

Abercynon Feeder Pipe Bridge

Bat Surveys

Report for Rhondda Cynon Taff Borough Council

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Summary of Key Findings

Temple Group Ltd. was commissioned by Rhondda Cynon Taff Borough Council in February 2022 to undertake a Preliminary Ecological Appraisal (including preliminary roost assessment for bats) to determine the status of bats on site and any likely constraints to the proposed development of the feeder piper bridge at Abercynon (REFERENCE). Following this report, a set of two bat emergence surveys were recommended on site which were conducted between May and July 2023. The main findings are as follows:

- A Dusk emergence survey on 23rd May 2023 returned no evidence of roosting bats within the bridge or abutment. Low levels of common and soprano pipistrelle and noctule foraging and commuting activity were recorded across the Site.
- A Dusk emergence survey on 20th July 2023 returned no evidence of roosting bats within the bridge or abutment. High levels of common and soprano pipistrelle and low levels of myotis and noctule foraging and commuting activity were recorded across the Site.
- No further surveys will be required to be undertaken, however as works are not due to begin until 2024 a toolbox talk should be given to all workers and a precautionary check should be conducted by a competent surveyor prior to any works. If any bats are found unexpectedly on site, all works must stop and a suitably qualified ecologist contacted. Additionally, if works do not start until later in 2024 update surveys may be required due to the limited viability of survey data.
- Mitigation measures for the site include the development of a sensitive lighting strategy for the works.
- Enhancement measures to increase the value of the Site for bats and other wildlife in accordance with national and local planning policies are also provided and include an increase in bat boxes around the site on existing trees.

1 Introduction

BACKGROUND TO COMMISSION

- 1.1 Temple Group Ltd. was commissioned in March 2023 by Rhondda Cynon Taff Borough Council to undertake bat emergence surveys to determine the presence/likely absence of roosting bats at the old feeder pipe bridge, Abercynon, in order to inform a planning application for the development of the old feeder pipe bridge into a public footpath bridge. These surveys were commissioned following on from the recommendations of the Preliminary Ecological Appraisal (PEA) and Preliminary Roost Assessment (PRA) report (Temple 1a, 2023).
- 1.2 The survey covers the bridge and abutments within the site boundary (henceforth referred to as 'the Site') as indicated on the plan provided by the client (Site GA Plan, drawing number 30003237-BHK-00-XX-DR-C-1801, Dated 2nd June 2023; Appendix 1, Figure 1).

SCOPE OF REPORT

- 1.3 This report provides an assessment of the likelihood that the Site supports roosting bats. It also provides an assessment of the value of the Site for foraging and/or commuting. Where possible, it also outlines any avoidance, mitigation, compensation and enhancement measures as may be required to ensure compliance with legislation and policy.
- 1.4 The assessment is based on the following sources of information, including that obtained from third parties and the results of surveys:
 - PEA/PRA report (Temple, 2023), and
 - Emergence survey data.
- 1.5 This assessment has been prepared with reference to best practice guidance published by the Bat Conservation Trust (Collins, 2016) and as detailed in British Standard 42020:2013 *Biodiversity – Code of Practice for Biodiversity and Development* (BSI, 2013).

- 1.6 This report provides supporting information in the appendices with a georeferenced map of the survey results in Appendix 1 and cross-referenced photographs in Appendix 2.

SITE CONTEXT AND STATUS

- 1.7 The proposed development site is located on the outskirts of the town of Abercynon, Rhondda Cynon Taff. The site is centred on Ordnance Survey National Grid Reference ST 09209 95484. Part of the site is subject to a non-statutory conservation designation. The site is bordered for the most part by agricultural land as well as commercial and domestic dwellings.

DEVELOPMENT PROPOSALS

- 1.8 The development proposals involve the conversion of the old disused feeder pipe bridge to a public footpath bridge across the river. A path linking the footbridge to the wider landscape will be created connecting to the existing footpaths on either side of the river. At the time of writing additional plans are in place for a temporary access track linking the existing footpath to the site compound. Further surveys are planned to establish any potential impacts on bats that this may incur, so an addendum to this report will be required at a later stage.

RELEVANT LEGISLATION AND PLANNING POLICY

- 1.9 The following key pieces of nature conservation legislation are relevant to this assessment. A more detailed description of this legislation is provided in Appendix 3.

- The Conservation of Habitats and Species Regulations 2017 (as amended);
- The Wildlife and Countryside Act 1981 (as amended);
- Natural Environment and Rural Communities Act 2006; and
- Environment (Wales) Act 2016;

- 1.10 The Planning Policy Wales (PPW) (Cabinet Secretary for Energy, Planning and Rural Affairs, 11th Ed. 2021) works with the objective to ensure the planning system

contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales.

- 1.11 River and lowland, mixed deciduous woodland on the Site are listed under Section 7 of the Environment (Wales) Act 2016. Section 7 lists habitats in Wales which are considered to be of key significance to sustain and improve biodiversity in Wales. It states that all reasonable steps must be taken to maintain and enhance the types of habitat included on this list.

2 Methodology

EMERGENCE SURVEYS

- 2.1 The bridge and abutments were determined to have ‘moderate’ suitability to support roosting bats and consequently, in line with best practice guidance (Collins, 2016) two dusk emergence surveys were carried out. Surveys were undertaken on 23rd May and 20th July. Two surveyors were employed to allow clear views of all potential roost entry/exit points identified at either end of the bridge/abutments during the preliminary roost assessments. The surveys were led by Gareth Harris, an Ecologist with over 7 years’ experience and a level 2 bat class licence from Natural Resources Wales (Licence number – S092795/1). The dusk surveys commenced 15 minutes before sunset and continued for up to 120 minutes after sunset. Each of the surveyors noted down details of any bat activity including bat passes¹, species, numbers, location, emergence, or re-entry, foraging and commuting, recording details to a data sheet and a map. The surveyors employed a combination of heterodyne bat detectors for aural ID in the field, and/or, full spectrum or zero crossing detectors for sound analysis post survey.

Post-Survey Analysis

- 2.2 The audio recordings may be analysed post survey using one or more of the following software: Analook™ V3.3q., Bat Explorer™ or Kaleidoscope™, to confirm species identification and the timing of any passes. Any passes likely to have originated from one of the myotis species were determined to genus level only due to the complexity of differentiating between these species.

Roost Characterisation

- 2.3 The results from the preliminary roost assessments and the emergence/-re-entry surveys are used to characterise any roosts that may be confirmed within the site.

¹ For the purposes of this assessment a bat pass is taken to be a series of individual registrations by an individual bat that are emitted in a short sequence and either heard or recorded as a bat passes the position of the surveyor or the detection envelope of the recorder that is employed.

This follows standard criteria for roosts, classifying roost type². Also included are variables such as: species; abundance; likely use; and importance throughout the year.

EVALUATION AND IMPACT ASSESSMENT

- 2.4 Where sufficient baseline data are available, the site's ecological importance has been evaluated broadly following guidance issued by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018) which ranks the nature conservation importance of a site according to a geographic scale of reference: international, national, regional (South Wales), metropolitan, county (Rhondda Cynon Taff), vice-county or other local authority-wide area (Abercynon); and of importance within the context of the site only. In evaluating the nature conservation importance of the site, the following factors were considered: nature conservation designations; species/habitat rarity; naturalness; fragility and connectivity to other habitats. Importance is assigned only where clear evidence is available to substantiate and justify the findings. In the absence of such evidence, the ecological feature is merely identified as a potential constraint to development. Reference is also made to Section 6³ of the Bat Mitigation Guidelines (Mitchell-Jones, 2004) and includes a summary of the scale of impact according to roost type and development effect, if known.
- 2.5 Where ecological constraints to development are identified, further survey requirements and/or mitigation measures that are proportionate to the predicted degree of risk to biodiversity and to the nature and scale of the proposed development are described. In addition, in accordance with the Environment (Wales) Act 2016, Planning Policy Wales and local/regional planning policies, opportunities to enhance or create benefits for wildlife are provided where this is possible based on the information available to date.

² Day, Night, Feeding Perch, Transitional, Satellite, Maternity, Hibernation, Foraging Area, Commuting Route, Swarming Site.

⁴ Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora

DATA VALIDITY AND LIMITATIONS

- 2.6 It is important to note that even where data are held, a lack of records for a defined geographical area does not necessarily mean that there is a lack of ecological interest; the area may be simply under-recorded.
- 2.7 Bats are highly mobile animals and can move roost sites both within and between years. Where surveys are not spread throughout the bat active season is possible that roost sites that are used for a limited time only could be missed, and the detection of small numbers of crevice dwelling species from an inspection alone may remain problematic, particularly where droppings accumulate within an inaccessible void such as a cavity wall or above the roof lining. Where visible and undisturbed, however, evidence of bats inside a structure is likely to be detectable throughout the year.
- 2.8 Data from bat surveys should be considered to be valid for a period of 12-18 months, unless there are any significant changes to the structures or other habitats within the site (CIEEM, 2019). Data used to support a mitigation licence application to Natural Resources Wales must be from the most recent survey season; depending on the timing of the application, this may mean from the same or previous year.

3 Results

FIELD SURVEY

Overview

- 3.1 The bridge itself and abutments contained moderate potential roosting opportunities, though no confirmed roosts were discovered.

EMERGENCE AND RE-ENTRY SURVEYS

- 3.2 A map showing the surveyor location map for each survey is in Appendix 1 Figure 2.

Bridge Survey Results

Dusk Emergence – 23rd May

- 3.3 The temperature at the start of the survey was 17°C, with scattered cloud cover, 1 wind (Beaufort) and remained dry throughout the survey.
- 3.4 No bats were recorded emerging from the bridge or abutments throughout the survey. During the survey common pipistrelle, soprano pipistrelle and Noctule foraging and commuting calls were recorded across the site.

Dusk Emergence – 20th July

- 3.5 The temperature at the start of the survey was 14°C, with scattered cloud cover, 1 wind (Beaufort) and remained dry throughout the survey.
- 3.6 No bats were recorded emerging from the bridge or abutments throughout the survey. During the survey common pipistrelle, soprano pipistrelle myotis sp. and Noctule foraging and commuting calls were recorded across the site.

Sound Analysis

- 3.7 The sound analysis confirmed bat identification from all field survey results and identified unknown bat species recorded. See Appendix 5 for post survey proforma amendments.

Other Fauna

- 3.8 An otter was identified swimming across the river underneath the bridge during the second survey.

4 Evaluation and Impacts

ROOSTING BATS

- 4.1 No bats were identified emerging during the surveys. No roost was confirmed during these surveys, therefore likely absence can be assumed.
- 4.2 A number of bats were seen foraging in the vicinity of the bridge during the surveys, in particular during the second survey. As the area of works is in proximity to suitable roosting trees, although these are not due to be disturbed during the works, it would be assumed that there are a number of potential roosts within the vicinity of the works and that therefore precautions to prevent disturbance should be taken.

5 Summary and Recommendations

SUMMARY

- 0.1 Following emergence and re-entry surveys no bat roosts have been confirmed.
- 0.2 The proposals are likely to impact foraging/commuting bats using the site, therefore sensitive artificial lighting should be employed during the construction and operational phase of development, as recommended below.

MITIGATION & COMPENSATION

Foraging and commuting habitat

- 0.3 The habitats on site are likely to provide suitable foraging and commuting habitat for bats in the local area and should be retained wherever possible, but particularly where these provide connectivity with suitable off-site habitat within the wider landscape. Any unavoidable loss should be compensated for through appropriate wildlife planting with input from a suitably experienced ecologist to ensure that habitat connectivity is maintained, and that an appropriate mix of species is used. In line with current national and local planning policy, measures should also aim to enhance the site's value for biodiversity as a result of the development. Outline recommendations are provided below in 5.15.
- 0.4 As some bat species can be deterred by artificial lighting (Jones, 2000), it is recommended that a sensitive lighting strategy is designed with input from a suitably experienced ecologist to minimise illumination of retained foraging habitat and potential flight corridors (see Appendix 4).

ENHANCEMENTS

- 5.5 Local Authorities have a duty under the Environment (Wales) Act 2016 and Planning Policy Wales 11th Edition (Welsh Government, 2021) to maintain and enhance biodiversity in the exercise of their functions.
- 5.6 The following measures would be suitable for integration into the site's design.

- Bat boxes on trees can be clustered with several on a single tree facing in different directions to provide a range of thermal conditions. These should be positioned discreetly between c.3 and 5m from the ground away from casual interference. No artificial bat roost features should be sited such that they are directly illuminated by artificial lighting, particularly during peak periods of activity such as around dusk and pre-dawn.

References

British Standards Institution (BSI) (2013). *Biodiversity. Code of practice for planning and development: 42020*. BSI, London.

CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal. Version 1.1*. Chartered Institute of Ecology and Environmental Management, Winchester

CIEEM (2019) *Advice Note on the Lifespan of Ecological Reports and Surveys*. April 2019.

Collins. (2016) *Bat Surveys - Good Practice Guidelines* 3rd Edition. Bat Conservation Trust, London.

Fure, A. (2006). *Bats and lighting*. The London Naturalist

Gunnell, K., Grant, G. and Williams, C. 2012. Landscape and urban design for bats and biodiversity. Bat Conservation Trust

Institution of Lighting Professionals (2018) *Bats and Artificial Lighting in the UK*. Guidance Note 08/18. Institution of Lighting Professionals and Bat Conservation Trust
<https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting>

Jones, J. (2000) *Impact of lighting on bats*. Bat Conservation Trust, London.

Mitchell-Jones, A.J. (2004) Bat Mitigation Guidelines. English Nature, Peterborough.

Mitchell-Jones, A.J. & McLeish, A.P. (2004) *The Bat Workers' Manual* 3rd Edition. Joint Nature Conservation Committee, Peterborough.

Stone, E.L. (2013) *Bats and lighting: Overview of current evidence and mitigation*. University of Bristol.

Temple (2023). *Abercynon Feeder Pipe Bridge, Preliminary Ecological Appraisal Report for Rhondda Cynon Taff Borough Council*

Welsh Government (2021). Planning Policy Wales. Edition 11. [Online].
[Accessed 02.08.2023]. Available at:
https://www.gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf

Appendix 1: Survey Maps

Figure 1: Site location map

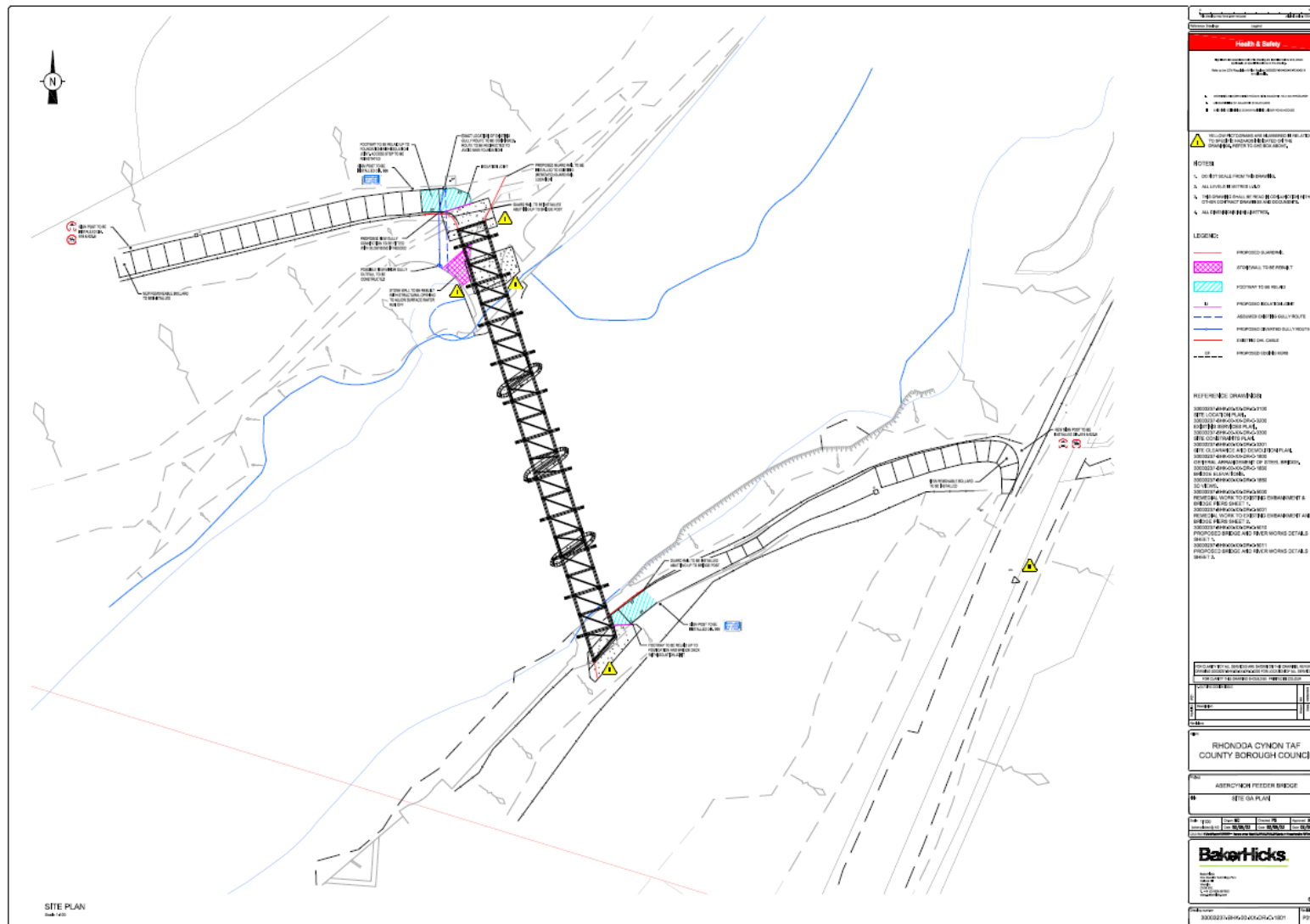
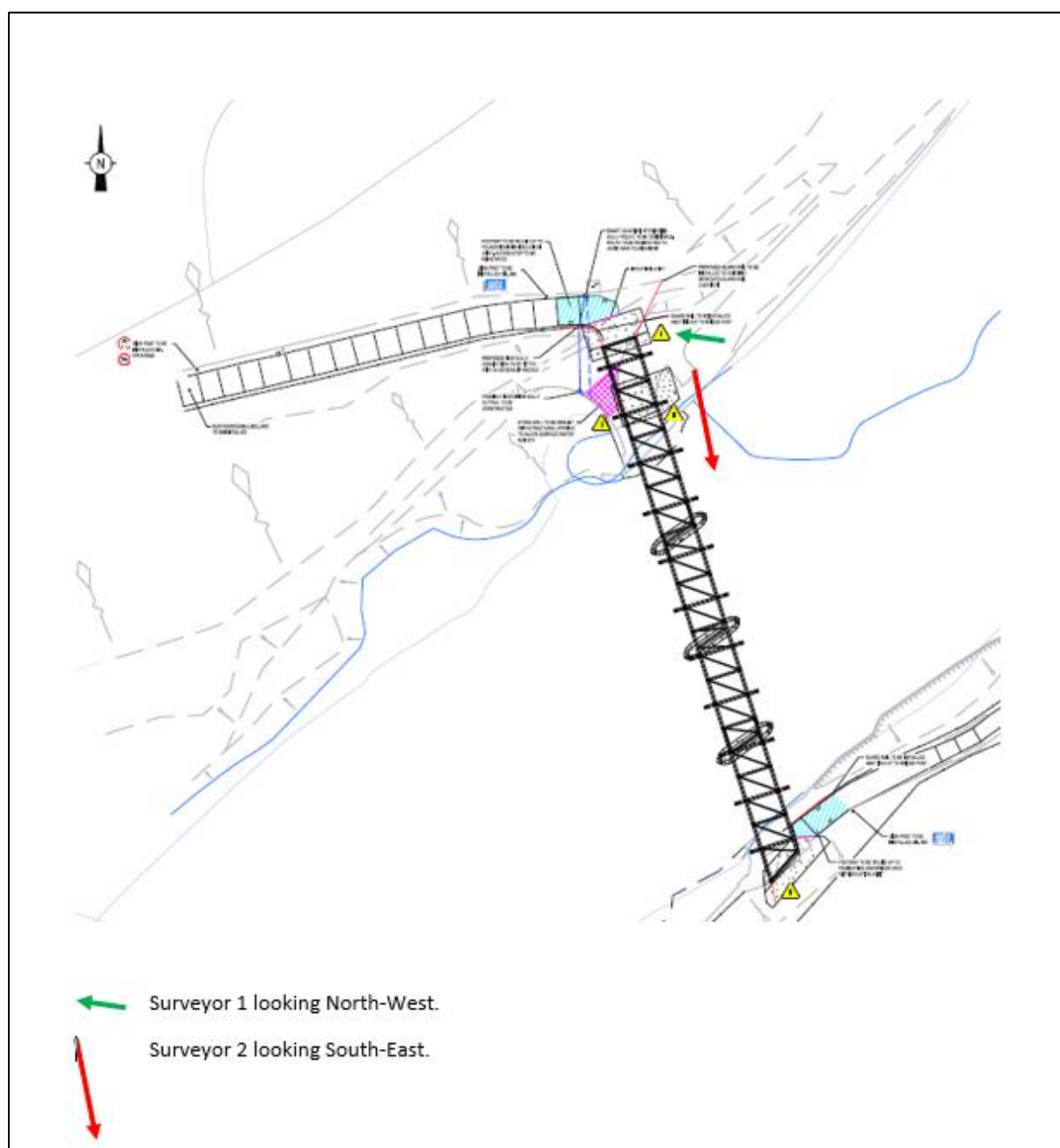


Figure 2: Surveyor location Map



Appendix 2: Photographs

Photograph 1
Bridge showing abutment at
North-west end.



Photograph 2
Bridge showing abutment at
south-east end.



Appendix 3: Legislation

Important Notice: This section contains details of legislation applicable in England and Wales only (i.e. not including Scotland, the Isle of Man, Northern Ireland, the Republic of Ireland or the Channel Islands) and is provided for general guidance only. While every effort has been made to represent the current (at the time of writing) situation with respect to the UK's position outside of the EU and to ensure accuracy throughout, this section should not be relied upon as a definitive statement of the law.

Over the past few years, three important bills have been published which are intended to shape how growing pressures on the environment post-Brexit (post-transition period) are tackled. Both the Agriculture Bill and Fisheries Bill gained Royal Assent in November 2020 and are now the Agriculture Act 2020 and Fisheries Act 2020 respectively; and, more recently, the Environment Bill was passed into law in November 2021, becoming the Environment Act 2021. *N.B. as environment policy is a devolved matter, most of this Act applies to England only.*

A LEGISLATION AFFORDED TO SPECIES

The objective of the EC Habitats Directive⁴ is to conserve the various species of plant and animal which are considered rare across Europe. The Directive is transposed into UK law by **The Conservation of Habitats and Species Regulations 2017 (as amended)** and **The 'Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended)**.

Various amendments to the 2017 Regulations in England and Wales have been made through the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. These changes came into effect on the 1 January 2021 following the UK's departure from the EU and the end of the Transition Period. The changes are largely limited to 'operability changes' that will ensure the Regulations can continue to have the same working effect as before.

⁴ Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora

The Wildlife and Countryside Act 1981 (as amended) is a key piece of national legislation which implements the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and implements the species protection obligations of Council Directive 2009/147/EC (formerly 79/409/EEC) on the Conservation of Wild Birds (EC Birds Directive) in Great Britain.

Since the passing of the Wildlife & Countryside Act 1981, various amendments have been made, details of which can be found on www.opsi.gov.uk. Key amendments have been made through the Countryside and Rights of Way (CROW) Act (2000).

As well as delivering long-term targets to reduce waste and improve resource efficiency and improve air and water quality targets, the **Environment Act 2021** aims to halt the decline of nature by 2030, mandates Biodiversity Net Gain for developments in England and amends the Wildlife and Countryside Act 1981 (as amended) to introduce an additional purpose for granting a protected species licence in relation to development which is ‘for reasons of overriding public interest’. The Act also introduces the Office for Environmental Protection (OEP), which will be a new public body intended to hold government and public authorities to account, although the government will be able to issue guidance to the OEP on how it enforces policies and legislation.

Some of the key biodiversity elements in the Act that will have a bearing on species protection in the UK include:

- A strengthened biodiversity duty on Local Planning Authorities;
- Biodiversity net gain to ensure developments, including Nationally Significant Infrastructure Projects (NSIP), deliver at least 10% increase in biodiversity;
- Local Nature Recovery Strategies to support a Nature Recovery Network;
- Duty upon Local Authorities to consult on street tree felling;
- Strengthen woodland protection enforcement measures;
- Conservation Covenants;
- Protected Site Strategies and Species Conservation Strategies to support the design and delivery of strategic approaches to deliver better outcomes for nature;

- Introduces the power for the Habitats Regulations to be amended or ‘refocused’ to ‘to deliver creative public policy thinking that delivers results’.

This section does not provide further detail on the Environment Act 2021 as, at the time of writing (November 2021), the Act, in its final form, has not been published and it remains to be seen how and when the various elements will be enacted at a national and local level.

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

- Salmon and Freshwater Fisheries Act 1975;
- Deer Act 1991;
- Protection of Badgers Act 1992;
- Wild Mammals (Protection) Act 1996;
- Countryside and Rights of Way (CROW) Act 2000;
- Natural Environment & Rural Communities (NERC) Act 2006;
- The Eels (England and Wales) Regulations 2009; and
- Environment (Wales) Act 2016.

Species and species groups that are protected or otherwise regulated under the aforementioned legislation, and that are most likely to be affected by development activities, include herpetofauna (amphibians and reptiles), badger, bats, birds, dormouse, invasive species, otter, plants, red squirrel, water vole and white clawed crayfish.

Explanatory notes relating to species protected under The Conservation of Habitats and Species Regulations 2017 (as amended), which includes smooth snake, sand lizard, great crested newt, natterjack toad, all bat species, otter, dormouse and some plant, invertebrate and fish species, are given below. **These should be read in conjunction with the relevant species sections that follow.**

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

- The Conservation of Habitats and Species Regulations 2017 (as amended) does not define the act of 'migration' and therefore, as a precaution, it is recommended that short distance movement of animals for e.g. foraging, breeding or dispersal purposes are also considered where relevant.
- In order to obtain a mitigation licence for species protected under the Conservation of Habitats and Species Regulations 2017 (as amended), the application must demonstrate that it meets all of the following three 'tests': i) the action(s) are necessary for the purpose of preserving public health or safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequence of primary importance for the environment; ii) that there is no satisfactory alternative and iii) that the action authorised will not be detrimental to the maintenance of the species concerned at a favourable conservation status in their natural range.

BATS

All species of bat are fully protected under The Conservation of Habitats and Species Regulations 2017 (as amended) through their inclusion on Schedule 2. Regulation 41 prohibits:

- Deliberate killing, injuring or capturing of Schedule 2 species (e.g. all bats);
- Deliberate disturbance of bat species as:
 - a) to impair their ability:
 - to survive, breed, or reproduce, or to rear or nurture young; or
 - to hibernate or migrate.
 - b) to affect significantly the local distribution or abundance of the species.
- Damage or destruction of a breeding site or resting place; and
- Keeping, transporting, selling, exchanging or offering for sale whether live or dead or of any part thereof.

Bats are also protected under the Wildlife and Countryside Act 1981 (as amended) in respect to sub-sections 9 (4) (b) and (c) and 9 (5) through their inclusion on Schedule 5. Under this Act, they are additionally protected from:

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

How is the legislation pertaining to bats liable to affect development works?

The appropriate licence issued by the relevant countryside agency (e.g. Natural England, Natural Resources Wales) will be required for works liable to affect a bat roost or for operations likely to result in a level of disturbance which might impair their ability to undertake those activities mentioned above (e.g. survive, breed, rear young and hibernate). The licence is to derogate from the relevant legislation but also to enable appropriate mitigation measures to be put in place and their efficacy to be monitored.

Though there is no case law to date, the legislation may also be interpreted such that, in certain circumstances, important foraging areas and/or commuting routes can be regarded as being afforded protection, for example, where it can be proven that the continued usage of such areas is crucial to maintaining the integrity and long-term viability of a bat roost⁵.

⁵ Garland and Markham (2008) Is important bat foraging and commuting habitat legally protected? Mammal News, No. **150**. The Mammal Society, Southampton.

Appendix 4: Standard Guidance for Sensitive Lighting for Bats

Bats and Lighting

Night-time lighting affects different bat species to varying degrees with certain species such as brown long-eared bats and myotis species being particularly sensitive to artificial illumination. Excessive and/or poorly directed lighting may delay bats in emerging from their roosts; shortening the time available for foraging, as well as causing bats to move away from favoured foraging grounds and drinking resources, movement corridors or roosting sites to alternative, and potentially sub-optimal darker areas (Jones, 2000). Artificial lighting is also thought to increase the chance of predation, as many avian predators will hunt bats (Institution of Lighting Professionals, 2018).

To minimise indirect impacts from lighting associated with new developments it is recommended that artificial lighting is only directed where necessary for health and safety reasons. Lighting should not illuminate any features of value to bats, including newly created, suspected or confirmed bat roosting sites and habitats of value to foraging and commuting bats. Habitats which are likely to support bats, and which could be affected by lighting include woodland, mature trees, hedgerows, scrub, ponds, lakes, ditches, streams, canals, rivers, rough grassland and buildings with suitability to support roosting bats. Lighting should only be used for the period of time for which it is required (Jones, 2000).

This can be achieved by following accepted best practice (Fure, 2006; Bat Conservation Trust 2011; Stone 2013; Institution of Lighting Professionals, 2018):

- Where appropriate, professional lighting designers should be consulted, and the need for quantitative lighting measurements should be considered;
- Lighting mitigation should be based on robust baseline surveys of bat behaviour and existing light levels on site wherever possible;
- The level of artificial lighting including flood lighting should be kept to an absolute minimum;
- Where this does not conflict with health and safety and/or security requirements, the site should be kept dark during peak bat activity periods (0 to 1.5 hours after sunset and 1.5 hours before sunrise);
- Variable lighting regimes (VLR) can be utilised to lower lighting levels during periods of low human activity (e.g. 00:30-05:30);
- Lighting required for security or safety reasons should use a lamp of no greater than 2000 lumens (150 Watts) and should comprise sensor-activated lamps;
- Use narrow-spectrum light sources that peak higher than 550 nanometres, avoiding lights with UV, white and blue wavelengths;

- Lights utilising LED technology are the preferred option as these lights do not emit on the UV spectrum, are easily controllable in terms of direction/spill and can be turned on and off instantly;
- A 'warm white' spectrum LED light (ideally <2700 Kelvin) should be used over 'cool white' to reduce blue light component;
- Avoid the use of sodium or metal halide lamps, these gas lamps require a lengthy period in which to turn off and the diffuse nature of the light emitted makes light spillage a significant problem.
- Lights required for night time deliveries or security patrols could be set to activate with pressure activated sensors set into the ground;
- Lighting should be directed to where it is needed to minimise light spillage. This can be achieved by limiting the height of the lighting columns and by using as steep a downward angle as possible and/or a shield/hood/cowl/baffle/louvre that directs the light below the horizontal plane and restricts the lit area;
- Usually using lower lighting columns and increasing the spacing between them reduces light intensity and spill;
- Plant vegetation to form light barriers and dark corridors. Use close-boarded fencing to screen light until vegetation matures. Dark corridors should be well connected to commuting routes;
- Artificial lighting should not directly illuminate any confirmed or potential bat roosting features or habitats of value to commuting/foraging bats. Similarly, any newly planted linear features or compensatory bat roosting features should not be lit;
- The use of reflective surfaces under lights should be avoided;
- Consider the use of 'smart glass' or automatic blinds where windows and glass facades cannot be avoided; and
- Create new habitat as alternative bat flightpaths if the effects of light cannot be properly mitigated for.

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