Built structures bat report

Site: Goss Moor NNR

Client: Natural England

Date: December 2021

ECOLOGY PARTNERS

www.ecologypartners.co.uk

Document Control

Job Ref.	EP21/145	**Version**	01	**Survey date**	14&16th October & 5th November 2021
Surveyor	Mark Tunmore, BSc MCIEEM	**Author**	Mark Tunmore, BSc, MCIEEM	**Issue date**	9th December 2021

Disclosure

The information and advice presented within this report is based on the professional and true opinions of Ecology Partners and is written in accordance with the CIEEM Code of Professional Conduct.

Table of Contents

	Page
1. Introduction	4
2. Methodology	4
2.1 Limitations	4
3. Results	5
4. Recommendations	23
5. Discussion	36
6. References	38
Appendix 1: Map 1	39

1. Introduction

Ecology Partenrs were commissioned to carry out a survey of the the built structures (bridges, building and culverts etc.) within Goss Moor NNR to assess their potential to support bats.

2. Methodology

A visual assessment was made of 39 built structures at Goss Moor NNR from a list of 36 provided by Natural England; an additional three structures (37 to 39) were added by the surveyor during the fieldwork. The main assessment work was carried out on 14 and 16 October 2021; additionally four structures were looked at on 5 November 2021. Assessment was carried out by Mark Tunmore (Natural England license number 2015-14995-CLS-CLS), an experienced bat ecologist who has worked extensively on bat projects in Devon and Cornwall.

A visual survey was carried out at each structure, searching for evidence of bat use, including droppings, feeding remains, staining from urine or grease from fur. A high-powered torch was used to examine visible parts of the structure.

The potential of each structure for roosting bats is categorized using the terms specified in *Bat Surveys for Professional Ecologists* (Collins, 2016), assigning suitability to one of four categories specified below:

- **Negligible**. Negligible habitat features on site likely to be used by roosting bats.
- **Low**. A structure with one or more potential roost sites that may be used by individual bats opportunistically but which does not provide appropriate conditions to be used regularly or by large numbers of bats.
- **Moderate**. A structure with one or more potential roost sites that could be used by bats but is unlikely to support a roost of high conservation value.
- **High**. A structure with one or more potential roost sites with obvious suitability for use by large numbers of bats on a more regular basis.

A fifth category was also introduced for the benefit of this study:

- **No potential**. A structure which held no possibility of being used by bats for roosting purposes at any time of the year.

Each structure is discussed in turn and *Table 1* summarises the key findings. Advice is given on management to ensure bats retain access to structures and enhancements are suggested where appropriate. Advice is given on required survey effort to establish possible bat use, where this is desirable.

2.1. Limitations

This assessment is based upon visual inspection of the features as they appeared during three separate days during October and November 2021. As such the findings of this survey present a snap-shot it is acknowledged that ecological features change over time and that evidence of bat presence can disappear quickly in wet environments. Bats are highly mobile species and can and do use different roosts at different times of year and from one year to the next.

This study does not take into account the farm buildings at Penrose Veor Farm, which form the headquarters of the Goss Moor NNR and are known to host several bat roosts.

The assessment focusses upon a list of features as provided by the client. Some additional features were discovered during the surveys and added to the survey programme. It remains possible that there may be further structures within the NNR which the surveyor is unaware of.

Structures 21 and 33 could not be located during the survey.

3. Results

Structure 1 (SW9581859751) Multi-use Trail Between Toads Hole and Gothers

Description: Large concrete pipe with metal bridge above. Some gaps where interlocking pipe section met, approximately 15mm.

Bat roost potential: Low.

Comments: Limited day roost potential in gap where pipes meet. Potential night roost. Suitable for bat box enhancement on the wall.

Further surveys: Daytime inspections May to September to establish bat use.

Structure 2 (SW9583759756) Multi-use trail Between Toads Hole and Gothers

Description: Culvert under track.

Bat roost potential: Negligible.

Comments: Little room for roosting bats and water level will be too high for periods.

Further surveys: None.

Structure 3 (SW9519160012) River Fal and Gothers track

Description: Concrete bridge over large plastic pipe.

Bat roost potential: Negligible.

Comments: Space inside limited, no crevices and smooth material.

Further surveys: None.

Structure 4 (SW9541860126) Confluence of River Fal and Pendine Ditch

Description: Wood and metal framed bridge

Bat roost potential: Low potential

Comments: No day roost features; night roost potential with good ground clearance and plenty of structures suitable for hanging bats. Suitable for bat box enhancement.

Further surveys: Camera trapping to check for night roost use.

Structure 5 (SW9510960042) Gothers Track near Blockhouse

Description: Three concrete culverts beneath concrete bridge.

Bat roost potential: Negligible.

Comments: The water level was high so not examined inside. However, it was clear that there was little room inside for roosting bats.

Further surveys: None.

Structure 6 (SW9467060108) Southerly Pool Track

Description: Long, square concrete culvert beneath track, heavily overgrown with bramble at each end, Dry, no running water. Smooth surfaces within.

Bat roost potential: In its current state, negligible. However, it has significant potential for enhancement.

Comments: Scrub clearance to open up the entrances would allow use as a possible night roost. Provision of bat boxes would increase the structure's usefulness for bats by providing crevices.

Further surveys: In its current condition, none needed. After access improvement, remote monitoring.

Structure 7 (SW9464560151) Southerly Pool Track Entrance

Description: Wide concrete slab over the river with metal rails. Substantial space beneath; smooth surfaces, broad shelf at the side.

Bat roost potential: Moderate potential for night roosting and day roosting bats.

Comments: Water depth prevented close inspection. Potential for enhancement through bat box provision.

Further surveys: Camera trapping and remote monitoring.

Structure 8 (SW9454160243) Gothers Track Approaching Geraghtys

Description: Wide concrete slab, completely smooth surfaces beneath.

Bat roost potential: Low. Possible use as a night and day roost by hanging bat species. No suitable crevices for other species.

Comments: Needs a little scrub clearance to open the structure up.

Further surveys: Camera trapping and remote monitoring.

Structure 9 (SW9452360330) Entrance to Geraghtys

Description: Pipe beneath concrete bridge.

Bat roost potential: Low.

Comments: Possible use as a night roost.

Further surveys: Camera trapping.

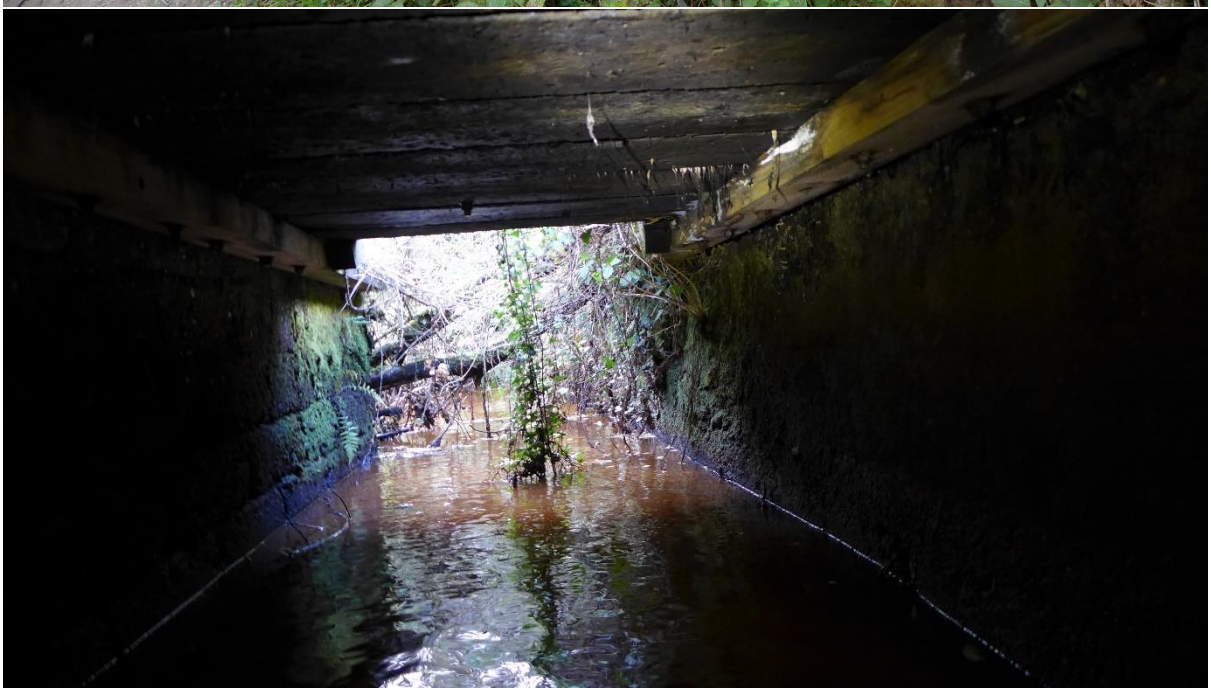
Structure 10 (SW9461060332) Northerly Pool Track Near Geraghtys

Description: Long structure with stone sides, made up of multiple sleepers running parallel with the track. Two long lengths of wood, one each side, to which the sleepers are bolted, with a significant gap present along their length between the wood and the stone.

Bat roost potential: Moderate with management. In its current state negligible.

Comments: Needs significant vegetation clearance to make it accessible to bats. Suitable gaps present for crevice-roosting bats.

Further surveys: After management, emergence surveys and remote monitoring in September.



Structure 11 (SW9484960155) Gothers Track Between Blockhouse and Geraghtys

Description: Long plastic pipe underneath track above. Smooth surfaces inside, no crevices.

Bat roost potential: Low potential, possible occasional use as a night roost.

Comments: Herald moth hibernating inside. Keep vegetation clear of the entrance through management.

Further surveys: None.

Structure 12 (SW9503460111) Central Goss Moor

Description: Concrete building with two 'rooms' on the ground floor and open access for bats. Heavily ivy-clad externally. Some crevices present at the junction of block walls in places. Eight square holes in the roof lead from the ground floor to the floors above and offer places for bats to roost.

Bat roost potential: Moderate potential. Almost certainly used as a night roost; some potential for day roosting bats but a lot of potential for enhancement. With work it could be made into a suitable day-roost for horseshoe bats and crevice-roosting species, as well as a hibernation roost and increased value as a night roost.

Comments: Only the ground floors examined as no means of access to the level above.

Structure 13 (SW9633660153) River Fal Near Dipping Platform

Description: Wood and metal bridge structure with large clearance above the water beneath.

Bat roost potential: Moderate for night roosting bats.

Comments: Very likely to be used by bats at night but unsuitable as a day roost due to lack of crevices and very open aspect. Potential for enhancement through provision of bat boxes.

Further surveys: Camera trapping and remote monitoring.

Structure 14 (SW9603760131) River Fal at Marsh Fritillary Trail

Description: Wooden bridge.

Bat roost potential: Negligible currently. Potential space beneath for night roost bats but needs scrub clearance to improve access.

Comments: No suitable crevices for day-roosting bats but potential for use as a night roost could be improved through management work.

Further surveys: None.

Structure 15 (SW9637860130) Dipping Pond

Description: Wooden bridge beside small lake.

Bat roost potential: Negligible.

Comments: Water level close to the bottom of the bridge throughout the year, leaving little potential for roosting bats. It is possible that bats may occasionally hang from the wooden rails as a night feeding roost, interspersed with forays over the water to catch insects.

Further surveys: None.

Structure 16 (SW9598460047) Marsh Fritillary Trail

Description: Plastic boardwalk over large area of standing water.

Bat roost potential: Negligible.

Comments: Approximately 40cm clearance between the water and the boardwalk did not offer sufficient space for use as a night roost at any time of year.

Structure 17 (SW9446360380) Geraghtys

Description: Steel-framed building with wooden walls and a corrugated asbestos sheeted roof, open on two sides of the building.

Bat roost potential: Low

Comments: Easy access makes it a likely night roost; gaps between beams and the roof offer some potential for day-roosting bats.

Further surveys: Emergence surveys, May to September.

Structure 18 (SW9432058816) Next to Domellick Cattle Arch

Description: Metal cattle grid.

Bat roost potential: Negligible.

Comments: Space below the grid but not enough for bats.

Further surveys: None.

Structure 19 (SW9430458816) Domellick End of the Multi-use Trail

Description: Stone-built cattle arch.

Bat roost potential: None.

Comments: Some gaps in the ceiling and the sides where mortar was missing from around the stones. Light ivy covering externally but not enough to host bats. Potential for night roosting and crevice-dwelling day-roosting bats.

Further surveys: Emergence surveys, May to September.

Structure 20 (SW9546759595) Multi-use Trail at Kink to the West of Gothers Track

Description: Two small concrete pipes beneath track.

Bat roost potential: None.

Comments: Only 20cm clearance from the water surface and the top of the pipes.

Structure 21 (SW9406059790) Western end of the Track Between Geraghtys entrance to the Railway Embankment near St Dennis Junction

Could not be located.

Structure 22 (SW9618259336) Where Track Splits at Salt Box

Description: Concrete pipe with smooth surfaces inside, c. 1.2m diameter.

Bat roost potential: Low.

Comments: Potential for use as a night roost or even a day roost by hanging bat species. Needs some vegetation clearance to open up access.

Further surveys: Camera trapping and remote monitoring.

Structure 23 (SW9524159285) From Field 9 on the East Side of Penrose Veor onto Goss Moor

Description: Large concrete pipe beneath track. Damp and muddy inside but no running water. Smooth interior with no crevices.

Bat roost potential: Low.

Comments: Night roost potential.

Further surveys: Camera trapping and remote monitoring.

Structure 24 (SW9346959669) Adder Field

Description: Plastic boardwalk.

Bat roost potential: None.

Comments: Too low to the ground and vegetated underneath to offer any potential for roosting bats.

Further surveys: None.

Structure 25 (SW9343559631) Gaverigan Field

Description: Three-piped culvert, pipes c. 30cm diameter.

Bat roost potential: None.

Comments: Pipes too small to offer any roost potential.

Further surveys: None.

Structure 26 (SW9339059634) Gaverigan Field

Description: Plastic pipe of c. 40cm diameter. Obscured by vegetation.

Bat roost potential: Negligible.

Comments: Little space for roosting bats and obscured by vegetation so unlikely to be used.

Further surveys: None.

Structure 27 (SW9367559594) Across Trail Next to Donkey Field North Entrance

Description: Square culvert, stone built. Approximately 1.2m clearance from the water to the roof.

Bat roost potential: Moderate.

Comments: Substantial gaps in stone walls and between rusting corrugated roof material.

Further surveys: Emergence surveys and remote monitoring, May to September.

Structure 28 (SW9370359380) Donkey Field South Entrance

Description: Long arched brick structure with approximately 80cm clearance between water and the ceiling.

Bat roost potential: Moderate.

Comments: Possible day and night roost. Needs scrub clearance at each end to improve access.

Further surveys: Emergence survey and remote monitoring.

Structure 29 (SW9525160769) Lily Pond Loop East Entrance Off Old A30

Description: Single plastic pipe. Even though the water was shallow (approximately 10cm deep) it left very little space inside the pipe.

Bat roost potential: None.

Comments: Too little space to be of any value for bats.

Further surveys: None.

Structure 30 (SW9605460979) East Entrance to Dinosaur Pen Off Old A30 Carpark

Description: Single plastic pipe. Very overgrown with vegetation.

Bat roost potential: None.

Comments: Too little space to be of any value for bats and heavily overgrown with vegetation, impeding access.

Further surveys: None.

Structure 31 (SW9499260942) Where Track to Duddons Branches off From Lily Pond Loop

Description: Two plastic pipes.

Bat roost potential: None.

Comments: Too little space to be of any value for bats (approximately 20cm from top of pipe to the water surface).

Further surveys: None.

Structure 32 (SW9369758729) South End of Track From Gaverigan Onto Road at Domellick

Description: Brick-built arched culvert beneath track. Shallow-flowing water, approximately 70cm clearance from the water surface to the top of the culvert.

Bat roost potential: Moderate.

Comments: Some bricks had fallen out and others were falling, creating potential for crevice-roosting bats in the substantial alcoves left behind. Close examination not possible at this time of year due to safety concerns, operating in a confined space with flowing water and loose bricks. This may be more feasible in the summer months. Some cracks and crevices also present in the outer part of the bridge, which held potential for roosting bats.

Further surveys: Daytime search in the summer months. Remote monitoring and camera trapping.

Structure 33 (SW9473160590) Lily Pond Loop West Entrance off Old A30

Unable to locate.

Structure 34 (SW9472760574) Old A30 Near Lily Pond Loop West Entrance

Description: Two plastic pipes, culvert under the old A30.

Bat roost potential: None.

Comments: Water level almost filling the pipes, leaving approximately 40cm clearance.

Further surveys: None.

Structure 35 (SW9559360908) West Entrance to Dinosaur Pen Off Old A30

Description: Culvert beneath concrete bridge. Totally impenetrable scrub.

Bat roost potential: None.

Comments: Not possible to examine properly due to the degree of vegetation growth. However, for the same reason it is not accessible to bats.

Further surveys: None.

Structure 36 (SW9403659896) Western End of Track Between Geraghtys Entrance to the Railway Embankment near St Dennis Junction

Description: Three concrete culverts beneath a concrete bridge.

Bat roost potential: Low.

Comments: Water level very high, preventing close examination. May have some roost potential in the summer months when the water level is lower.

Further surveys: Daytime inspection in summer months.

Structure 37 (SW9658160129) Tregoss Bridge

Description: Stone bridge with two square culverts.

Bat roost potential: Moderate.

Comments: Very suitable for roosting bats, both night roosting and day roosting. Some crevices present.

Further surveys: Emergence surveys in the summer months and remote monitoring.

Structure 38 (SW9462160167) Gothers Track approaching Geraghtys (left hand side within woodland)

Description: Two wooden sleepers over the river.

Bat roost potential: Low.

Comments: May be occasionally used as a night roost by bats foraging over the water.

Further surveys: None.

Structure 39 (SW9373858721) Road bridge over Fal on St Dennis road

Description: Concrete road bridge over the river. Broad and high clearance above the water (approximately 3m).

Bat roost potential: Moderate.

Comments: Not examined at close quarters due to water height. May be used as a night roost by bats foraging over the water.

Further surveys: Daytime inspection in the summer months.

Structure 40 (SW9386159567) St Dennis railway embankment

Description: Stone-built arched bridge over the River Fal. Broad and high clearance above the water (approximately 5m).

Bat roost potential: Moderate.

Comments: Not examined at close quarters due to water height. Study through binoculars suggested the potential for cracks and crevices within the interior stonework.

Further surveys: Emergence surveys in the summer months.

Table 1. Summary of findings relating to each surveyed structure. NB For bat roost potential words in brackets refer to the potential that could be achieved after management.

Structure number	Bat roost potential	Management	Enhancements	Further surveys
1	Low	Keep vegetation clear around each side.	Schwegler 1FE and back plate on outside wall.	Daytime inspection, May to September.
2	Negligible	None.	None.	None.
3	Negligible	None.	Schwegler 1FE and back plate on outside wall.	None.
4	Low	Maintain access through vegetation clearance.	Two Schwegler GS bat boxes.	Camera trapping.
5	Negligible	None.	None.	None.
6	Negligible (moderate).	Scrub clearance each side to open up entrances.	Internal bat box provision. One Schwegler 1FE and back plate; one Schwegler GS.	Remote monitoring and camera trapping.
7	Moderate.	None.	Schwegler GS.	Daytime inspection, camera trapping and remote monitoring, May to September.
8	Low.	Maintain access through vegetation clearance.	Schwegler GS.	Camera trapping and remote monitoring, May to September.

Structure number	Bat roost potential	Management	Enhancements	Further surveys
9	Low.	Maintain access through vegetation clearance.	None.	Camera trapping.
10	Negligible (moderate).	Open up access through vegetation clearance.	Two Schwegler GS bat boxes.	Emergence surveys and remote monitoring, May to October.
11	Low.	Maintain access through vegetation clearance.	None.	None.
12	Moderate.	None.	Significant potential to turn the ground floor into a dedicated bat roost area for day-roosting, night-roosting and hibernating bats.	Two emergence surveys and remote monitoring, May to September.
13	Moderate.	None.	Schwegler GS bat box.	Camera trapping and remote monitoring, May to October.
14	Negligible (low).	Open up access through vegetation clearance.	None.	None.
15	Negligible.	None.	None.	None.
16	None.	None.	None.	None.
17	Low	None.	Two Schwegler 1FE and back plates inside.	Two emergence surveys, May to September.
18	None.	None.	None.	None.
19	Moderate.	None.	None.	Emergence surveys, May to September.
20	None.	None.	None.	None.
21	Could not be located.			
22	Low	Maintain access through vegetation clearance.	None.	Remote monitoring and camera trapping.
23	Low.	None currently but ensure vegetation does not encroach.	None.	Remote monitoring and camera trapping.

Structure number	Bat roost potential	Management	Enhancements	Further surveys
24	None.	None.	None.	None.
25	None.	None.	None.	None.
26	Negligible.	None.	None.	None.
27	Moderate	None.	Two Schwegler GS bat boxes.	Emergence surveys and remote monitoring, May to October.
28	Moderate	Maintain access through vegetation clearance.	Two Schwegler GS bat boxes.	Emergence surveys and remote monitoring, May to October.
29	None.	None.	None.	None.
30	None.	None.	None.	None.
31	None.	None.	None.	None.
32	Moderate.	Maintain access through vegetation clearance.	Schwegler 1FE and back plate on outside wall.	Daytime search, remote monitoring and camera trapping, May to October.
33	Unable to locate			
34	None.	None.	None.	None.
35	None.	None.	None.	None.
36	Low.	None.	Schwegler 1FE and back plate on outside wall.	Daytime inspection, May to September.
37	Moderate.	None.	Two Schwegler GS bat boxes.	Emergence surveys and remote monitoring, May to September.
38	Low.	None.	None.	None.
39	Moderate.	None.	Two Schwegler GS bat boxes.	Daytime inspection, May to September.
40	Moderate	None.	Schwegler 1FE and back plate on outside wall.	Emergence surveys, May to September.

4. Discussion

Recent survey work (Tunmore, 2020) recorded a total of nine bat species active across the NNR—barbastelle (*Barbastella barbastellus*), brown long-eared bat (*Plecotus auritus*), common pipistrelle (*Pipistrellus pipistrellus*), daubenton's bat (*Myotis daubentonii*), greater horseshoe (*Rhinolophus ferrumequinum*), lesser horseshoe (*Rhinolophus hipposideros*), Natterer's bat (*Myotis nattereri*), noctule (*Nyctalus noctula*) and whiskered bat (*Myotis mystacinus*). With its abundance of insects, resulting from the wetland and woodland habitats present and lack of light pollution over such a large area of land, the NNR offers optimal foraging habitat for bats. Less is known about the roosting habits of bats within the reserve although it is presumed that some species are roosting in tree features.

Buildings within the NNR are scarce, only the blockhouse offering a substantial structure that may be attractive to roosting bats, although potential is limited here by its exposure to the elements and daylight. Bridges and culverts, on the other hand, are frequent and well distributed across the NNR and it is likely that some of the structures discussed in this report are used by bats, at least on an occasional basis.

Bats may use bridges for day-roosting, hibernating, rearing young (maternity roosts), mating/social behaviour and night roosting/night feeding perches. Daubenton's bat, common pipistrelle, soprano pipistrelle (*Pipistrellus pygmaeus*) and Natterer's bat in particular are known to use bridges but other species may also do so.

Although no evidence of bats was found during this assessment, this is not significant as bat use can be occasional and evidence of bat presence can disappear quickly in such wet environments. The most frequent use of some of the structures is likely to be as a night roost/feeding perch. A night roost is a location where bats rest or shelter at night but not by day; a feeding perch is where bats rest at night whilst feeding, returning to a perch to feed upon a captured insect. Normally feeding perches in terrestrial buildings can be easy to detect by the presence of insect wings (particularly moths and butterflies) but of course when there is flowing water below a feeding perch, as is often the case with bridges and culverts, any such evidence is quickly removed. Many of the roost features discussed in this report are smooth surfaced (e.g. plastic culvert pipes) and thus can't be used by day-roosting crevice-dwelling bats such as pipistrelles but they may be used by bats at night. A number of structures did, however, have suitable crevices for day-roosting bats and further surveys of such features would be helpful in adding to the understanding of their use by bats.

In terms of management, it is important to retain access to those structures highlighted in this report. Vegetation encroachment is a common issue at some of these structures and an annual inspection is recommended to make sure that structures with potential for roosting bats remain open to use through vegetation management. At moderate potential buildings this should ideally be carried out in mid-October to mid- November to avoid potential disturbance of any hibernating bats and allow them to relocate.

Although the term 'moderate potential' does not sound particularly significant, this is not the case as moderate in this instance refers to a potential roost feature with significant interest. Comparatively few buildings have high potential for bats.

In terms of planning management work, structures with potential described as "none" or "negligible" can be regarded as unlikely to support bats and no further investigations would be necessary to inform work. Structures with potential described as "low" or "moderate" would need to be considered with regard to possible bat presence and further investigation/seasonal timing of work/method statements may be necessary.

There is significant potential for enhancing the value of many of the built structures described in this report through provision of durable bat boxes for crevice-dwelling species, particularly the Schwegler 1FE and GS bat boxes.

In order to gain a better understanding of the use by bats of built structures within the NNR, further study of some of the more interesting structures highlighted within this report is recommended, through daytime inspections at different times of the year, remote monitoring and camera trapping, and in some cases emergence surveys. Use of thermal imaging cameras along water courses would also be a very informative technique for understanding the importance of such water courses for bats, as well as the built structures. It is known that Daubenton's bat occurs on the NNR, this being a species that is particularly associated with rivers and water courses, but it has not yet been observed foraging over water on the reserve, which must surely be a regular event. Only active observation at night can provide an understanding of this.

5. References

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

Tunmore, M., 2020. Growing Goss Bat Survey Report. Ecology Partners, Port Isaac.

Appendix 1:Map1 location of built structures with in the NNR

ECOLOGY PARTNERS

MAP 1: Distribution of built structures within NNR
PROJECT: Goss Moor NNR built structures bat survey
CLIENT: Natural England
DATE: December 2021 / DRAWN BY: JS

KEY
- Built structures
- NNR boundary

0 250 500 m