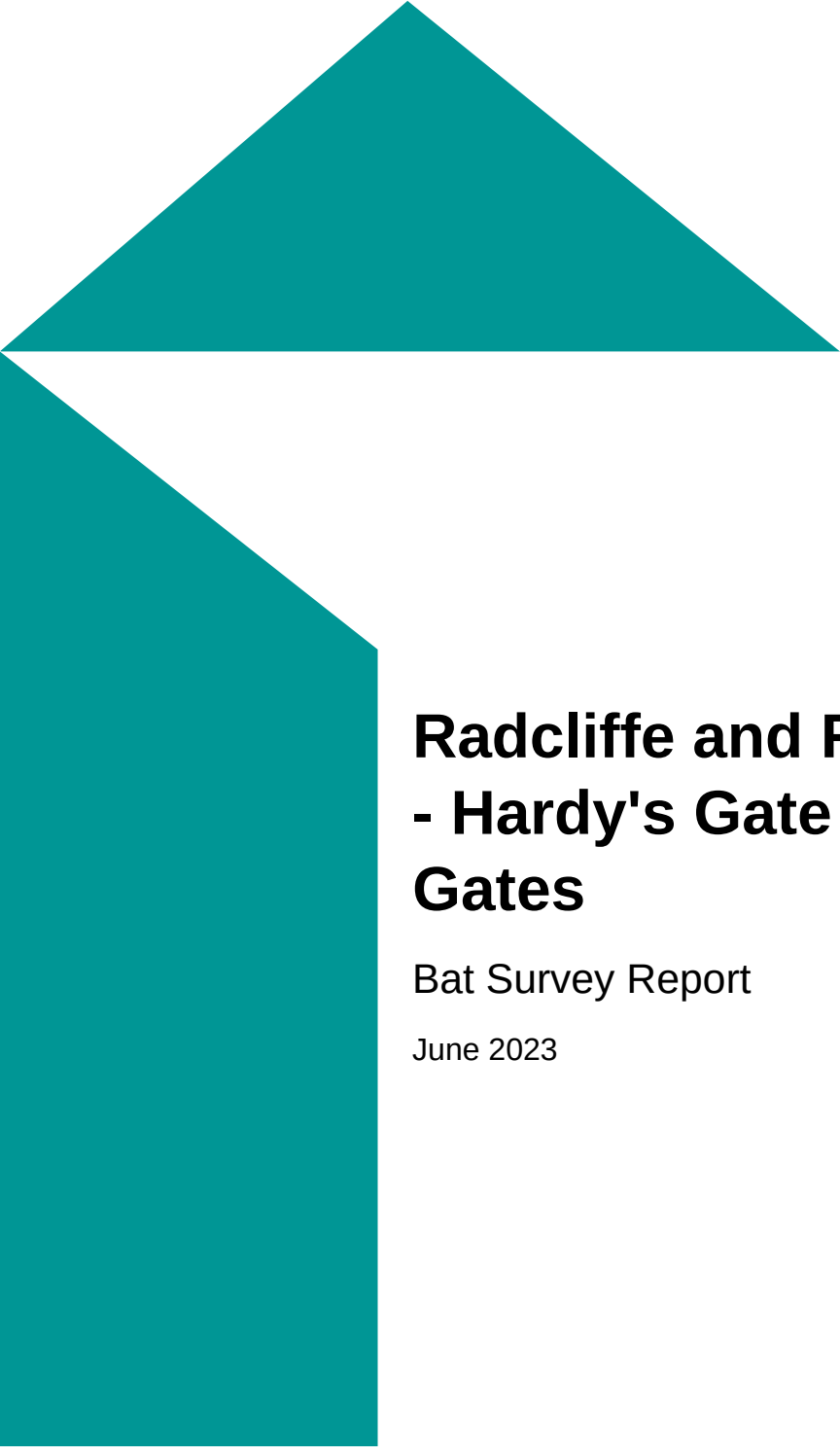




Radcliffe and Redvales FRMS - Hardy's Gate Bridge Flood Gates

Bat Survey Report

June 2023

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Mott MacDonald
Spring Bank House
33 Stamford Street
Altrincham WA14 1ES
United Kingdom

T +44 (0)161 926 4000
mottmac.com

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Bat Survey Report

June 2023

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Executive summary

BAM Nuttall and Mott MacDonald Joint Venture (BMM JV) have been commissioned by the Environment Agency (EA) to undertake bat surveys of Hardy's Gate Bridge (HGB) (central ordnance survey grid reference: SD 80251 08426). The purpose of this report is to document the findings of the bat surveys, to inform the proposed works to HGB and provide appropriate recommendations and mitigation requirements in relation to bats.

The scope of works to HGB is strengthening the spandrel walls and creating localised flood relief openings in the upstream and downstream parapets to allow the bridge deck to flood before the bridge structure becomes unstable.

All native species of bat afford full protection under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981 (as amended). In order to assess which bat species are present and how habitats are used by these species, the following surveys have been undertaken:

- Preliminary roost assessment (PRA) (undertaken on 23 March 2023: external assessment of HGB, to identify roosting features for bats;
- Emergence survey (undertaken on 18 May 2023): to determine the presence of roosting bats in HGB.

HGB has been assessed as suitable to support opportunistic crevice dwellers during the active bat season but is unlikely to be used by hibernating bats. No confirmed roost was detected within HGB during the emergence survey, however, due to the limitations posed during both the PRA and the emergence survey further considerations are recommended in this report.

Measures to avoid, mitigate against, and compensate for adverse impacts on bats and habitat features for bats are provided in this report. This report also highlights enhancement opportunities for bat species.

1 Introduction

1.1 Project Background

The Environment Agency (EA) commissioned BAM Nuttall and Mott MacDonald Joint Venture (BMM JV) to carry out the detailed design and construction of new defences as Phase 2 of the Radcliffe and Redvales Flood Risk Management Scheme (FRMS). The work was commissioned in response to significant flooding during the winter months of 2015-2016 and completed during the period 2019-2022. As part of the Radcliffe and Redvales FRMS, raised flood defence walls have been installed upstream of Hardy's Gate Bridge (HGB) to protect against flooding up to the 100-year event (Q100 +Y50 climate change). These flood defences tie into the upstream face of HGB at a level just above the top of the existing upstream parapet. The flood defences terminate at HGB because the flood levels drop significantly across the bridge during a flood event. However, the structural investigation identified that the existing bridge would be at elevated risk during water loading above bridge deck level and it was not practical to reinforce the masonry bridge or the parapet sufficiently within the various constraints. Due to the risk of parapet failure, it was therefore identified that floodwater needs to be contained at HGB to protect the adjacent properties. Various solutions to contain floodwaters have been considered and developed over an extensive period of options review and investigation. This has included consideration of bridge reconstruction, bridge strengthening, demountable defences and permanent flood gates. The current solution proposes the installation of flood gates to either side of the bridge to contain waters during of overtopping of the cut outs in the parapet and act as a preferred barrier to floodwaters in the event of parapet failure.

1.2 Site Description and Location

Radcliffe and Redvales is an area located on the outskirts of Greater Manchester, encompassing the southern extent of Bury and the western extent of Radcliffe. HGB (central grid reference SD 380253 408426) crosses the River Irwell carrying Dumers Lane, as shown on Figure 1.1 below. HGB is made up of stone blocks and mortar, comprising three arches. The habitat immediately surrounding the structure is riparian habitat comprising broadleaved woodland, scattered scrub and scattered trees. In this location, the River Irwell is prone to flooding with flood waters reaching the underside of HGB during flood events. Surrounding land use comprises industrial buildings and residential estates to the north and south.

Figure 1.1: Hardy's Gate Bridge Location



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Photo 1.2: Hardy's Gate Bridge – Eastern Elevation



Source: Mott MacDonald, 2023

1.3 Proposals

The proposed interventions involve strengthening the spandrel walls and creating localised flood relief openings in the upstream and downstream parapets to allow the bridge deck to flood before the bridge structure becomes unstable. Flood water would be retained on the bridge deck by the closure of flood gates at either end of the bridge spanning between the ends of the parapet walls. In the event of extreme water levels, the floodgates would contain flows should localised failure of either parapet occur. The retained water on the bridge would provide a stabilising effect on the arch barrel and piers.

1.4 Scope of Report

The objectives of this report are as follows:

- To present the results of the field surveys for bats;
- To make an assessment of the potential impacts of the proposals on bats;
- To identify potential constraints on the proposals in relation to bats, and
- To provide recommendations for further survey work and / or mitigation and licencing requirements.

1.5 Legislation and Policy

All UK bat species and their roosts are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 (as amended). In summary, it is an offence to:

- Deliberately capture, injure or kill a bat;
- Intentionally or recklessly disturb a bat in its roost or deliberately disturb a group of bats;
- Damage or destroy any structure or place used for shelter or protection by a bat (even if bats are not present in the roost);
- Intentionally or recklessly obstruct access to a structure or place which it uses for that purpose; or
- Possess or advertise/sell/exchange a bat (dead or alive) or any part of a bat.

Seven species are also listed on Section 41 of the Natural Environment and Rural Communities Act 2006 as species of principal importance for nature conservation. All bat species are considered to be of conservation importance in Greater Manchester and are listed on the Greater Manchester Biodiversity Species Action Plan for bats.

Bat species listed under Annex II of the Habitats Directive (1992) must be protected under the Natura 2000 Network and the sites managed in accordance with the ecological requirements of the species.

To undertake an activity which is prohibited under wildlife legislation, a protected species development licence may be applied for from Natural England (NE) (in England) as the statutory regulator. By holding a development licence, the works can be conducted in accordance with an agreed method statement, including mitigation to maintain the conservation status of the affected species, and minimise the risk of committing an offence under wildlife legislation to an acceptable level.

1.6 Bat Ecology

British bats are insectivorous, occupying many habitat types and have the potential to disperse over large areas (Collins, 2016). They are cryptic species and require warm summer breeding roosts and undisturbed, thermally stable winter hibernation sites.

They spend much of the winter (dependent on conditions) in torpor at hibernation sites. During the spring bats feed more during the night and the period from April to early June is a time of intense feeding to recover weight lost during the winter. During this time, females gather together at maternity roosts that provide appropriate conditions to rear young. In some species, males are also present in maternity roosts although for many species the males roost elsewhere either individually or in small groups.

Birthing times can be highly variable but the main period for births is June. The young begin to fly in July and August. As the young become independent, the adults disperse to find mates and gain weight before winter.

During autumn, many bats swarm at caves and mines to mate and / or find a hibernation site. Males of some species establish mating territories where they may fly or call specifically to attract females.

As weather turns colder, bat activity declines and foraging becomes restricted to warmer nights. Bats spend progressively more time in torpor and slowly return to their hibernacula.

1.7 Status of Bat Species at a National Level

There are 18 species of bat in the UK, 17 of which are known to be breeding within the UK. Historically, severe declines in bat populations have been reported, and bats have yet to recover from these losses. The main factors currently causing loss or decline of bat species include:

- **Habitat loss** - decreasing areas of deciduous woodland, hedgerows, wetlands and grasslands reduce the availability of feeding and roosting sites. Loss and drainage of wetlands and inappropriate riparian management leads to loss of feeding and roosting areas. Undeveloped land which does not meet the standards for designation as a Site of Special Scientific Interest (SSSI) or Local Wildlife Site probably forms the bulk of bats' foraging areas;
- **Habitat fragmentation** - the presence of linear features and wildlife corridors such as hedgerows and former railway lines between habitats can reduce the impact of fragmentation;
- **Disturbance** - Disturbance in the summer may lead to the abandonment of young, whilst disturbance in the winter may arouse hibernating bats and force them to use up essential food reserves too quickly, with fatal consequences;
- **Tree felling and arboricultural works to dead / hollow trees** - all bat species, and particularly noctules, will use hollow trees for both summer and winter roosting;
- **Refurbishment and demolition of man-made structures and buildings** - roost sites in cellars, roof spaces and under eaves in buildings are lost through building maintenance, renovation and the installation of cavity wall insulation. It is now thought that bats may use cavity walls as hibernation roost sites. Bats have very specific roost requirements therefore it cannot be assumed that they will relocate to another apparently suitable site if a roost site is destroyed;
- **Remedial timber treatments** - these can be poisonous to bats. Because of their communal nature, entire roosts may be lost due to insensitive timber treatment exercises. Lindane, a chemical that was widely used in the past, has been implicated in the eradication of entire bat colonies. Treatments carried out during the 1980s are still toxic today; and
- **Changes to external lighting** - may pose a threat to existing and potential bat roosts.

1.8 Quality Assurance

The lead surveyor is an associate member of the Chartered Institute of Ecology and Environmental Management and holds a Natural England Class 1 bat licence (2022-10190-CL17-BAT).

2 Methodology

2.1 Desk Study

Due to the localised nature of works, a detailed desk study and local records centre check was not undertaken. However, a MAGIC (<http://magic.defra.gov.uk/>) search was undertaken to identify statutory designated sites within 2.0km and any records of bat licences within 1.0km.

2.2 Preliminary Roost Assessment

A preliminary roost assessment (PRA) of HGB was undertaken by a licensed bat ecologist on 23 March 2023 following the Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition) (Collins, 2016). Using direct observation and close-focussing binoculars a systematic search was made of the exterior of HGB to identify potential or actual bat access points and roosting places and to locate any evidence of bats such as live or dead specimens, bat droppings, urine splashes, fur-oil staining and / or squeaking noises.

The aim of this PRA is to determine the actual or potential presence of bats and the need for further survey and / or mitigation. HGB was assessed as either having bats presence or as negligible, low, moderate or high suitability for roosting bats. Table 2.1 provides a summary of the assessment categories.

Table 2.1: Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape, to be applied using professional judgement.

Suitability	Description Roosting Habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions, and / or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e., unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain potential roost features (PRFs) but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e., not very well connected to the surrounding landscape by another habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys,

Suitability	Description Roosting Habitats	Commuting and foraging habitats
	potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

Source: adapted from Collins 2016

2.3 Bat Emergence Survey

The requirement for a bat emergence survey was informed by the results of the PRA. One emergence survey was undertaken on 18 May 2023. The survey was undertaken with four suitably qualified Mott MacDonald ecologists with the aim being to establish whether bats were roosting within HGB.

The survey was carried out using full spectrum bat detectors (Elekon Batlogger M) to identify the species of bats and the behaviours observed. The ultrasonic calls of the bats were recorded at the time of survey and later analysed using Bat Explorer analysis software. Calls of sufficient clarity and of an adequate length allowed the surveyor to identify the bat species (or genus in the case of *Myotis* species).

The survey followed the best practice guidance (Collins, 2016) which recommends a start time of 15 minutes before sunset for dusk emergence surveys and for between 1.5-2 hours post-dusk.

Details on survey timings and weather conditions were recorded for the survey and are presented in section 3.3.

2.4 Bat Call Analysis

The recordings made during the emergence survey were analysed using 'Bat Explorer' software. All data has gone through an internal quality control process whereby at least 5% of all bat registrations and 100% of registrations identified as less commonly recorded species within the dataset (Long eared bats *Plecotus sp.*, serotine *Eptesicus serotinus*, Leisler's *Nyctalus leisleri* and Nathusius' *Pipistrellus nathusii*) were double checked by an experienced bat ecologist.

Any call which is between 49 and 51kHz and deemed to be pipistrelle will be recorded as pipistrelle species due to the overlap of common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *Pipistrellus pygmaeus*.

2.5 Limitations

Ecological surveys are limited to factors which affect the presence of plants and animals, such as time of year, migration patterns and behaviour. With a single site visit it is possible that certain species may have been overlooked or under-recorded during the assessment as optimal survey periods vary from species to species.

2.5.1 Preliminary Roost Assessment

Due to the bridge spanning the River Irwell, surveyors used bankside vantage points to assess the structure. It was not possible to directly enter the watercourse, due to high and fast flows, to

assess directly underneath the arches of the bridge. This is considered to be a significant constraint in identifying potential roost features (PRFs), however, as it was possible to assess the eastern and western elevations, assessment for roosting suitability was still possible and a precautionary approach has been applied to the assessment.

2.5.2 Bat Emergence Survey

Due to health and safety concerns with having surveyors positioned bankside in low light levels and during periods of darkness, the four bat surveyors were positioned on the four corners of the bridge deck looking down towards the arches of the bridge and the watercourse, during the survey. The four surveyors had good vantage from the bridge deck, however, due to reflection off the watercourse surface, visibility during the survey was limited. This is deemed to be a significant constraint as it was not possible to conclusively determine bat behaviour and flight paths, however, recommendations within this report address this limitation.

2.5.3 Bat Call Analysis

Due to extreme similarities in their sonograms, it is difficult to identify certain species of bat to species level. For this reason, *Myotis* species were not identified to species level without further supporting evidence such as DNA analysis of droppings or identification of bats in hand (no capture of bats is proposed at this time). *Leisler's* bats were grouped together under the genus *Nyctalus* when the calls were not clear. Furthermore, *Nyctalus* bats and serotine were grouped together under big bats when the calls were not distinct. The species within these groups are likely to use the survey area features in a similar way and as such the proposed mitigation will be similar for all species groups.

The results taken from bat detector recordings are biased towards bats that use louder echolocation calls. Therefore, quiet species such as brown long-eared bats may be under recorded due to the limited recording range of the equipment. This is an unavoidable limitation for all surveys using bat detectors, the implications of which have been considered when analysing the results.

It is difficult to confidently relate calls registered to numbers of bats present, even if more than one bat pass is detected simultaneously. The number of bat passes do not provide any indication of bat abundance; it is intended to only indicate the level of activity at a particular point.

3 Results and Interpretation

3.1 Desk Study

Reference to the MAGIC website (<http://magic.defra.gov.uk/>) indicates that there are no international or national designated sites within 2.0km of structure. However, a local designated site, Hollins Vale Local Nature Reserve (LNR), is situated approximately 1.2km east. Due to the localised nature of the works, within existing infrastructure, and the distance from the site to the LNR it has been assessed as very unlikely that the LNR will be adversely impacted by the works.

There are no records of bat licences within 1.0km of HGB.

3.2 Preliminary Roost Assessment

A PRA of the structure was undertaken on 23 March 2023. HGB is made up of stone blocks and mortar, comprising three arches. No expansion joints are present as part of the bridge design.

Photo 3.1: Hardy's Gate Bridge – Eastern Elevation



Source: Mott MacDonald, 2023

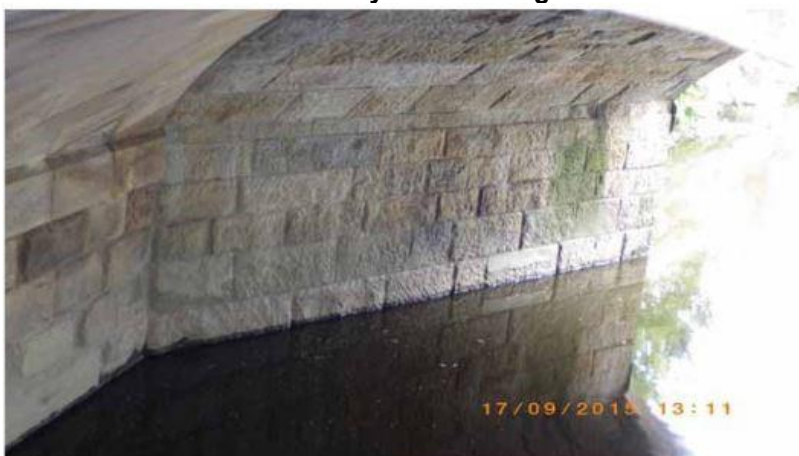
Photo 3.2: Hardy's Gate Bridge – Western Elevation



Source: Mott MacDonald, 2023

No PRFs were identified within the stone or mortar from an inspection of the eastern or western elevations and the bridge appeared to be well sealed. However, due to the lack of access to the underside of the bridge and limited view to the underside, opportunities for PRFs within the bridge materials, underneath the arches of the bridge, cannot be ruled out. However, images from a 2015 inspection report (Sanderson Watts Associates, 2015) of HGB show the underside of the arches to be well sealed and in good condition. Additionally, repointing work was recommended within the report, which appears to have been undertaken, further reducing the suitability for PRFs.

Photo 3.3: Underside of Hardy's Gate Bridge



Source: Sanderson Watts Associates, 2015

Photo 3.4: Underside of Hardy's Gate Bridge



Source: Sanderson Watts Associates, 2015

Phot 3.5: Underside of Hardy's Gate Bridge



Source: Sanderson Watts Associates, 2015

Although it is deemed that the condition of the bridge is unlikely to have deteriorated significantly since the inspection and the repointing work was carried out, due to the age of this inspection report it cannot solely be relied upon for this assessment.

The riparian habitat surrounding the bridge has potential to be used by bats for foraging and commuting, therefore, if PRFs are present it is possible that the bridge may be used by opportunistic bats.

The River Irwell is prone to flooding with flood waters reaching the underside of HGB during flood events. This inundation typically occurs annually, reducing the suitability of the bridge for roosting.

The construction material of the bridge (stone) would offer good thermal regulation and hibernation suitability for bats if PRFs were present. However, due to the reasons listed above; being well maintained, repointing works and regular inundation from flooding, HGB is assessed as not having hibernation suitability.

As a limited visual PRF assessment was undertaken, the structure is assessed as having low suitability for roosting bats on a precautionary principle. Therefore, one dusk emergence survey was recommended to be undertaken within the active season for bats.

During the PRA, a bird nest was identified on a narrow ledge underneath an arch of the bridge.

Photo 3.6: Bird Nest – Underneath Arch, Viewed From Eastern Elevation



Source: Mott MacDonald, 2023

Photo 3.7: View of Bird Nest Through Binoculars



Source: Mott MacDonald, 2023

3.3 Bat Emergence Survey

A dusk emergence survey was undertaken on HGB on 18 May 2023. Weather conditions are presented in Table 3.1 below.

Table 3.1: Dusk Emergence Survey

Date	Start Time	End Time	Sunset Time	Start Temperature	Precipitation	Cloud Cover (Oktas Scale)	Wind Speed (Beaufort Scale)
18/05/2023	20:53	21:38	21:08	16°C	0	6/8	0

Source: Mott MacDonald, 2023

Positions of surveyors (red dots) during the survey can be found on Figure 3.1 below.

Figure 3.1: Emergence Survey Surveyor Locations (red dots)



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

No emergences were recorded during the survey; however, a precautionary principle has been applied to the recommendations due to limited visibility from reflections off the watercourse surface during the survey and constant bat activity for the duration of the survey.

Bats were observed persistently foraging and commuting along the riparian corridor, through and around the arches of HGB and foraging on the surface of the watercourse for the duration of the survey. Therefore, it was not possible to conclusively rule out bats emerging from the underside of HGB.

Surveyors recorded presence of pipistrelle and myotis species, with activity starting at 20:56 which persisted until the end of the survey at 22:38. Presence of these species during the survey has been confirmed via the bat analysis. Bat analysis also identified socialising pipistrelle species.

4 Conclusion and Recommendations

4.1 Conclusion

HGB has been assessed as suitable to support opportunistic crevice dwellers during the active bat season but is unlikely to be used by hibernating bats.

No confirmed roost was detected within HGB during the emergence survey. However, due to the limitations posed during both the PRA and the emergence survey further recommendations are made.

4.2 Further Recommendations

4.2.1 Timing of Works

At the time of writing, it is unknown as to when the works on HGB are proposed. If time constraints for the proposals allow, it is advised that the proposed works are carried out during the hibernation period when HGB is unlikely to be utilised by bats. The bridge is regularly disturbed by heavy traffic and the proposed works are unlikely to result in excessive vibration levels above the baseline of traffic movement, during installation of the gates. This coupled with the regular inundation from flooding and repointing work reduces the suitability for hibernating bats. Therefore, the following approach is deemed acceptable:

- Works to be undertaken during the hibernation period (typically November to March) only;
- Briefing of all contractors via a toolbox talk by a suitably qualified ecologist;

In the unlikely event that a bat is found on site during the works, all works should cease and an ecologist contacted for advice. If a bat roost is found, a licence will need to be applied for to Natural England, which will have cost and time implications to the project.

4.2.2 Inspection of Arches

If it is not possible for the works to be undertaken within the bat hibernation period, then a pre-construction detailed inspection of the underside of the bridge should be undertaken, by a Level 2 bat licensed ecologist. This inspection should be undertaken during the active bat season to assess whether there are any PRFs within the underside of the bridge arches. If PRFs are found to be present these should be inspected with an endoscope (where possible) and further recommendations may be advised.

In the unlikely event that a bat is found on site during the works, all works should cease and an ecologist contacted for advice. If a bat roost is found, a licence will need to be applied for to Natural England, which will have cost and time implications to the project.

4.2.3 Nesting Birds

A bird nest was identified underneath the bridge. If the works cannot be undertaken outside of the bird nesting season (taken to be March to August inclusive), a pre-construction check (not more than 24 hours before construction starts) must be undertaken by a suitably experienced ecologist to identify if any birds are nesting within or close to HGB. If a bird nest is found, it must be left in-situ and protected from works; no works can be undertaken in that area until the young birds have fledged from the nest site. This may take up to six weeks depending on the species.

4.3 Enhancement Opportunities

Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006, requires a list of habitats and species that are of principal importance for the conservation of biodiversity in England to be published. These habitats and species are known as S41, habitats of principal importance (HPI) and species of principal importance (SPI). The NERC Act also places a duty on public bodies to conserve and enhance biodiversity whilst undertaking their functions (the 'biodiversity duty'). In line with this, opportunities for ecological enhancement to benefit bats under the proposals have been highlighted below:

- Provision of thermally stable bat boxes within trees in the wider area to provide increased opportunities for roosting bats.

4.4 Validity of Survey Data and Assessment

In line with CIEEM (2019) guidance on the lifespan of ecological surveys, the bat survey results are considered valid for up to 12-18 months. Following this, the survey data should be reviewed and, if appropriate, updated to ensure any assessment and mitigation approach remains valid.

5 References

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