legislation has informed the assessment of effects within this Chapter, and is detailed further in **Appendix 9.1**:
- The Conservation of Habitats and Species Regulations 2017 (as amended)ⁱ;
 - Natural Environment and Rural Communities (NERC) Act 2006ⁱⁱ;
 - Countryside and Rights of Way (CRoW) Act 2000ⁱⁱⁱ;
 - Wildlife and Countryside Act 1981 (as amended)^{iv}; and
 - Hedgerow Regulations (1997)^v.
- 9.7 The following guidance has informed the assessment of effects within this Chapter and is detailed further in **Appendix 9.1**:
- Design Manual for Roads and Bridges (DMRB), Volume 10: Section 4, Part 1, LA 118 - Biodiversity design (2019)^{vi};
 - DMRB, Volume 11: Section 2, Part 4, LA 104 - Biodiversity design (2019)^{vii};

- Guidelines for Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Management (CIEEM) 2018)^{viii};
- UK Post-2010 Biodiversity Framework 2018 (revised)^{ix};
- Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition) 2016^x; and
- Environment Bill Policy Statement (2019)^{xi}.

Summary of Consultation

- 9.8 **Table 9.1** provides an overview of the consultation that has been undertaken to inform the Proposed Scheme and EIA, including the consideration of likely significant effects and the methodology for assessment.

Table 9.1: Summary of Consultation

Body / Organisation	Contact	Date and Form of Consultation	Summary
Merseyside Environmental Advisory Service (MEAS)	Rachel Rhodes (RR) – Ecological Advisor	19/12/2019 Email return and phone conversation	Discussed the Proposed Scheme and design proposals and the potential to cause significant disturbance to qualifying features of known designated sites. On review of the distance from the Site and the level of disturbance anticipated, RR confirmed no requirement to include Habitat Regulation Assessment (HRA) Screening within the scope of the ES. RR confirmed happy with the proposed scope on that basis.

Scope of the Assessment

- 9.9 An EIA Scoping Report was submitted to Liverpool City Council (LCC) in January 2020, as presented as **Appendix 2.1**. This section provides an update on the scope of the assessment presented within this Chapter following submission of the EIA Scoping Report.

Effects which are Not Significant

- 9.10 The following not significant effects were identified as part of the EIA Scoping Report and are not considered further in this Chapter. The effects and evidence to support this are represented and updated as below.

Disturbance to Badger, Great Crested Newt and Reptiles as a result of the Proposed Scheme

- 9.11 A Preliminary Ecological Appraisal was undertaken in 2014 by Mott MacDonald Limited, as part of the previous planning application on the Site. The PEA Report (PEAR) concluded that there was no habitat to support, and no evidence of, great crested

newt (GCN) *Triturus cristatus*, badger *Meles meles* or reptiles being active on Site. In addition, no data records were returned for these species within 2km of the Site.

- 9.12 No suitable terrestrial habitat is located within or adjacent to the Site for GCN, as it is predominately made up of hardstanding with amenity grassland and ornamental planting. No suitable aquatic habitat for GCN is located within 250m from the Site boundary.
- 9.13 No suitable habitat for badger or reptiles is located within the Site as it is predominately made up of hardstanding with amenity grassland and ornamental planting. Stanley Park is unsuitable to support badger and reptiles due to high levels of disturbance through a continuous grass cutting regime and as well as recreational use by the general public. It also isolated within the urban landscape of Liverpool and has limited connectivity to the surrounding landscape.
- 9.14 Since the PEAR in 2014, all habitats on Site have remained of the same ecological value and their condition is unchanged.
- 9.15 Therefore, disturbance to badgers, GCN and or reptiles is unlikely to be considered significant and is not considered.

Habitat loss within and adjacent to the Stadium as a result of the Proposed Scheme

- 9.16 The habitats on Site have not changed since the PEAR was undertaken in 2014 by Mott MacDonald Limited. Habitats on Site include amenity grassland, bare ground, buildings, hardstanding, introduced shrub and scattered trees. The habitats present are very common, homogenous in nature and isolated from larger areas of natural habitat. Therefore these habitats are not considered to be of ecological importance in their own right.
- 9.17 No habitat removal is planned within or adjacent to a National or European designated site.
- 9.18 Therefore, habitat loss, within and adjacent to the Stadium as a result of the Proposed Scheme is very unlikely to be considered significant and is not considered.

Disturbance to features of European Statutory Designated Sites

- 9.19 European Statutory Designated Sites; Liverpool Bay Special Protection Area (SPA), Mersey Narrows & North Wirral Foreshore Special Area of Conservation (SAC), SPA & Ramsar are all located within 5km of the Scheme. These areas are designated for their important numbers of various species of water birds including populations of over-wintering birds including red-throated diver *Gavia stellata* and common scoter *Melanitta nigra*.
- 9.20 It is noted that common scoter is an extremely shy species (Garthe & Huppopp (2004)^{xii}, sensitive to disturbance and noise. However, given the distance between these receptors and the Proposed Scheme, the presence of other industry and potential prior sources of disturbance, it is considered unlikely that a significant effect associated with noise and disturbance would occur as a result of the proposed development. As such, potential effects to European statutory designated sites are not considered significant and is not considered within this ES.

- 9.21 Since the submission of the EIA Scoping Report (January 2020) a revised PEAR has been produced (**Appendix 9.2**) which has confirmed the findings set out above. In addition, the following additional effects are not considered significant and the evidence to support this is outlined below.

Disturbance to bats (not roosting in Anfield Stadium) and birds

- 9.22 The light currently emitted from the Kop Stand causes a large light splay in the direction of Stanley Park. This will be reduced after construction as the new Anfield Road Stand will be taller and therefore obstruct more of the light splay directed from the Kop Stand. The lowest permissible lighting levels required will be operated along the southern periphery of Stanley Park, where possible, and will be directed towards the target areas to be lit. Lighting cowls will be installed to direct any lighting spill away from trees, in line with best practice guidance^{xiii}. These mitigation measures will avoid obstructing bats from accessing retained low suitability roosting features in trees adjacent to the Site, as a result of newly installed lighting. The Design and Construction Lighting Strategy (included within the Scoping Report, **Appendix 2.1**) describes the lighting specifications in further detail. No night works are proposed during construction. Any work audible at the Site boundary, outside normal hours, would be subject to agreement with the LCC Environmental Protection Unit.
- 9.23 The five individual scattered parkland trees assessed as having low suitability for bat roosts (referred to as T1-T5 – see **Appendix 9.3**), do not require further surveys^{xiv}. Following the production of the Tree Retention and Removal Plan (**Figure 4.1**) and updated Potential Roost Assessment (PRA) (**Appendix 9.3**), one tree of low suitability for bats will be lost out of a total of 20 trees that will require removal as part of the Proposed Scheme. The updated PRA identifies the remaining trees to be removed as having negligible suitability for bats.
- 9.24 A ‘soft felling’ methodology will be implemented where trees of low suitability for bats are to be removed as part of the Proposed Scheme^{xiv}. This comprises of removing brash from the canopy first and laying it on the ground around the trunk to form a cushion. Branches and the trunk comprising suitable roosting features are felled in sections and lowered onto the brash ‘cushion’. Suitable roosting features should be lowered and positioned face up, then inspected by a suitably qualified (licensed) bat ecologist. Should roosting bats be found or suspected at any time, then works must stop immediately, although this is considered very unlikely.
- 9.25 The amenity grassland is heavily managed to a short sward making it unsuitable for invertebrates and therefore unsuitable for foraging bats. One hedgerow is defunct and the other continuous hedgerow is isolated, both of which have low ecological value for commuting bats in their current state. However, they do provide limited opportunity for foraging bats and birds and therefore will be replaced with like-for-like habitat post-construction. The temporary loss of amenity grassland and hedgerows will not have a significant effect on bats or birds.
- 9.26 Several small areas of introduced shrub, Anfield Stand (referred to as Building A.3 in **Appendix 9.3**) and semi-mature broadleaved parkland scattered trees around the perimeter of the car parks and along Stanley Park pedestrian paths have low potential for nesting urban birds. The amenity grassland and defunct hedgerow that will be

temporarily lost during construction to form the compound area are of low suitability for birds, with limited opportunities for foraging only. The continuous hedgerow, while dense, is low, not very wide and managed into a box-shape. Therefore, it has low suitability for nesting birds due to disturbance from the maintenance regime, dogs and predation risks, park users and visitors to Anfield Stadium. Although the footfall of visitors to the Stadium will increase in volume (expansion of Anfield Road Stand capacity) and frequency (additional events held at the Stadium during the summer close season), the associated disturbance is not anticipated to impact nesting urban birds (March to August inclusive ¹)^{xv}.

9.27 The baseline disturbance to birds is relatively high in these areas, as birds choosing to nest in these areas are considered to have a high tolerance to match day disturbance and therefore the impacts of the Proposed Scheme are not considered significant. Therefore, the following best practice mitigation will be implemented:

- primary mitigation - retention of trees with known active bird nests or with high suitability for nesting birds; and
- tertiary mitigation – nesting bird check, a 5m exclusion buffer around active bird nests, direct any lighting and noise emitting equipment and vehicles away from trees, avoid night works where possible.

9.28 The effects of the Proposed Scheme, including *damage to green space within Stanley Park including the loss of trees and grassland*, on bats (excluding roosts in Anfield Stadium) and birds are not considered significant and therefore will not be considered further.

Habitat loss within and adjacent to the Site as a result of the Proposed Scheme

9.29 The updated PEAR (**Appendix 9.2**), concludes that the bare ground north of Anfield Road has changed, in addition hedgerows now form part of the Site boundary. The area previously noted as bare ground now comprises predominantly of hardstanding, with small areas of amenity grassland, scattered trees and introduced shrub. The areas of hardstanding comprise a tarmacked car park, repurposed shipping containers supplying catering services and an outside broadcast (OB) area adjacent to Liverpool Football Club TV (LFCTV) shipping containers. The hedgerows on Site are not ‘important’ hedgerows as defined by The Hedgerow Regulations 1997^{xvi} and there are no habitats of principal importance (S41 of the NERC Act 2006) present on the Site. These habitats are very common, homogenous in nature, are either of low or negligible ecological importance and have poor connectivity to large areas of better-quality natural habitat.

9.30 Tree retention was a priority during landscape design. A total of 20 trees will be removed as part of the Proposed Scheme with a total of 19 semi-mature trees to be replanted, comprising of native species of local provenance. Although a 1:1 ratio for replanting is not feasible due to the limited space on the Site, the maximum number of trees are being planted in the space available and all the young trees to be removed

¹ Nesting seasons are provided as guidance they are not definitive periods of time within which all nesting attempts are recorded. Bird species may have active nests outside this core period.

will be replaced with more mature trees. This will raise the ecological value for birds from negligible to low for many of the trees, providing suitable habitat for nesting.

- 9.31 The compound area will not result in the loss of any trees, however a section of species-poor defunct hedgerow (length yet to be determined at the time this chapter was produced) and amenity grassland will be temporarily lost during construction. The amenity grassland has negligible ecological value, so the temporary degradation of this green space in Stanley Park during construction is not considered to be significant. The habitats within the compound area in Stanley Park will be reinstated to pre-construction conditions, on completion of the Proposed Scheme. Habitat loss and temporary increase in air pollution during construction and operation will not be significant to habitats on or adjacent to the Site.
- 9.32 The EIA Scoping Report (**Appendix 2.1**) identified ‘removal of or damage to protected trees’ as being a Likely Significant Effect within Stanley Park. In this context, protected trees refers to tree preservation orders (TPO) and trees within Stanley Park, as a whole, that contribute to the heritage designation Grade II listed green space. TPOs are designation for the amenity value of trees or woodlands and their removal would not have ‘a significant negative impact on the local environment’^{xvii} as part of this Proposed Scheme. Permission for the removal of any TPOs will be obtained from the local planning authority prior to works commencing. Neither designations are for biodiversity and as such will not be discussed further within this chapter of the ES.

Damage to green space within Stanley Park including the loss of trees and grassland

- 9.33 Following the production of the updated PEAR (**Appendix 9.2**), updated PRA (**Appendix 9.3**) and the Tree Retention and Removal Plan (**Figure 4.1**), under the rationale stated above, ‘*Damage to green space within Stanley Park including the loss of trees and grassland*’, as detailed in the Scoping Report, **Appendix 2.1**, is not considered significant and will no longer be assessed under *Likely Significant Effect* within this chapter of the ES.

Likely Significant Effects

- 9.34 The following effects (**Table 9.2**) are considered significant and are reported within this Chapter:

Table 9.2: Likely Significant Effects

Likely Significant Effect	Applicable Phase
Disturbance and destruction of a potential transitional bat roost in the Anfield Road Stand (absence to be confirmed through further survey work)	Construction
Disturbance to roosting bats (confirmed in the Kop Stand)	Construction and Operation

Extent of the Study Area

- 9.35 The study area is defined by the Zone of Influence (Zol), which is the area considered to contain the extent of ecological features potentially impacted upon by the Proposed Scheme. The extent of the Zol is determined by the nature of the development and the

ecological features being assessed. As a minimum, the Zol will include the Site and, in almost all cases, will extend beyond it to some degree. The Construction Boundary comprises of two areas which are separated by a pedestrian access path (Dahlia Walk) to Stanley Park. The more southerly area comprises the Anfield Road Stand and the areas of hardstanding north of Anfield Road. The second area is north of Dahlia Walk and comprises a large car park and the southern corner of Stanley Park. The Construction Boundary includes the Anfield Road Stand only, and not the other three stands. The entirety of the Anfield Stadium is included within the study area to assess the likely significant effects of the Proposed Scheme (the expansion of Anfield Road Stand and extension of the planning application to hold more events during the close season) on the confirmed bat roost within the Kop Stand. The Construction Boundary and study area combined are referred to as the Site throughout this chapter. Where impacts and mitigation are considered for a specific area, this separation is made clear.

9.36 **Table 9.3** outlines the Zol for each ecological feature relevant to the Proposed Scheme.

Table 9.3: Zone of Influence

Ecological Features	Zone of Influence
European statutory designated sites	Within the Site and 10km buffer around the Site
National statutory designated site	Within the Site and 2km buffer around the Site
Protected species records	Within the Site and 2km buffer around the Site
Extended phase 1 habitat survey	Within the Site and in between the two Site areas (as described above)
Badgers	Within the Site and 50m buffer around the Site
Bats	Within the Site and 5km buffer around the Site
Reptiles and amphibians	Within the Site and 250m buffer around the Site
Great crested newt	Within the Site and 250m buffer around the Site
Breeding Birds	Within the Site and 500m buffer around the Site

9.37 This assessment excluded all buildings currently outside the ownership of LFC, which includes the housing on Alroy Road, Anfield Road and Skerries Road. These buildings are a sufficient distance away from the Site so that the Proposed Scheme is not considered to have a direct or indirect impact on any potential bat roosts in these residential buildings, during the construction or operational phase.

Background Studies to Inform the ES

9.38 The following background studies have informed this Chapter:

- Updated 'Preliminary Ecological Appraisal Report', Mott MacDonald 2020 – see **Appendix 9.2**;
- 'Potential Roost Assessment (PRA) for trees and structures - Technical Note', Mott MacDonald 2020 – see **Appendix 9.3**;

- Tree Retention and Removal Plan, Planit I.E Limited – see **Figure 4.1**
- Updated Bat Assessment ‘LFC Bat Technical Note: Bat survey results – Anfield Stadium’, Mott MacDonald 2018 – see **Appendix 9.4**; and,
- ‘Preliminary Ecological Appraisal Report’, Mott MacDonald 2014 – see **Appendix 9.5**;
- Initial Bat Assessment, Mott MacDonald 2014 – see **Appendix 9.6**.

Assessment Methodology

9.39 The assessment has been undertaken in accordance with the CIEEM guidelines for ecological impact assessment^{xviii}, as well as DMRB, LA 104 Environmental assessment and monitoring^{xix}. The assessment method is as follows:

- Identifying and characterising impacts and their effects;
- Incorporating measures to avoid and mitigate adverse impacts and effects;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects; and
- Identifying opportunities for ecological enhancement.

9.40 A number of standard methods were followed to allow an evaluation of the baseline conditions within the ZoI (See **Table 9.3** above). This included a combination of a desk study and field studies, which are detailed within the Background Studies to Inform the ES section above. The baseline data has been collected in order to meet the requirements of a number of different assessments:

- Assessment of likely significant effects on ecological resources;
- Compliance with legislation relating to species protection; and,
- Compliance with legislation relating to European sites.

9.41 Specific limitations relevant to each survey, such as access constraints, are detailed in the relevant ecology survey reports, appended to this chapter, as outlined within the Background Studies to Inform the ES results section above. It is not considered that any of these survey specific constraints represent a significant limitation, barrier or data gap such that the baseline picture gathered is inadequate or insufficiently thorough. It is considered that the baseline that has been established is suitably robust such that the assessment it has informed is also adequately robust.

Baseline Conditions

9.42 The assessment contained within this chapter has been informed by a number of sources. Information regarding statutory and non-statutory sites was obtained from Natural England’s MAGIC Interactive Map^{xx}, with further information utilised from

Natural England^{xxi} and the Joint Nature Conservation Committee (JNCC)^{xxii}. In addition, Lancashire and Cheshire Fauna Society (L&CFS) and Merseyside BioBank (MBB) databases have been consulted.

- 9.43 Information relating to habitats and species have been obtained from ecological surveys undertaken on behalf of Liverpool Football Club and Athletics Grounds Limited since 2014 until present.

Reporting of the Environmental Effect and Significance Criteria

- 9.44 The assessment of likely significant environmental effects as a result of the Proposed Scheme has taken into account the construction and operational phases.
- 9.45 The duration of the effect has been assessed as either 'short-term', 'medium-term' or 'long-term'. Short-term is considered to be up to 1 year, medium-term is considered to be between 1 and 10 years and long-term is considered to be greater than 10 years.

Determining Sensitivity of Receptor

- 9.46 The sensitivity of affected receptors has been considered on a scale of **high**, **medium**, **low** or **negligible**. In addition to the methodology set out in Chapter 2, an additional descriptor of '**very high**' is used within this chapter to accord with topic specific guidance.
- 9.47 The assessment process requires ecological receptors to be valued by an ecologist with the appropriate level of experience, using their professional judgement, available guidance, consultation with MEAS and information on the distribution and status of the features that are being considered. In accordance with these guidelines, the significance of effect on an ecological receptor is arrived at by considering the environmental value (sensitivity) of the receptor or resource and the magnitude of change. For consistency between ES Chapters, the term environmental value (sensitivity) is used, however it should be noted that this is referred to as nature conservation importance by CIEEM guidance^{xxiii}.
- 9.48 The value or sensitivity of receptors are detailed within **Table 9.4** below.

Table 9.4: Environmental value (sensitivity) and descriptions

Value (sensitivity) of receptor / resource	Typical description
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Source: Highways England, 2019

Determining the Magnitude of Change

- 9.49 The magnitude of change has been considered as the change experienced from the baseline conditions at the sensitive receptor and has been considered on a scale of **large, medium, small** or **negligible**. For consistency between ES Chapters, the term magnitude of change is used, however it should be noted that this is referred to as the magnitude of impact by the DMRB. In addition, the DMRB uses different terminology for the levels of magnitude of change (shown in brackets in **Table 9.5**). However, the DMRB terms will not be used during this assessment, to ensure consistency between ES Chapters.
- 9.50 The assessment of the magnitude of change shall cover the following factors:
- The sensitive receptors/resources (natural) which would be affected and the pathways for such effects;
 - The geographic importance, sensitivity or value of receptors/resources;
 - The duration (long or short term); permanence (permanent or temporary) and changes in significance (increase or decrease);
 - Reversibility - e.g. is the change reversible or irreversible, permanent or temporary;
 - Environment (e.g. local air quality standards) being threatened; and
 - Feasibility and mechanisms for delivering mitigating measures, e.g. Is there evidence of the ability to legally deliver the environmental assumptions which are the basis for the assessment.
- 9.51 Using the combination of the conservation value (sensitivity) of the receptor, and the magnitude of change, the significance of the effect upon biodiversity features as a result of the scheme can be assigned. **Table 9.5** below describes the magnitude of change.

Table 9.5: Magnitude of change and typical descriptions

Magnitude of Change		Typical description
Large (Major)	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Medium (Moderate)	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.

Magnitude of Change		Typical description
Small (Minor)	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Source: Highway England, 2019

Determining the Level of Effect

- 9.52 The level of effect attributed to each effect has been assessed based on the magnitude of change due to the Proposed Scheme and then sensitivity of the affected receptor, as well as a number of other factors that are outlined in more detail in **Chapter 2 – Approach to EIA**. The level of effect has been based on professional judgement and **Table 2.2** has been a tool which has assisted with this process. For consistency between ES Chapters, the terms negligible, minor, moderate and major are used to describe the significance of the effects instead of the terms neutral, slight, moderate, large or very large detailed in the DMRB^{xxiv}.
- 9.53 Whilst **Table 2.3** provides ranges, the level of effect is confirmed as a single level and not a range, informed by professional judgement. For each effect, it has been concluded whether the effect is ‘*beneficial*’ or ‘*adverse*’. A statement is also made as to whether the level of effect is ‘**Significant**’ or ‘**Not Significant**’, again based on professional judgement.
- 9.54 The following terms have been used to define the significance of the effects identified and these can be ‘beneficial’ or ‘adverse’:
- **Major effect:** where the Proposed Scheme is likely to cause a considerable change from the baseline conditions and the receptor has limited adaptability, tolerance or recoverability or is of the highest sensitivity. This effect is considered to be ‘Significant’;
 - **Moderate effect:** where the Proposed Scheme is likely to cause either a considerable change from the baseline conditions at a receptor which has a degree of adaptability, tolerance or recoverability or a less than considerable change at a receptor that has limited adaptability, tolerance or recoverability. This effect is considered more likely to be ‘Significant’ but will be subject to professional judgement;

- **Minor effect:** where the Proposed Scheme is likely to cause a small, but noticeable change from the baseline conditions on a receptor which has limited adaptability, tolerance or recoverability or is of the highest sensitivity; or where the Proposed Scheme is likely to cause a considerable change from the baseline conditions at a receptor which can adapt, is tolerant of the change or/and can recover from the change. This effect is considered less likely to be 'Significant' but will be subject to professional judgement; and
- **Negligible:** where the Proposed Scheme is unlikely to cause a noticeable change at a receptor, despite its level of sensitivity or there is a considerable change at a receptor which is not considered sensitive to a change. This effect is 'Not Significant'.

Baseline Conditions

- 9.55 The following section reports the baseline conditions for those receptors scoped into the ES (bats in this instance). For information regarding other biodiversity, please refer to the **Preliminary Ecological Appraisal Report**, Mott MacDonald 2020 (**Appendix 9.2**).

Protected / Notable species

Bats

- 9.56 The following surveys have been undertaken at the Site between 2013 and 2020 and inform this assessment:
- Potential roost assessment (PRA) to assess trees and structures for their suitability for roosting bats, with further assessment of habitats on Site and immediately adjacent to identify potential commuting and or foraging features (in 2013, 2018, 2020);
 - Emergence and re-entry surveys to assess the presence of roosts in structures and trees in 2018) (and scheduled in the Anfield Road Stand for May 2021); and
 - Hibernation surveys, to assess the potential for buildings to support hibernating bats and locate any hibernation roosts (in 2018 and 2020).
- 9.57 The results of these surveys are detailed within the Potential Roost Assessment (PRA) for trees and structures Technical Note, Mott MacDonald 2020 (**Appendix 9.3**) and summarised below.

Structures

- 9.58 Three buildings/structures within the Site have been identified as having negligible potential to support roosting bats and therefore have been scoped out of the ES. Anfield Stadium was subdivided into individual stands for surveying due to its size (**Appendix 9.3**). It comprises of: A.2 - Sir Kenny Dalglish Stand and A.4 – Main Stand, both of which have negligible suitability for roosting bats; A.3 - Anfield Road Stand has low suitability for roosting bats; and A.1 - Kop Stand has been confirmed as supporting bats.

Kop Stand

- 9.59 A transitional common pipistrelle roost was identified within the Kop stand during October 2013 (**Appendix 9.6**), as part of planning application for the redevelopment and erection of the main stand and associated areas around it and an outline planning application to re develop the Anfield Road Stand to increase spectator capacity.
- 9.60 Further surveys were completed during April to mid-June 2018 by Mott MacDonald to inform a permit for a change of use of the Stadium for concerts to be held during the football off-season (**Appendix 9.4**). During these surveys, no bats were identified to be roosting within the Kop structure, however a number of droppings were identified and therefore these surveys suggest the roost to be a transitional roost for a small number of common pipistrelle bats.
- 9.61 In January 2020, it was identified that two bats were hibernating within the Kop Stand (**Appendix 9.3**). Therefore, it is concluded that this roost is being used for the majority of the football season (October to March).

Anfield Road Stand

- 9.62 No roosting bats or evidence of roosting bats have been identified within the Anfield Road Stand. However, it was not possible to definitively rule out roosting bats due to limited access. It has been identified as having low potential for roosting bats.

Habitat

- 9.63 The Site is considered to have low suitability for foraging and commuting bats as habitats present comprise predominantly hardstanding, buildings, amenity grassland, with one species-poor defunct hedgerow and one isolated species-poor continuous hedgerow.

Future Baseline

- 9.64 In the absence of the Proposed Scheme, it is anticipated that: the feature currently being used in the Kop Stand would continue to be used as a hibernation roost by individual bats; trees with low suitability for roosting bats would have potential to further develop suitable features as they mature; the species present would not change as habitat management and disturbance would continue as stated in the baseline and therefore suitability to support other species or larger populations would remain the same.

Sensitive Receptors

- 9.65 The following sensitive receptors have been identified and assessed within the ES:
- Confirmed hibernation roost in the Kop Stand.
 - A possible transitional roost for individual bats of common species within the Anfield Road Stand (albeit this has not been identified through survey work to date).
- 9.66 **Figure 9.1** shows the location of these sensitive receptors. Access for internal inspection surveys is limited due to the size and structure of the Anfield Road Stand

causing a lack of visibility to some areas. Subsequently, the presence of a roost could not be ruled out in the January 2020 internal inspection surveys by Mott MacDonald (**Appendix 9.3**). Therefore 'a possible transitional roost for individual bats of common species within the Anfield Road Stand' is being considered as a sensitive receptor on a precautionary principle. This is discussed further in the following sections below: *Primary and Tertiary Mitigation and Assessment of Effects, Secondary Mitigation and Residual Effect*.

Primary and Tertiary Mitigation

Construction Phase

- 9.67 The following primary and tertiary mitigation which has been evaluated as part of the construction phase assessment are outlined below.
- 9.68 The confirmed hibernation roost in the Kop Stand is not anticipated to be impacted by construction as works will be carried out in summer months when bats are considered to be absent from the Stadium and the Kop stand will not be subject to construction works. Furthermore, bats were recorded roosting in the Kop Stand in 2013 and 2018, before and after the Main Stand was constructed, indicating no adverse long-term effects. As such, this receptor is not discussed further with regards to the Construction Phase. See the Operation Phase section below however.
- 9.69 Death or injury to- and disturbance of- bats using a potential roost in the Anfield Road Stand (should this be identified) will be avoided by undertaking construction activities in a phased manner. This would, if required, involve carrying out activities furthest away from any potential roost first or undertaking activities that will cause negligible disturbance first. This could comprise some pre-construction set-up activities, as the presence of bats in the Kop stand indicate that individuals exploiting the Stadium have a high tolerance to noise, vibration and even low levels of light splay from internal lighting of the welfare facilities. Creation of a temporary partition would allow these construction activities of low-level disturbance to commence in adjacent sections of the buildings, whilst maintaining bat access to a potential roost. The noise of the works and the activity of bats would need to be monitored throughout to ensure roosting bats were not adversely affected.
- 9.70 No night-time works are proposed, further reducing the likelihood of disturbance to bats potentially roosting in the Anfield Road Stand. The external front of the Stadium along Anfield Road is currently well-lit at night and internal lighting in Anfield Road Stand is on periodically through the year (associated with the frequency of events). Internal lighting is recurrent throughout the Stadium in winter, during the football season. Existing internal and external urban lighting and more hours of daylight during the summer, weekday working period, make the need for additional lighting redundant for demolition and construction activities. Any additional lighting will likely have a negligible effect on potential bats roosting, as this is anticipated to be minimal. In contrast, existing lighting will be maintained where possible during construction to ensure that the condition of potential roost features in the Anfield Road Stand (though currently assessed as having low potential) are not incidentally improved by reducing exposure to light. This would increase the likelihood of bats opportunistically using these features during construction.

Operational Phase

- 9.71 The following primary and tertiary mitigation which has been evaluated as part of the operational phase assessment is outlined below.
- 9.72 There is low potential for disturbance to bats roosting in the Kop Stand, opportunistically foraging around security lighting or commuting over the Stadium, resulting from the increased frequency of events and additional venue use.
- 9.73 Where possible, construction of temporary concert stages will be erected in such a way as to avoid obstructing bat access to the roost throughout the year. Particular attention must be given during the winter months as this is the only time of year bats have been observed roosting in the Kop stand.
- 9.74 Regardless of whether further survey results indicate that a transitional roost is present in the Anfield Road Stand (and therefore would require destruction for the Proposed Scheme to commence) or not, the operational phase is not considered to impact bats in the Anfield Road Stand as they will not be present after implementing pre-construction mitigation.

Assessment of Effects, Secondary Mitigation and Residual Effects

Construction Phase

Disturbance and destruction of a potential transitional bat roost in the Anfield Road Stand

- 9.75 Overall, Anfield Road Stand has low suitability to support roosting bats as the structure is in good condition, is well-sealed with limited access points (restricted to when doors are open) and no evidence of bats has been found in this stand. In addition, the areas of the Anfield Road Stand surveyed do not provide enough space to support more than a few individual bats, ruling out important maternity roosts or hibernation roosts for more than a couple of bats. The desktop study and previous survey results, surrounding habitat and disturbed nature of the confirmed roost (Kop stand) suggest any bats present would be of a common species (on the rarity scale^{xxv}).
- 9.76 Considering there is suitable commuting habitat for bats adjacent to the Site (in Stanley Park) and two individual bats of a common species have been identified roosting in the Kop stand in winter (whose building material and structure is similar to the Anfield Road Stand) which was previously assessed as having low suitability for bats, it is anticipated that there is potential for roosting features in the areas of the Anfield Road Stand which are inaccessible for internal inspections.
- 9.77 However, it is highly unlikely that there is a bat roost present within the Anfield Road Stand, as it would be expected that field signs would have been identified during the January 2020 internal surveys or activity would have been observed during the 2018 summer emergence/re-emergence surveys. However, as the presence of a roost cannot be ruled out, the worst-case scenario is that the Proposed Scheme will result in the destruction of a roost (a hibernation roost would be the most sensitive) of a common bat species, of a size able to support an individual or two, which have opportunistically found a suitable feature and exploited it. Therefore, on the precautionary principle, if a bat roost was present within the Anfield Road Stand, the

bat assemblage associated within this roost would be of up to local importance^{xxvix} which informs the sensitivity of the receptor below. This will result in the permanent loss of a bat roost and potentially the death, or injury, of a small population of bats.

- 9.78 The sensitivity of a potential transitional bat roost in the Anfield Road Stand (as identified in the Section above) is considered to be low. The magnitude of change is considered to be small. Therefore, there is likely to be a direct, permanent, long-term, adverse effect which is considered to be minor.

Secondary Mitigation or Enhancement

- 9.79 As some areas of Anfield Road Stand were not fully inspected, an increased survey effort will be undertaken to provide additional evidence that the low potential status of bats using the Anfield Road Stand is a robust assessment and that there is no roosting feature hidden out of view of accessible areas. As such, two nocturnal surveys will be undertaken consisting one dusk and one separate dawn survey, to be undertaken between May and September with at least one being undertaken between May and August in line with best practice^{xxvii}.
- 9.80 Should the proposed survey results confirm presence of a transitional bat roost, effort will be made to encourage bats to move to the surrounding landscape of their own accord (where time allows prior to construction) and to dissuade bats from re-entering Anfield Road Stand, prior to construction commencing. This will be achieved by installing bat boxes in the retained mature and semi-mature scattered parkland trees along the Site-parkland boundary, to compensate for the loss of a potential roost of low suitability in the Anfield Road Stand. Bat boxes do not constitute 'like for like' replacement for the loss of a potential roost feature, and as such will be installed at a 2:1 ratio to compensate. A licenced bat ecologist will provide guidance on Site as to where the bat boxes must be positioned, for example south-facing, not in direct sunlight or exposed to artificial lighting. This would ensure that bats potentially roosting in the Anfield Road Stand would have a safe place to roost with minimal disturbance during operation. Following the provision of alternative roosts (bat boxes) adjacent to the Site, the potential roost in the Anfield Road Stand would need to be monitored by a licenced bat ecologist, until bats no longer occupy the feature. At which point, the licenced bat ecologist would seal the entrance, where possible, or supervise the immediate dismantlement (destruction) of the feature. Neither impact is anticipated to affect the conservation status of the local bat population, however, both are considered an offence under the Wildlife and Countryside Act 1981 (as amended). As such, a European Protected Species Licence (EPSL) would need to be obtained from the appropriate authorities (independent of the class licence the ecologist holds) to grant the lawful implementation of these activities.
- 9.81 If bats are opportunistically exploiting the Anfield Road Stand as a roost, it would suggest that there are opportunities for foraging and limited commuting adjacent to the Site and, either, trees of suitable maturity have not developed potential roosting features (PRF) or the trees are positioned in unsuitable locations (e.g. feature entrance in lighting splay).

Residual Effect

- 9.82 The sensitivity of a potential transitional bat roost in the Anfield Road Stand (as identified in the Section above) is considered to be low. The magnitude of change, following secondary mitigation, is considered to be negligible. Therefore, there is likely to be a direct, permanent, long-term, beneficial residual effect which is considered to be negligible.
- 9.83 This effect is considered to be Not Significant.

Operational Phase

Disturbance to roosting bats (confirmed in the Kop Stand)

- 9.84 Current high levels of disturbance during football events would continue on event days, with an increase in frequency per annum. Bats were recorded hibernating in the Kop Stand in January 2020 during the football season, indicating they have a high tolerance to disturbance, in particular noise. Surveys from 2018 signify that the Stadium is not used by bats throughout the summer. Therefore, the proposal to extend the licence for permission to hold up to an additional six events over the summer, above the current licence allowance (resulting in a total of up to 12 events per annum), is considered highly unlikely to disturb bats.
- 9.85 The hibernation roost status of a common bat species is categorised as being of county importance^{xxviii}. The size and structure of stages for various concerts is currently unknown, however, the timings of the proposed additional six events will be outside of the bat hibernation period (October to March inclusive). Survey results from 2018 (droppings but no roost recorded in the Kop Stand) support the October 2013 survey that the Kop Stand is also used as a transitional roost. Transitional roosts are used by bats after they emerge from hibernation (April) or before they enter hibernation (September/October)^{xxix}. The effects of operations on bats will be intermittent, as events will not be held continuously throughout the year; frequent football matches will continue to be held through winter (as currently exists) and additional events will be distributed throughout the off-season. As such there is a low potential of obstructing bat access to the roosting feature in the Kop Stand during operation.
- 9.86 The assessment below (paragraph 9.88) is a precautionary assessment, however it is not anticipated to change following completion of 2021 surveys, regardless of whether evidence of small numbers of common bat species are found using the Kop stand in the summer or not. In the unlikely situation that summer activity is recorded, the secondary mitigation would be updated to state that access to the feature would not be obstructed during operation, without first obtaining an EPS licence.
- 9.87 Although the replacement tree planting will fall short of the number removed (by one tree), the age of these trees will be semi-mature compared to a high proportion of the trees removed, which are predominantly young and have negligible value for bats foraging or roosting. Some of the larger species of semi-mature trees will have potential to provide opportunities for either foraging or roosting bats sooner than existing young species which are unlikely to provide any potential roosting featured in the future.

- 9.88 The sensitivity of a confirmed hibernation bat roost in the Kop Stand (as identified in the Section above) is considered to be low. The magnitude of change is considered to be small. Therefore, there is likely to be a direct, temporary, short-term, adverse effect which is considered to be minor.

Secondary Mitigation or Enhancement

- 9.89 The high tolerance of roosting bats in the Kop Stand to the existing baseline disturbance suggests that increasing the frequency of events through winter is likely to have a negligible effect. Although it is unlikely that bats will emerge from hibernation during winter months, a change in weather conditions may cause them to wake from torpor and subsequently leave the roost to forage. It is for this reason, that it is advised that, any design of stage which would obstruct access to the roost will not be erected during the winter months.
- 9.90 As there is still some uncertainty whether concert stages would obstruct access to the roost (in the Kop Stand), an inspection under the wall-fixed table will be undertaken between May-August in 2021 to confirm that bats are not using the roost during the summer months (proposed timing for construction). If bats are found to be absent during this time, then the roost area should be cleared of droppings and left for 2 weeks. After a 2-week period, the roost should be inspected again for any signs or evidence of bats. The results of these surveys will inform whether permanent or temporary exclusion of bats during events is required, to ensure satisfactory provision of alternative roosting features and habitat enhancement. However, the best option will be to avoid obstruction altogether, regardless of the time of year.
- 9.91 Following the provision of bat boxes prior to construction (if surveys confirmed bats are present within the Anfield Road Stand), there will be more opportunities for bats to roost adjacent to the Site during Operation. However, if pre-construction surveys confirm the absence of bat roosts in the Anfield Road Stand, bat boxes will not be provided and therefore the quantity of potential roosts will not change from pre-construction conditions. If bats continue to use the Kop Stand during events at the Stadium, this would be considered evidence that they have high tolerance to disturbance and demonstrate their habitual nature to return to the same roost sites.

Residual Effect

- 9.92 The sensitivity of disturbance and obstruction of a bat hibernation roost in the Kop Stand (as identified in the Section above) is considered to be low. The magnitude of change, following secondary mitigation, is considered to be negligible. Therefore, there is likely to be a direct, permanent, long-term, beneficial residual effect which is considered to be negligible.
- 9.93 This effect is considered to be Not Significant.

Limitation and Assumptions

- 9.94 To ensure transparency within the EIA process, the following limitations and assumptions have been identified.
- It should be noted that the absence of protected or rare species does not preclude their presence on a site. There is always the risk of protected or rare

species being overlooked, owing to the timing of the survey, scarcity of the species at the site, or changes over time in habitat management.

- This assessment is based on a professional judgement of the potential impacts on the conservation status of habitats and species using all available sources of data.
- This assessment is based on the most up to date Proposed Scheme design available at the time of writing. In the event that significant changes are made to the design of the Proposed Scheme, an updated assessment may be required. However, this assessment has taken account of the worst reasonable case to incorporate a reasonable deviation limit.
- During the initial bat assessment, some areas were not fully inspected due to a lack of visibility or areas being inaccessible due to the size and structure of the Stadium. As such, as a precaution it is assumed that there is a roost present in the Anfield Road Stand until further surveys confirm otherwise.

Summary

- 9.95 This Biodiversity Chapter assessed the significance of impacts of the Proposed Scheme on two receptors; a potential transitional bat roost in the Anfield Road Stand and the confirmed common pipistrelle hibernation roost in the Kop Stand.
- 9.96 Surveys to date identify Anfield Road Stand is of low suitability, with no evidence of roosting currently observed. However, it was not possible to definitively rule out roosting bats in this structure due to limited access and therefore further surveys are integral to confirming the absence of a roost in the Anfield Road Stand. It is considered highly unlikely that these additional surveys (part of the recommended secondary mitigation and enhancement) will identify the presence of bat roosts in the Anfield Road Stand. Therefore, the current assessment (deduced from the data collected in 2018 and January 2020) is not anticipated to change following completion of these pre-construction surveys in 2021. If in the unlikely event that a bat roost is identified in the Anfield Road Stand, and therefore will require destruction under an EPS licence for the Proposed Scheme to commence, the further secondary mitigation prior to construction (provision of bat boxes) is anticipated to ameliorate the effects on the receptor to negligible. With survey results to date, it is anticipated that the conservation status of bat species will not be impacted by the Proposed Scheme and the effect is considered to be not significant during construction. The additional surveys on Anfield Road Stand are anticipated to confirm this assessment of significance.
- 9.97 There is some uncertainty whether the droppings found during the 2018 surveys are evidence of a hibernation and a transitional roost, or whether these could have been remnant from the summer. It is thought that the wall under the wall-mounted table is unlikely to be regularly cleaned as part of the stadium's standard cleaning regime, so it's unlikely that evidence has been unknowingly removed regularly between 2013 and 2018 surveys. Recommended additional monitoring surveys are anticipated to confirm that bats do not roost in the Kop Stand during the summer months and therefore there will be no restrictions on the size or structure of concert stages during this time of the year (May to August inclusive). Any design of stage which would obstruct access to the

transitional and hibernation roost will not be erected from September to April inclusive. If this is unavoidable, an EPS licence will need to be obtained and justification for committing an offence (obstruction of a hibernation roost) will need to be provided. An increase in the frequency of noise, light and vibration disturbance is considered to have negligible adverse effect on bats considering that they are successfully hibernating through current baseline conditions (high levels of disturbance). The effect is considered to be not significant during construction.

9.98 There are no significant effects that would inform the decision-making process.

9.99 **Table 9.6** provides a summary of the effects, receptors, residual effects and a conclusion as to whether the effect is significant or not significant.

Table 9.6: Summary of Residual Effects

Effect	Receptor	Residual Effect	Is the Effect Significant
Construction Phase			
Disturbance and destruction of a potential bat roost	A potential transitional bat roost in the Anfield Road Stand	Negligible	NO
Operational Phase			
Disturbance to a confirmed hibernation bat roost	Confirmed hibernation bat roost in the Kop Stand	Negligible	NO

Reference List

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- ⁱ The Conservation of Habitats and Species Regulations 2017 (as amended). [Online] [Accessed 13 January 2020]. Available at: <http://www.legislation.gov.uk/ukxi/2017/1012/contents/made>
- ⁱⁱ Natural Environment and Rural Communities (NERC) Act 2006, c.16. [Online] [Accessed 13 January 2020]. Available at: http://www.legislation.gov.uk/ukpga/2006/16/pdfs/ukpga_20060016_en.pdf
- ⁱⁱⁱ Countryside and Rights of Way (CROW) Act 2000, c.37. [Online] [Accessed 13 January 2020]. Available at: http://www.legislation.gov.uk/ukpga/2000/37/pdfs/ukpga_20000037_en.pdf
- ^{iv} Wildlife and Countryside Act 1981 (as amended), c.69. [Online] [Accessed 13 January 2020]. Available at: <http://www.legislation.gov.uk/ukpga/1981/69>
- ^v Hedgerow Regulations (1997), no.1160. [Online] [Accessed 13 January 2020]. Available at: <http://www.legislation.gov.uk/ukxi/1997/1160/introduction/made>
- ^{vi} Highways England (2019). Design Manual for Roads and Bridges (DMRB): LA 118 Biodiversity design. Volume 10: Section 4, Part 1. [Online] [Accessed 13 January 2020]. Available at: <https://www.standardsforhighways.co.uk/ha/standards/dmr/vol10/section4/LA%20118%20Biodiversity%20design-web.pdf>
- ^{vii} Highways England (2019). Design Manual for Roads and Bridges (DMRB): LA 104 Environmental assessment and monitoring. Volume 11, Section 2, Part 4. [Online] [Accessed 13 January 2020]. Available at: www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section2/LA104.pdf
- ^{viii} Chartered Institute of Ecology and Environmental Management (CIEEM) (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.
- ^{ix} UK Post-2010 Biodiversity Framework 2018 (revised). [Online] [Accessed 13 January 2020]. Available at: <http://data.jncc.gov.uk/data/587024ff-864f-4d1d-a669-f38cb448abdc/UKBioFwk-RevisedImpPlan-Jun2018.pdf>
- ^x Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.
- ^{xi} Environment Bill Policy Statement (2019). [Online] [Accessed 13 January 2020]. Available at: <https://www.gov.uk/government/publications/environment-bill-2020/30-january-2020-environment-bill-2020-policy-statement>
- ^{xii} Garthe, S. and Huppopp, O. (2004). Scaling possible adverse effects of marine windfarms on seabirds: developing and applying a vulnerability index. *Journal of Applied Ecology* 41 724734.
- ^{xiii} BCT and ILP (2018). Bats and artificial lighting in the UK: Bats and the Built Environment series. Bat Conservation Trust and the Institute of Lighting Professionals.
- ^{xiv} Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.
- ^{xv} GOV.UK (2015). Wild birds: surveys and mitigation for development projects. [Online] [Accessed 19 March 2020]. Available at: <https://www.gov.uk/guidance/wild-birds-surveys-and-mitigation-for-development-projects>
- ^{xvi} Hedgerow Regulations (1997), no.1160. [Online] [Accessed 13 January 2020]. Available at: <http://www.legislation.gov.uk/ukxi/1997/1160/introduction/made>
- ^{xvii} GOV.UK (2014). Tree Preservation Orders and trees in conservation areas. [Online] [Accessed 21 February 2020]. Available at: <https://www.gov.uk/guidance/tree-preservation-orders-and-trees-in-conservation-areas>

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- ^{xviii} CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester
- ^{xix} Highways England (2019). Design Manual for Roads and Bridges (DMRB): LA 104 Environmental assessment and monitoring. Volume 11, Section 2, Part 4. [Online] [Accessed 13 January 2020]. Available at:
- ^{xx} Defra (2020). MAGIC Interactive Map website. [Online] [Accessed 13 January 2020]. Available at: <http://magic.defra.gov.uk/>
- ^{xxi} Natural England (2020) Natural England website. [Online] [Accessed 13 January 2020]. Available at: <https://www.gov.uk/government/organisations/natural-england>
- ^{xxii} Joint Nature Conservation Council (JNCC) (2020). JNCC website. [Online] [Accessed 13 January 2020]. Available at: <http://jncc.defra.gov.uk/>
- ^{xxiii} Highways England (2019). Design Manual for Roads and Bridges (DMRB): LA 104 Environmental assessment and monitoring. Volume 11, Section 2, Part 4. [Online] [Accessed 13 January 2020]. Available at: www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section2/la104.pdf
- ^{xxiv} Highways England (2019). Design Manual for Roads and Bridges (DMRB): LA 104 Environmental assessment and monitoring. Volume 11, Section 2, Part 4. [Online] [Accessed 13 January 2020]. Available at: www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section2/la104.pdf
- ^{xxv} Wray, S., Wells, D., Long, E. & Mitchell-Jones, T. (2010). Valuing bats in ecological impact assessment. In Practice, No. 70, Institute of Ecology and Environmental Management.
- ^{xxvi} Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.
- ^{xxvii} Natural England (2020) Natural England website. [Online] [Accessed 13 January 2020]. Available at: <https://www.gov.uk/government/organisations/natural-england>
- ^{xxviii} UK Post-2010 Biodiversity Framework 2018 (revised). [Online] [Accessed 13 January 2020]. Available at: <http://data.jncc.gov.uk/data/587024ff-864f-4d1d-a669-f38cb448abdc/UKBioFwk-RevisedImpPlan-Jun2018.pdf>
- ^{xxix} Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.