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THE NETWORK RAIL (STALYBRIDGE TO DIGGLE (SADDLEWORTH) ENHANCEMENTS) ORDER

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1. OVERVIEW OF WORKS

- 1.1.1 This Technical Note provides the bat survey methodology used for the Network Rail (Stalybridge to Diggle (Saddleworth) Enhancements) Order (hereinafter referred to as the 'Order Scheme'). This Technical Note is focused on Stalybridge Tunnel and Scout Tunnel and represents a summary of the proposed tunnel works for the Order Scheme, and the approach used for the bat survey methodology, interpretation of results and mitigation. The requirement for this Technical Note has arisen following a Discretionary Advice Service (DAS) meeting with Natural England on 7 August 2024 and forms the formal written scope. This Technical Note was authored and checked by AtkinsRéalis Natural England Bat Level 2 (CL18) licenced Ecologists who are knowledgeable of the Order Scheme and local region.
- 1.1.2 The Order Scheme is located between Stalybridge and Diggle (Greater Manchester). The proposed works are required to electrify the railway through overhead line equipment (OLE), thereby increasing network reliability, carrying capacity and reducing the reliance on trains powered directly by fossil fuels. This note focuses specifically on works which will occur within Stalybridge Tunnel (MVL3/3), and Scout Tunnel (MVL3/11) (see Figures 1-1 – 1-4 and Table 1-1 below). Ground stabilisation works are required and the track beds will be lowered to allow space for the OLE.
- 1.1.3 These tunnel works will be consented through the Order Scheme powers or via the use of permitted development rights.
- 1.1.4 It is assumed that bats are able to roost within the railway tunnels as they may have become desensitised to the noise, vibration and air flow disturbance from passing trains. AtkinsRéalis understand the potential value of rail tunnels for bat roosting (including hibernation) and foraging.
- 1.1.5 There is little available literature and guidance to inform a robust methodology and mitigation for surveying the tunnels. To avoid potential project delays, AtkinsRéalis sought guidance from Natural England in 2024 on the proposed survey methodology, interpretation of results and mitigation at Stalybridge and Scout Tunnels.

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Table 1-1 - Scheme Details

Site Location	Central Grid Reference	Tunnel Length (m)	Trains per Hour (peak)	Hours of Operation	Proposed Works (applicable to both tunnels)
Stalybridge Tunnel (MVL3/3)	SJ 96560 98860	610	4	24 hours	Ground stabilization works in the tunnel stability. Cutting works to lower the existing track to create room for the OLE within the tunnel. Construction works are likely to take several months to complete. Exact month for the start of works to be confirmed.
Scout Tunnel (MVL3/11)	SD 97326 01314	183	4	24 hours	

Figure 1-1 - Stalybridge Tunnel – Western Portal. Off A635 Wakefield Road.



Figure 1-2 - Stalybridge Tunnel – Eastern Portal. Off A635 Wakefield Road.



Figure 1-3 - Scout Tunnel – Southern Portal. Off A635 Manchester Road.



Figure 1-4 - Scout Tunnel – Northern Portal. Off A635 Manchester Road.



1.2 Current Survey Progress

- 1.2.1 Preliminary Roost Assessments (PRA) were undertaken on Stalybridge and Scout Tunnels in May 2024, which identified multiple potential roost features (PRFs) within both tunnels. Bats were noted exiting Stalybridge Tunnel incidentally during the PRA.
- 1.2.2 PRAs were undertaken under possessions, between 00:00 and 04:30 hours. The length of the tunnels was walked and the interior and exterior of the portals viewed. Both tunnels are not artificially lit, therefore PRA effort was undertaken in generally pitch-black conditions, although high-powered lamps were utilised to inspect the outer walls of the structures and identify PRFs. Multiple crevice features were found along the length of both tunnels.
- 1.2.3 Other ecological surveys, including bat emergence surveys will be undertaken for other aspects of TRU W2B. Access is comparatively less restricted therefore surveys will be undertaken in accordance with the relevant good practice guidance.

1.3 Access Restrictions and Issues

- 1.3.1 Possessions are heavily restricted on the MVL3 rail line in which the Order Scheme is located; the line is the main rail line between Manchester Victoria and Huddersfield, Leeds, York, and the East Coast Main Line. Surveyor access onto the railway would be only permitted between 00:00 – 04:30

hours in midweek nights (Monday to Friday) on an occasional basis; the reality of accessing the rail corridor under a possession means access is usually taken 1 hour after the possession begins whilst waiting for permission from the Signaller. Further access outside of these timeframes have been explored with Network Rail but are not deemed possible due to maintaining the existing rail service and associated health and safety requirements.

- 1.3.2 Separated access can theoretically allow for access to the railway corridor at any point during the day or night. However, separated access cannot be safely progressed for both portals of the tunnels due to restrictions in access points and/ or safe walking routes along the access.
- 1.3.3 Separated access would, in theory, allow for a surveyor to stand at one end of the tunnel for both Stalybridge Tunnel (western portal only) and Scout Tunnel (eastern portal only); the opposite ends of each tunnel offer no separated access due to a lack of a suitable, safe access (i.e. no safe way to stay more than 2 metres away from the nearest rail line). Given the constrained access, surveyors are unable to be positioned at both ends of the same tunnel at one time. Therefore, any bats recorded flying through either of the tunnels during bat roost surveys may be foraging/ commuting having flown through the tunnel, rather than roosting within, however, there would be no way to confirm this.

1.4 Dusk Emergence Surveys

- 1.4.1 The 4th edition of Bat Conservation Trust (BCT) Good Practise Guidelines¹ state that dusk emergence surveys should start 15 minutes before sunset and finish 1.5 to 2 hours after sunset.
- 1.4.2 Sunset in Stalybridge on 15 August 2024 was at 20:35, therefore requiring a dusk emergence survey between 20:20 to 22:05-22:35. If surveys took place in 2025 outside of seasonal restrictions, the latest the sun would set in Stalybridge is 21:41 (21 June 2025). The dusk emergence survey would end at 23:11-23:41. That would be prior to gaining any possession of the site at 00:00 (noting that realistic site access is usually one hour after the possession begins).
- 1.4.3 Irrespective of the time of year, there is no overlap between railway possessions and dusk emergence survey times. Dusk emergence surveys

¹ Collins, J. (ed.) (2023) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition)*. The Bat Conservation Trust, London. ISBN-978-1-7395126-0-6.

of Stalybridge Tunnel and Scout Tunnel is therefore not possible to take place in line with best practice guidelines.

1.5 Roost Re-entry Surveys

- 1.5.1 Roost re-entry surveys are no longer routinely recommended in the 4th edition of the BCT Guidelines¹ due to the risk of bats returning to the roost early and being missed. Surveys generally would be expected to start 2 hours prior to sunrise and finish 15 minutes after sunrise. AtkinsRéalis have taken a view to suspend roost re-entry surveys in line with guidelines, unless there is no possible alternative (i.e. dusk emergence surveys).
- 1.5.2 Sunrise in Stalybridge on 16 August 2024 was 05:50, therefore requiring a roost re-entry survey period of 03:50 – 06:05; an overlap of only ten minutes with site access for any possession. If surveys took place in 2025 outside of seasonal restrictions, the earliest the sun would rise in Stalybridge is 04:38 (21 June 2025), twenty-three minutes after the BCT Guideline survey suggested end time. At most, there is only a small period of 1 hour and 22 minutes of overlap between any railway possession and roost re-entry suggested survey time. This available time on site would reduce prior to and after 21 June / mid summer.
- 1.5.3 Given the above constraints, roost re-entry surveys would be insufficient due to:
- The unreliability of roost re-entry surveys per the BCT Guidelines;
 - Insufficient time spent surveying during the suggested survey window; and
 - Missing the most important survey times relative to expected roost re-entry.
- 1.5.4 Therefore, neither a dusk emergence or roost re-entry survey would provide sufficient on-rail time to provide robust conclusions on roosting behaviour.

2. PROPOSED METHODOLOGY

- 2.1.1 A proposed methodology has been developed to in accordance with the BCT Guidelines¹, namely:
- Table 2 Roosting preferences of different species;
 - Table 3 Summary of emergence times; and
 - Table 4 Foraging habitat preferences and foraging strategies of different UK species.

2.1.2 The same survey methodology would be adopted for both Stalybridge and Scout Tunnels. The proposed survey approach would rely on automated/ static detectors which would record the calls of bats entering and exiting each of the tunnels. Records would be cross-referenced with likely bat emergence times and assumptions made on roosting. Sections 2.2 – 2.7 below provides further clarification into the proposed methodology.

2.2 Bat Species Scoping

2.2.1 Table 1-2 lists all bat species that are known to breed within the UK and provides a scoping decision based upon presence in the local area and the roosting preference. A review of local record centre desk study data will be used to validate this scoping. The bat species that are scoped out are deemed as not roosting within the tunnels; any records would be assumed as foraging/ commuting.

Table 1-2 - Bat Scoping

Bat common name	Scoping decision	Justification
Brandt's bat/ Whiskered bat	Scoped In	Able to use tunnel crevice features for roosting.
Daubenton's bat	Scoped In	Able to use tunnel crevice features for roosting.
Natterer's bat	Scoped In	Able to use tunnel crevice features for roosting.
Common pipistrelle/ Soprano pipistrelle	Scoped In	Able to use tunnel crevice features for roosting.
Nathusius' pipistrelle	Scoped In	Able to use tunnel crevice features for roosting.
Brown long-eared bat	Scoped In	Able to use tunnel crevice features/potential void features for roosting.
Barbastelle	Scoped Out	Considered absent from the North West of England
Serotine	Scoped Out	Considered absent from the North West of England
Alcathoe	Scoped Out	Considered absent from the North West of England.
Bechstein's bat	Scoped Out	Considered absent from the North West of England
Grey long-eared bat	Scoped Out	Considered absent from the North West of England
Leisler's bat	Scoped Out	Unlikely to be present in local area. Prefers

Bat common name	Scoping decision	Justification
		to roost in tall trees ² .
Noctule	Scoped Out	Roosts almost exclusively in tree holes, otherwise are generally found in high roosts relative to ground level and near water
Greater horseshoe bat	Scoped Out	Considered absent from the North West of England
Lesser horseshoe bat	Scoped Out	Considered absent from the North West of England

2.2.2 Table 1-3 lists all bat species scoped in for further consideration. A May – September scoping decision, targeting day and transitional roosts denote the maximum known emergence time. A hibernation scoping decision and justification is provided. The bat species that are scoped out for hibernation are deemed as not hibernating within the tunnels; any records would be assumed as foraging/ commuting. The bat species that are scoped out for swarming are deemed as not swarming at/ within the tunnels; any records would be assumed as foraging/ commuting.

Table 1-3 – Bats Scoped In

Bat common name	Emergence time ³			Hibernation scoping decision	Hibernation justification	Swarming scoping decision	Swarming justification
	May/ June	July	August				
Brandt's bat	30.9	24.8	29	Scoped In	Have been found hibernating in caves and other underground sites ⁴ .	Scoped In	Swarming behaviour is common among <i>Myotis</i> species.
Whiskered bat	33.3						
Daubenton's bat	58.1			Scoped In	Have been found hibernating in tunnels.		
Natterer's bat	57.7			Scoped In	Have been found		

² Automated/static detector records would likely encompass foraging or commuting calls. Any calls linked to roosting would be considered to have been recorded from adjacent woodland.

³ Emergence times taken from Table 3.3 in the BCT Guidelines. The times represent the latest (relative to sunset) mean or median emergence times (minutes) for each particular species. The time calculated is the standard deviation (range in which 95% of observations accrued in studies).

Emergence times are generalised where there is insufficient data to inform monthly differences. In this scenario, the maximum known emergence time is considered.

No data is provided for September. August emergence times will be adopted for this month.

⁴ For this exercise, tunnels are considered as caves/underground sites. Namely, due to the tunnel length which would provide shelter from the elements and a relatively constant temperature relative to the outdoor environment.

Bat common name	Emergence time ³			Hibernation scoping decision	Hibernation justification	Swarming scoping decision	Swarming justification
	May/ June	July	August				
					hibernating in railway tunnels.		
Brown long-eared bat	54	66	94	Scoped In	Have been found hibernating in underground sites.	Scoped In	Swarming behaviour is common among <i>Plecotus</i> species.
Nathusius' pipistrelle	30			Scoped In	Records are unlikely as hibernation usually occurs in mainland Europe. Remained scoped in as bats have been found in caves and underground sites.	Scoped Out	There is little evidence that <i>Pipistrelle</i> bats undergo regular swarming.
Common pipistrelle	42.7			Scoped In	Not generally found hibernating in tunnels, caves or underground sites, but may be hibernating at tunnel entrances.		
Soprano pipistrelle	47	33	34				

2.3 Day Roost & Transitional Roost Monitoring

- 2.3.1 Automated/ static detectors will be deployed in accordance with the BCT Guidelines for 'high' suitability structures i.e. data to be collected for a minimum of five consecutive nights per month, ideally through months April to October. Due to access restrictions, monitoring commenced in August and no data has been collected for months April – July. Temperature

permitting, monitoring will be extended into September to target transitional roosts.

- 2.3.2 The tunnels will be assumed as suitable for night and feeding roosts. Automated/ static monitoring would not be able to confirm the presence or absence of these roost types.

2.4 Autumn Swarming Monitoring

- 2.4.1 Automated/ static detectors will be deployed during the main swarming period (August – October inclusive) to identify if the tunnel is used by bats for swarming.

2.5 Hibernation Monitoring

- 2.5.1 Automated/ static detectors will be deployed during the main hibernation period (December – February inclusive) to identify if the tunnel is used by hibernating bats. Tunnel conditions will be monitored during each possession (i.e. once monthly over the hibernation period) whereby handheld temperature and humidity readings will be taken at fixed points along Stalybridge and Scout Tunnels. Data from nearby weather stations may be used to supplement the handheld readings if deemed necessary by the surveyor. The results will provide context (in terms of environment conditions) for the survey results collected.

2.6 Maternity Suitability

- 2.6.1 Both tunnels are considered to offer negligible suitability for maternity roosts. The tunnels are subject to regular increases in noise, artificial lighting, vibration and air-flow from passing trains including during the key maternity period. Whilst bats can become acclimatised to regular sources of potential disturbance, bats are usually very sensitive during the maternity season and may abandon their young if they are disturbed⁵. Additionally, internal tunnel temperatures are expected to be low year-round and maternity roosts require relatively high mean temperatures⁶.
- 2.6.2 Though PRFs with suitable depth or extension may be present, conditions are deemed sub-optimal. Maternity roosts are scoped out for further assessment.

⁵ Bat Conservation Trust (2024) *Bat roosts*. Available at: <https://www.bats.org.uk/about-bats/where-do-bats-live/bat-roosts/maternity-roosts> Accessed 13/08/2024.

⁶ Shepherd, B., Stroud, J. (2009) *Mitigation for roosts in buildings workshop national bat conference*. Available at: <https://www.bsg-ecology.com/wp-content/uploads/2017/05/Mitigation-for-roosts-in-buildings-ps-final.pdf> Accessed 13/08/2024.

2.7 Proposed Interpretation of Results

Roost/ Swarming Identification

Day Roost and Transitional Roost Monitoring

- 2.7.1 All bat calls recorded prior to the maximum emergence time for that species will be considered as a possible roost within the tunnel. All calls that are within the defined time bracket will be subject to analysis. Records will be classified by a competent ecologist i.e. an ecologist deemed Capable in bat sound analysis and a check conducted by an Accomplished ecologist per the Chartered Institute of Ecology and Environmental Management (CIEEM) Competency Framework⁷.
- 2.7.2 It is assumed that bats emerging from the tunnel will be echolocating as if in a cluttered environment due to the surrounding tunnel walls and track. This would be represented by a change in call features such as frequency, intensity, duration and intervals⁸. Bats commuting past the outside of the tunnel would likely echolocate as if in an open environment due to less obstacles being present. In some cases, it may be possible to differentiate between bats emerging from the tunnel which may be indicating a roost, and commuting which would indicate flight past the tunnel entrance. The classification of a day roost and transitional roost will be assessed using ecologist professional judgement based on time of year and weather conditions.

Autumn Swarming Monitoring

- 2.7.3 High levels of bat activity that peak later in the night during stable high-pressure, high-temperature weather conditions can indicate swarming⁹, shown especially through social calling. If bat activity fits such parameters, calls will be analysed to help determine if the tunnel are used for swarming. The classification of the tunnel(s) as a swarming site will be assessed using ecologist professional judgement. Many swarming sites are also hibernation sites and it is likely that at least some of the bats swarming go on to hibernate in the same site¹⁰. Hibernation data can be used to help inform the presence of autumn swarming.

Hibernation Monitoring

- 2.7.4 A review of temperature and humidity data would inform which time periods were deemed appropriate for hibernation. It is expected that bats would

⁷ CIEEM (2021) *Competency Framework*. Available at: <https://cieem.net/wp-content/uploads/2023/09/Competency-Framework-2022-Web.pdf> Accessed 13/08/2024.

⁸ Jones, G., Holderied, M. (2007) *Bat echolocation calls: adaptation and convergent evolution*. School of Biological Sciences, University of Bristol, 274: 905–912

⁹ Grubb, E. (2012) *The effect of landscape scale weather conditions on swarming activity of Natterer's bat*. MSc thesis, University of Leeds.

¹⁰ Glover, A., Altringham, J. (2008) *Cave selection and use by swarming bat species*. Biological Conservation. 141: 1493-1504.

generally hibernate in prolonged conditions of 60-100% relative humidity with temperatures of $<5^{\circ}\text{C}$ ¹¹, although it is acknowledged that this can vary by species. Outside of these conditions, bats may enter torpor or be fully awake.

- 2.7.5 When bat calls overlap with suitable hibernating conditions, inferences can be made into whether the tunnels are used as a hibernation site. This will take into account recent research which suggests that bats rouse from hibernation fairly regularly to switch roosts during the hibernation period. The classification of a hibernation roost will be assessed using ecologist professional judgement.

2.8 Limitations

Tree Roosts

- 2.8.1 Both tunnels are surrounded by semi-mature/ mature deciduous woodland, a valuable commuting, foraging and roosting resource for a number of UK bat species. There is a possibility that the automated/ static detector monitoring will record emergences from tree roosts and commuting/ foraging behaviour surrounding the woodland. The records would be falsely applied as a tunnel roost.
- 2.8.2 This limitation will be reduced by placing the automated/ static detectors inside the tunnel, on the tunnel portals and/ or at maximum distance away from trees with potential roost features.

Automated/ Static Monitoring

- 2.8.3 The number of bats cannot be counted using automated/ static detectors. Records would only indicate the species richness, rather than numbers present. The number of roosts could not accurately be identified as bats considered roosting may have exited from one, or multiple features.
- 2.8.4 Species such as brown long-eared may be under recorded due to relatively quiet echolocation calls that have not been recorded by the monitors.
- 2.8.5 Upon analysis of monitoring data, assumptions into the number of individual roosts will be made, relative to species recorded and emergence times.

Roost Re-entry

- 2.8.6 There is insufficient data on the roost re-entry time for each species as this is based upon many unknown variables including the local weather conditions, availability of prey and presence of other bats and species. Data from possible roost re-entry will be considered alongside the species recorded, environmental conditions and season, but will not be used in

¹¹ Perry, R. (2012) *A review of factors affecting cave climates for hibernating bats in temperate North America*. Environmental Reviews. 21.

isolation to classify the presence of a roost. The intended use of this data is to help inform the dusk emergence roosting activity which is considered more robust for this proposed approach.

Hibernation Monitoring

- 2.8.7 Data loggers, designed to record temperature and humidity, cannot be deployed within the tunnels as a >2 metre separation to passing trains cannot be maintained. The data loggers would therefore have to be placed outside of the tunnel portals within the open air and therefore would not provide an accurate representation of the tunnel conditions. A review of weather station data and handheld monitoring at fixed locations through both tunnels will be conducted to address this constraint.

2.9 Proposed Mitigation Licensing

The Three Tests

- 2.9.1 Any future licence submission for the destruction of bat roosts within Stalybridge and Scout Tunnels under PD would reference the ‘three tests’ which are required for a licence to be granted:
1. The proposed works can be justified in relation to preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature;
 2. There is no satisfactory alternative as the associated rail network requires an essential upgrade; and
 3. The surveys will determine if the proposed works will be detrimental to the maintenance of the species concerned at a favourable conservation status in their natural range.
- 2.9.2 The proposed works will follow the mitigation hierarchy of avoiding adverse effects, mitigating for impacts if this is not possible and as a last resort, compensating for impacts.

2.10 Policy 4

- 2.10.1 It is understood that Natural England will be expected to ensure that licensing decisions are properly supported by survey information, taking into account industry standards and guidelines. It is suggested that a Policy 4¹² licencing approach is adopted as the alternative proposed methodologies will assume roosting details including:

- The presence of a roost;
- The exact whereabouts of the roost feature;
- The number of bats within the roost; and

- The classification of roost type.

2.10.2 Mitigation and compensation will be provided to cover the maximum impact of the activity, based on an assessment of plausible scenarios (Natural England, 2022)¹². The design will be produced with input from an AtkinsRéalis Bat Technical Lead and consultation from Natural England if deemed necessary.

2.11 Provision of Advice

2.11.1 This Technical Note is intended to inform a document review by Natural England. AtkinsRéalis intend to receive an agreement of the proposed methodology and mitigation strategy, or information on the amendments required to receive an agreement of the proposed methodology and mitigation strategy.

¹² Natural England (2022) *European protected species policies for mitigation licences*. Available at: <https://www.gov.uk/guidance/european-protected-species-policies-for-mitigation-licences#policy-4-alternative-sources-of-evidence-to-reduce-standard-survey-requirements> Accessed 14/08/2024.