

1 Project Details			
Project Name:	Haweswater Aqueduct Resilience Programme	Project Number:	80061155
Written:	Mark Breaks, Senior Field Ecologist	Approved:	Alice Helyar, Principal Ecologist
Report reference:	TR3 Ecology Survey Data Report_2022_Bat tree assessment Phase 2	Date:	13/10/2022
2 Project Drawings			
Bat Tree Assessment Phase 2		BOW167_HARP_TR3 Bat tree assessment Phase 2_Oct 2022 (Plans 3 of 3)	
4 Ecology Surveys			
Surveyors:	Mark Breaks (NE licence: 2016-26712-CLS-CLS) Paula Hollings (NE licence: 2015- 16053-CLS-CLS) Ryan Knight (NE licence holder) Non Scott (NE licence: 2019-39208-CLS-CLS) Curtis Blank Luke Hall Sam Robinson Jordan Simpson Jack Taylor		
Additional dusk emergence surveyors:	Dave Anderson (NE licence: 2015-15784-CLS-CLS) Dave Fisher (NE licence: 2015-12106-CLS-CLS) Jack Sykes (NE licence: 2015-16340-CLS-CLS) Lucy Brookfield Felicity Cunliffe Davies Joanna Day Anielia James Nina Morris Vinny Smith		
Survey date(s):	July to September 2022 (see Table 4.1 and Table 4.3)		
Survey Method:	This report provides the details of all trees identified in TR3 and on Highways (TR3 and TR4) survey area, which have been subject to full assessment in accordance with Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition) (Collins, 2016). A preliminary ground level assessment to identify trees supporting Potential Roosting Features (PRF's) was undertaken during the extended Phase 1 habitat survey during 2019, 2020 & 2021 (Bowland, 2020, 2020a, 2021 & 2021a). This Phase 2 assessment was carried out to assess in further detail the trees identified during the preliminary assessment as having Moderate or High Potential for roosting bats. The surveys aimed to search for bats and their field signs, such as bat droppings, urine stains, bat		

	<p>feeding remains (moth wings, insect cases), bat staining, a distinctive smell of bats, scratch marks and smoothing of surfaces which would indicate a roosting site. An updated assessment of the potential roosting features was also carried out, and where appropriate the bat roost potential status of the trees was updated. Surveys were aided by close focus binoculars, high-powered torches, endoscopes, ladders and rope climbing equipment. All trees retained previously assigned unique reference number and their locations marked on a plan.</p> <p>Trees classified as Moderate or High suitability as bat roosting habitat are shown in Table 4.1 and Table 4.2. Trees classified as Moderate suitability were subjected to two inspections and trees classified as High suitability were subject to three inspections. Inspections methods comprised ground inspection as well as ladder and rope climb inspection. Where it was not possible to closely inspect the features, dusk emergence surveys were undertaken. Upon completion of the inspections, trees that were re-evaluated as Negligible, Low or were determined to be outside the survey boundary were omitted from further surveys; these details are shown in Table 4.3 and Table 4.4. Assessments are based of The Good Practice Guidelines and are summarised below:</p> <p>Low – A tree of sufficient size and age to contain PRFs but none seen from the ground, or features seen with only very limited roosting potential.</p> <p>Moderate – A tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, condition and surrounding habitats but unlikely to support a roost of high conservation status.</p> <p>High – A tree with one or more PRFs, that are obviously suitable for larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, condition and surrounding habitat.</p>
Weather Conditions:	The surveys were undertaken in appropriate weather conditions (avoiding heavy rain or strong wind).
Limitations to the survey:	Trees adjacent to the highways survey areas were assessed from both sides where access had been arranged. However, there were a number of situations where only one side was accessible due to lack of access at TR3.HBG5, TR3.HBG18, TR3.HBG19, TR3.HBG20, TR4.HBG44 and TR4.HBG16.

4.1 Survey Results – Table of Phase 2 High and Moderate Trees (Including Survey Dates)

No confirmed bat roosts were identified during any of the tree inspections.

Title	No. Trees	Section	Bat Roost Potential (Phase 1)	Bat roost Potential follow Phase 2	Phase 2 Survey Type	Visit 1	Visit 2	Visit 3
TR3.BT3	1	route	High	High	ladder	29-Jul	Emergence 23-Aug	Emergence 05-Sept
TR3.BT17	1	highways	Moderate	Moderate	climb	29-Jul	27-Sep	-
TR3.BT110	1	route	Moderate	High	ladder	22-Jul	26-Aug	27-Sep
TR3.BT124	1	route	Moderate	Moderate	climb	21-Jul	Emergence 15- Aug	-
TR3.BT125	1	route	Moderate	High	climb	21-Jul	Emergence 15- Aug	Emergence 29-Aug
TR3.BT126	1	route	Moderate	Moderate	ground	21-Jul	Emergence 15- Aug	-
TR3.BT127	1	route	Moderate	Moderate	ground	21-Jul	Emergence 15- Aug	-
TR3.BT142	1	route	Moderate	Moderate	climb	26-Jul	27-Sep	-

Title	No. Trees	Section	Bat Roost Potential (Phase 1)	Bat roost Potential follow Phase 2	Phase 2 Survey Type	Visit 1	Visit 2	Visit 3
TR3.BG32	4	route	Moderate	Moderate	emergence	04-Aug	Emergence 07-Sept	-
TR3.BG33.T2	1	route	Moderate	Moderate	ladder	22-Jul	26-Aug	-
TR3.BG34.T1	1	route	Moderate	Moderate	emergence	Emergence 11-Aug	Emergence 31-Aug	-
TR3.HBG15.T1	1	highways	Moderate	Moderate	ground	14-Jul	29-Jul & 27-Sep	-
TR3.HBG15.T2	1	highways	Moderate	Moderate	ground	14-Jul	29-Jul & 27-Sep	-
TR3.HBG15.T3	1	highways	Moderate	Moderate	ladder	29-Jul	27-Sep	-

4.2 Survey Results - High and Moderate Tree Information

Individual Trees

TR3.BT3



NGR: SD 60693 67268

Species: Oak species

Categorisation: High potential

2022 Inspection

Butt-rott - small entrance 15x15 cm, at ground level behind gate facing NW, internal 100 cm height, 10cm width, 0 cm depth. Rough, chambered, debris.



Knot-hole on limb at 4 m N, 7x7 cm entrance, internal 0 cm height, 7 cm width, 30 cm depth, rough and dry with old bird nest present.



Cavity - 30 x 5 cm entrance, internal 2 cm height, 10 cm width, 1.5 m depth, damp, rough, horizontal tube and no smell.




Numerous branch cavities and crevices with split heartwood and lifted bark creating numerous opportunities for crevice dwelling species at 3-5 m.



2022 Results





- 29th Jul – close inspection (ladder) – no evidence of bats noted;
- 23rd Aug – dusk emergence – no bat emergence; and
- 5th Sep – dusk emergence – no bat emergence.

TR3.BT17	
	<p>NGR: SD 62113 66417</p> <p>Species: Oak species</p> <p>Categorisation: Moderate potential</p> <p><u>2022 Inspection</u></p> <p>Mature oak, 70 cm Diameter at Breast Height (DBH), 20+m, multiple dead limbs in cavity with exposed heartwood though only limited lifted bark on low limb at 4 m, 30 cm Diameter at PRF Height (DPH) facing SE, knot-hole at 7 m SE, 10x10 cm entrance hidden within remaining heartwood, internal 0 cm height, 20 cm width and 20 cm depth. Rough, dry, no smell, no apex and slugs present.</p> <p>Lightning strike, 50 cm DPH at 12 m N. Entrance 60x10 cm, internal 60 cm height tube that is open to the top, 12 cm width and 0 cm depth. Damp, rough, no smell, tube, occasional sheltered location in tube/ramshorn.</p> <p><u>2022 Results</u></p> <ul style="list-style-type: none"> • 29th Jul – close inspection (climb) – no evidence of bats noted; and • 27th Sep – close inspection (climb) – no evidence of bats noted.
TR3.BT110	
	<p>NGR: SD 69076 49954</p> <p>Species: Alder</p> <p>Categorisation: High potential</p> <p><u>2022 Inspection</u></p> <p>Tear-out at 5m west with entrance 40x10 cm, internal 130 cm height, 10 cm width and 500 cm depth. Feature extends to ground with additional three access points. Smooth, no smell, dry, dome, no evidence of bats. Upgrade to High potential.</p> <p><u>2022 Results</u></p> <ul style="list-style-type: none"> • 22nd Jul – close inspection (ladder) – no evidence of bats noted; • 26th Aug – close inspection (ladder) – no evidence of bats noted; and • 27th Sep – close inspection (ladder) – no evidence of bats noted.



TR3.BT124	
	<p>NGR: SD 69293 49934</p> <p>Species: Ash</p> <p>Categorisation: Moderate potential</p> <p><u>2022 Inspection</u></p> <p>Knot-hole at 8m N with entrance 20x35 cm and internally 150+ cm height, 20 cm width and 0 cm depth. Hazard-beam on limb at 6 m N with entrance 3x100 cm and internally 100 cm height, 10 cm width and 12 cm depth. Additional knot-hole at 5 m N and 4 m NW offer no potential.</p> <p><u>2022 Results</u></p> <ul style="list-style-type: none"> • 21st Jul – close inspection (climb) – no evidence of bats noted; and • 15th Aug – dusk emergence – no bat emergence.
TR3.BT125	
	<p>NGR: SD 69303 49931</p> <p>Species: Ash</p> <p>Categorisation: High potential</p> <p><u>2022 Inspection</u></p> <p>Tear-out at 7 m E with entrance 20x12 cm and internally 0 cm height, 12 cm width and 100+ cm depth. Knot-hole on limb at 5 m W with entrance 5x12 cm and internally 100+ cm height, 20 cm width and 0 cm depth. Wound on limb at 6 m E with entrance 20x8 cm and internally 25 cm height, 8 cm width and 35 cm depth. Additional butt-rot present. Upgrade to High potential.</p> <p><u>2022 Results</u></p> <ul style="list-style-type: none"> • 21st Jul – close inspection (climb) – no evidence of bats noted; • 15th Aug – dusk emergence – no bat emergence; and • 29th Aug – dusk emergence – no bat emergence.




TR3.BT126	
	<p>NGR: SD 69315 49929</p> <p>Species: Ash</p> <p>Categorisation: Moderate potential</p> <p><u>2022 Inspection</u></p> <p>Butt-rot at 0-1 m.</p> <p><u>2022 Results</u></p> <ul style="list-style-type: none"> • 21st Jul – close inspection (ground) – no evidence of bats noted; and • 15th Aug – dusk emergence – no bat emergence.
TR3.BT127	
	<p>NGR: SD 69324 49928</p> <p>Species: Ash</p> <p>Categorisation: Moderate potential</p> <p><u>2022 Inspection</u></p> <p>Butt-rot at 1 m NW with entrance 20x6 cm and internally 1 cm height, 150 cm width and 20 cm depth.</p> <p><u>2022 Results</u></p> <ul style="list-style-type: none"> • 21st Jul – close inspection (ground) – no evidence of bats noted; and • 15th Aug – dusk emergence – no bat emergence.
TR3.BT142	
	<p>NGR: SD 69972 50190</p> <p>Species: Ash</p> <p>Categorisation: Moderate potential</p> <p><u>2022 Inspection</u></p> <p>Knot-hole at 8 m NW with entrance 25x9 cm and internally 55 cm height, 23 cm width and 2 cm depth.</p> <p><u>2022 Results</u></p> <ul style="list-style-type: none"> • 26th Jul – close inspection (climb) – no evidence of bats noted; and • 27th Sep – close inspection (climb) – no evidence of bats noted.




TR3.BG32	
<p>Trees 1-4</p> 	<p>Species: Ash's</p> <p>Categorisation: Moderate potential</p> <p>Number of trees: four</p> <p><u>2022 Inspection</u></p> <p>Moderate potential trees on edge of redline boundary.</p> <p>Tree 1 – Ash (NGR: SD 69671 50099), 90 cm DBH, knot-hole at 5 m SW and 10 m E.</p> <p>Tree 2 – Ash (NGR: SD 69661 50086), 120 cm DBH, knot-holes at 8 m N, 10 m S, 16 m E.</p> <p>Tree 3 – Ash (NGR: SD 69658 50078), 160 cm DBH, knot-hole at 18 m W.</p> <p>Tree 4 – Ash (NGR: SD 69640 50065), 70 cm DBH, knot-hole at 11 m SW.</p> <p><u>2022 Results</u></p> <ul style="list-style-type: none"> • 4th Aug – dusk emergence – no bat emergence; and • 7th Sep – dusk emergence – no bat emergence.
TR3.BG33.T2	
	<p>Species: Beech</p> <p>Categorisation: Moderate potential</p> <p><u>2022 Inspection</u></p> <p>Tree 2 – Beech (NGR: SD 69750 50131), 110 cm DBH, fluting leading to truck cavity at 1 m, 2 m and 3 m E. Bottom two flutes connect with internal 15 cm height and 10 cm width and 40 cm depth. Entrance 30x 5 cm. Third flutes offers shallow crevice. Dead ivy cladding is a low potential feature.</p> <p><u>2022 Results</u></p> <ul style="list-style-type: none"> • 22nd Jul – close inspection (ladder) – no evidence of bats noted; and • 26th Aug – close inspection (ladder) – no evidence of bats noted.




TR3.BG34.T1	
	<p>Species: Beech</p> <p>Categorisation: Moderate potential</p> <p><u>2022 Inspection</u></p> <p>Tree 1 – Beech (NGR: SD 69809 50259), 40 cm DBH, wound on main stem from 2-9 m East.</p> <p><u>2022 Results</u></p> <ul style="list-style-type: none"> • 11th Aug – dusk emergence – no bat emergence; and • 31st Aug – dusk emergence – no bat emergence.
TR3.HBG15.T1-T3	
<p style="text-align: center;">Trees 1-3</p> <div style="display: flex; justify-content: space-around;">   </div> <div style="text-align: center; margin-top: 20px;">  </div>	<p>Species: Ash, crab apple & beech</p> <p>Categorisation: Moderate potential</p> <p>Number of trees: three</p> <p><u>2022 Inspection</u></p> <p>Tree 1 – Ash (NGR: SD 62059 66407), DBH 40cm, on edge of field. Butt-rott, entrance 2.5 m by 10 cm, internal 40 cm height, 20 cm width, 0 cm depth with narrow tube going up. Dry, rough, dome, woodlice. Moderate potential</p> <p>Tree 2 – Crab apple (NGR: SD 62130 66396), DBH 40 cm, knot-hole at 2.5 m facing north. Entrance 10 cm high by 3 cm wide, internal 10 cm height, 10 cm width, 5 cm depth. Rough, dry, dome, slugs and woodlice. Moderate Potential</p> <p>Tree 3 – Beech (NGR: SD 62141 66339), 90 cm DBH with compression fork at 3 m E, entrance 30x2 cm, with 25 cm depth and shallow fluting on the SE elevation offer PRF. Ladder/climb. Moderate Potential</p> <p><u>2022 Results</u></p> <ul style="list-style-type: none"> • 14th Jul – close inspection of T1 & T2 (ladder) – no evidence of bats noted; • 29th Jul – close inspection of all (ladder) – no evidence of bats noted; and • 27th Sep – close inspection of all (ladder) – no evidence of bats noted.


4.3 Survey Results - Table of Phase 2 Trees Omitted from Survey (Including Survey Dates)						
Title	No. Trees	Section	Bat Roost Potential (Phase 1)	Bat roost Potential follow Phase 2	Phase 2 Survey Type	Visit
TR3.BT113	1	route	Moderate	Negligible	ladder	22-Jul
TR3.BT117	1	route	Moderate	Low	climb	21-Jul
TR3.BT119	1	route	Moderate	Low	climb	21-Jul
TR3.BT121	1	route	Moderate	Negligible	climb	21-Jul
TR3.BT128	1	route	Moderate	Low	climb	22-Jul
TR3.BT136	1	route	Moderate	Low	climb	28-Jul
TR3.BT137	1	route	Moderate	Negligible	ground	28-Jul
TR3.BG2	-	route	Moderate	None identified within survey area	ground	14-Jul
TR3.BG28	-	route	Moderate	None identified within survey area	ground	22-Jul
TR3.BG33.T1 & T3	1	route	Moderate	Low	climb	26-Jul
TR3.BG34.T2 - T5	1	route	Moderate	Low	climb	26-Jul
TR3.HBT21	1	highways	Moderate	Negligible	ground	14-Jul
TR3.HBT22	1	highways	Moderate	Negligible	ground	14-Jul
TR3.HBT23	1	highways	Moderate	Negligible	ground	14-Jul
TR3.HBG5	-	highways	High	None identified within survey area	ground	14-Jul
TR3.HBG18	-	highways	High	None identified within survey area	ground	14-Jul
TR3.HBG19	-	highways	Moderate	None identified within survey area	ground	14-Jul
TR3.HBG20	-	highways	Moderate	None identified within survey area	ground	14-Jul
TR4.HBT10	1	highways	Moderate	Negligible	ladder	22-Jul
TR4.HBG11	1	highways	Moderate	Negligible	ground	21-Jul
TR4.HBG16	2	highways	Moderate	None identified within survey area	ground	13-Jul
TR4.HBG44	1	highways	Moderate	None identified within survey area	ground	13-Jul

4.4 Survey Results – Omitted Tree Information	
TR3.BT113	
	<p>NGR: SD 68951 50103</p> <p>Species: Alder</p> <p><u>2022 Inspection</u></p> <p>No potential bat roost features located during ground inspection. Categorisation downgraded to Negligible.</p>
TR3.BT117	
	<p>NGR: SD 69200 49939</p> <p>Species: Ash</p> <p>Categorisation: Moderate downgraded to Low potential</p> <p><u>2022 Inspection</u></p> <p>Tear-out at 3.5m N found to offer low potential for roosting bats during climb inspection. Categorisation downgraded to Low.</p>




TR3.BT119	
	<p>NGR: SD 69213 49940</p> <p>Species: Ash</p> <p>Categorisation: Moderate downgraded to Low potential</p> <p><u>2022 Inspection</u></p> <p>Knot-holes at 5m SE, 7m W and 8m SE found to offer low or no potential for roosting bats during climb inspection. Categorisation downgraded to Low.</p>
TR3.BT121	
	<p>NGR: SD 69225 49942</p> <p>Species: Ash</p> <p><u>2022 Inspection</u></p> <p>No potential bat roost features located during climb inspection. Tear-out feature found no suitable bat roosting habitat. Categorisation downgraded to Negligible.</p>
TR3.BT128	
	<p>NGR: SD 69334 49927</p> <p>Species: Ash</p> <p><u>2022 Inspection</u></p> <p>Following climbing inspection tree downgraded to Low potential.</p>
TR3.BT136	


	<p>NGR: SD 68741 51041</p> <p>Species: Sycamore</p> <p><u>2022 Inspection</u></p> <p>Knot-hole at 10m found to offer low potential for roosting bats during climb inspection. Categorisation downgraded to Low.</p>
<p>TR3.BT137</p>	
	<p>NGR: SD 68699 51066</p> <p>Species: Sycamore</p> <p><u>2022 Inspection</u></p> <p>No potential bat roost features located during ground inspection. Pruning wounds at 4-6m are all well-sealed and offer no roosting potential. Categorisation downgraded to Negligible.</p>
<p>TR3.BG2</p>	
	<p>NGR: SD 62160 66302</p> <p>Species: Oak, sycamore, beech, holly, silver birch</p> <p>Number of trees: 10</p> <p><u>2022 Inspection</u></p> <p>No trees with moderate or high potential bat roost features located during ground inspection within survey boundary except for those included in TR3.HBG15.T1-T3.</p>

TR3.BG28	
	<p>NGR: SD 69009 49910</p> <p>Species: Oak, sycamore, alder, ash, cypress (<i>Cupressus</i> sp.), conifer species</p> <p>Number of trees: 10</p> <p><u>2022 Inspection</u></p> <p>No trees with moderate or high potential bat roost features located during ground inspection within survey boundary.</p>
TR3.BG33.T1 & T3	
	<p><u>2022 Inspection</u></p> <p>Inspection of moderate potential tree group on edge of redline boundary resulted in the downgrade of two trees.</p> <p>Tree 1 – Beech (NGR: SD 69763 50163), 120cm DBH, knot-hole at 4m SW, transverse snap at 8m N, climbing inspection found knot holes at 8m (N) and 12m (SE) to offer Low potential.</p> <p>Tree 3 – Ash (NGR: SD 69746 50122), 60cm DBH, tear-out at 5m facing NE. Inspected, shallow crevice and Ramshorn from 1-4m. Low potential.</p>
TR3.BG34.T2-T5	
	<p><u>2022 Inspection</u></p> <p>Inspection of moderate potential tree group on edge of redline boundary resulted in the downgrade of four trees.</p> <p>Tree 2 – Ash (NGR: SD 69796 50246), 50DBH, knot-hole at 6m SW, ladder inspection found no PRF features. Negligible Potential.</p> <p>Tree 3 – Beech (NGR: SD 69793 50238), 100cm DBH, flute on upward facing branch at 12m on NE side of tree. Climbing inspection found tree to offer Low potential.</p> <p>Tree 4 – SD 69775 50198 beech 130m, knot-hole on limb NE facing at 7m. Climbing inspection found knot hole to offer Low potential.</p> <p>Tree 5 – Beech (NGR: SD 69772 50188), 100cm DBH, knot-hole on NE side of main stem at 5m. Ladder inspection found no PRF features. Negligible Potential.</p>

TR3.HBT21	
	<p>NGR: SD 63946 68115</p> <p>Species: oak species</p> <p><u>2022 Inspection</u></p> <p>No potential bat roost features located during ground inspection. Categorisation downgraded to Negligible.</p>
TR3.HBT22	
	<p>NGR: SD 63902 68068</p> <p>Species: oak</p> <p><u>2022 Inspection</u></p> <p>No potential bat roost features located during ground inspection. Categorisation downgraded to Negligible.</p>
TR3.HBT23	
	<p>NGR: SD 63902 68062</p> <p>Species: oak</p> <p><u>2022 Inspection</u></p> <p>No potential bat roost features located during ground inspection. Categorisation downgraded to Negligible.</p>

<p>TR3.HBG5</p> 	<p>NGR: SD 64008 69523</p> <p>Species: Sycamore, ash, alder, oak species</p> <p>Number of trees: 15</p> <p><u>2022 Inspection</u></p> <p>No trees with moderate or high potential bat roost features located during ground inspection within survey boundary.</p>
<p>TR3.HBG18</p> 	<p>NGR: SD 64047 68310</p> <p>Species: oak, sycamore, ash</p> <p>Number of trees: ~100</p> <p><u>2022 Inspection</u></p> <p>No trees with moderate or high potential bat roost features located during ground inspection within survey boundary.</p>
<p>TR3.HBG19</p> 	<p>NGR: SD 64050 68207</p> <p>Species: oak, sycamore, alder</p> <p>Number of trees: 10</p> <p><u>2022 Inspection</u></p> <p>No trees with moderate or high potential bat roost features located during ground inspection within survey boundary.</p>
<p>TR3.HBG20</p> 	<p>NGR: SD 63941 98119</p> <p>Species: oak, hazel</p> <p>Number of trees: ~15</p> <p><u>2022 Inspection</u></p> <p>No trees with moderate or high potential bat roost features located during ground inspection within survey boundary.</p>

TR4.HBT10	
	<p>NGR: SD 70004 50143</p> <p>Species: Ash</p> <p><u>2022 Inspection</u></p> <p>No potential bat roost features located during ladder inspection. Categorisation downgraded to Negligible.</p>
TR4.HBG11	
	<p>NGR: SD 70490 48876</p> <p>Species: Sycamore</p> <p>Number of trees: 2</p> <p><u>2022 Inspection</u></p> <p>No potential bat roost features located during ground inspection. Categorisation downgraded to Negligible.</p>
TR4.HBG16	
	<p>NGR: SD 72414 44326</p> <p>Species: Ash, sycamore and alder</p> <p>Number of trees: 8</p> <p><u>2022 Inspection</u></p> <p>No trees with potential bat roost features located during ground inspection within survey boundary.</p>

TR4.HBG44	
	<p>NGR: SD 72331 45172</p> <p>Species: Ash and alder</p> <p>Number of trees: 3</p> <p><u>2022 Inspection</u></p> <p>No trees with potential bat roost features located during ground inspection within survey boundary.</p>

References

Bowland Ecology. (2020). *TR3 Ecology Survey Data Report - Bat tree assessment V2*

Bowland Ecology. (2020a). *TR3 Wray Car Park Ecology Survey Data Report: Bat Tree Assessment V1.*

Bowland Ecology. (2021). *TR3 Highways Ecology Survey Data Report - Bat tree assessment V1*

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