

BAT SURVEY INTERIM REPORT

AUGUST 2024

Castlefield Viaduct Urban Park

Duke Street

Manchester

M3 4RU

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QUALITY MANAGEMENT

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1 NON-TECHNICAL EXECUTIVE SUMMARY

- 1.1.1.1 The National Trust has proposed further development of land at Castlefield Viaduct in Castlefield, Manchester (hereafter referred to as ‘the site’). The proposals include the extension of the opened urban park into the presently undeveloped section, with stairway and lift connectivity to Egerton Street.
- 1.1.1.2 Urban Green has been appointed to complete Bat Surveys and a Report of the results. Following nocturnal surveys undertaken in 2021, and 2023, surveys reaffirmed the previously identified non-breeding summer roosts within the site, and the activity surveys showed the site to be used frequently for foraging common pipistrelle.
- 1.1.1.3 Updated surveys, in the form of emergence and activity surveys, were instructed as part of an ongoing monitoring scheme. Three dusk emergence surveys were undertaken on site and reaffirmed the presence of a non-breeding summer roost in Structure 1, previously identified in the 2021 and 2023 surveys.
- 1.1.1.4 Five activity surveys were completed on site between April-July, as well as the monthly deployment of two static detectors in the same timeframe. The results confirm the continued, frequent use of the site by common pipistrelle, utilising the entire length of the site for foraging.
- 1.1.1.5 The level of activity of foraging bats is in-line with the findings of previous years; though a greater number of simultaneous bats was recorded consistently throughout the 2024 surveys, as well as an increased degree of usage of the developed section of the site.

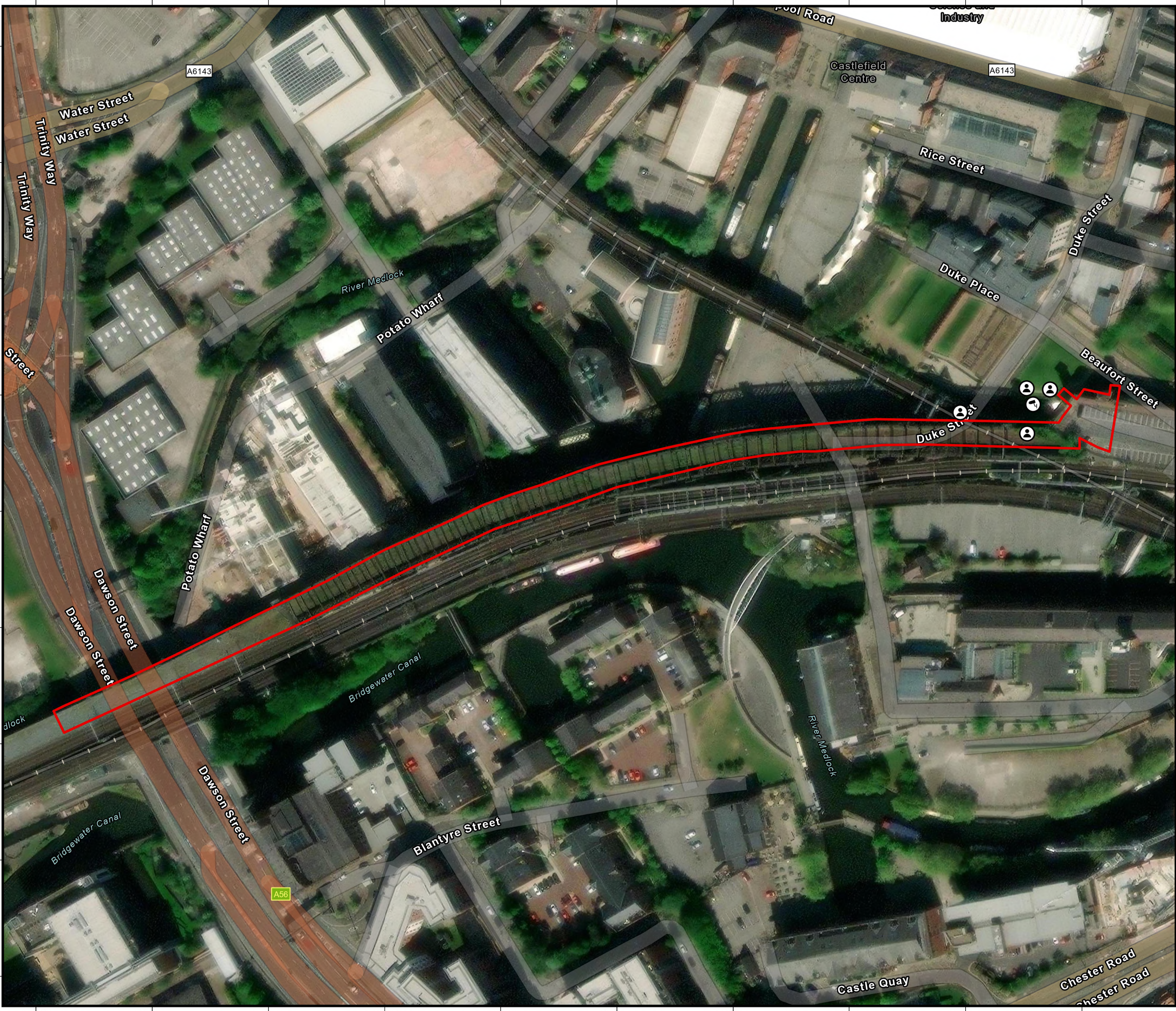
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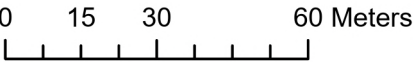
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Project: Castlefield Viaduct	Scale @ A4 1:5000			
Title: Site Context	Approved by: CL	Checked by: SP		
Drawing Ref: UG_922_SITE_CONTEXT	Author: CL	Date: 29/07/2024		



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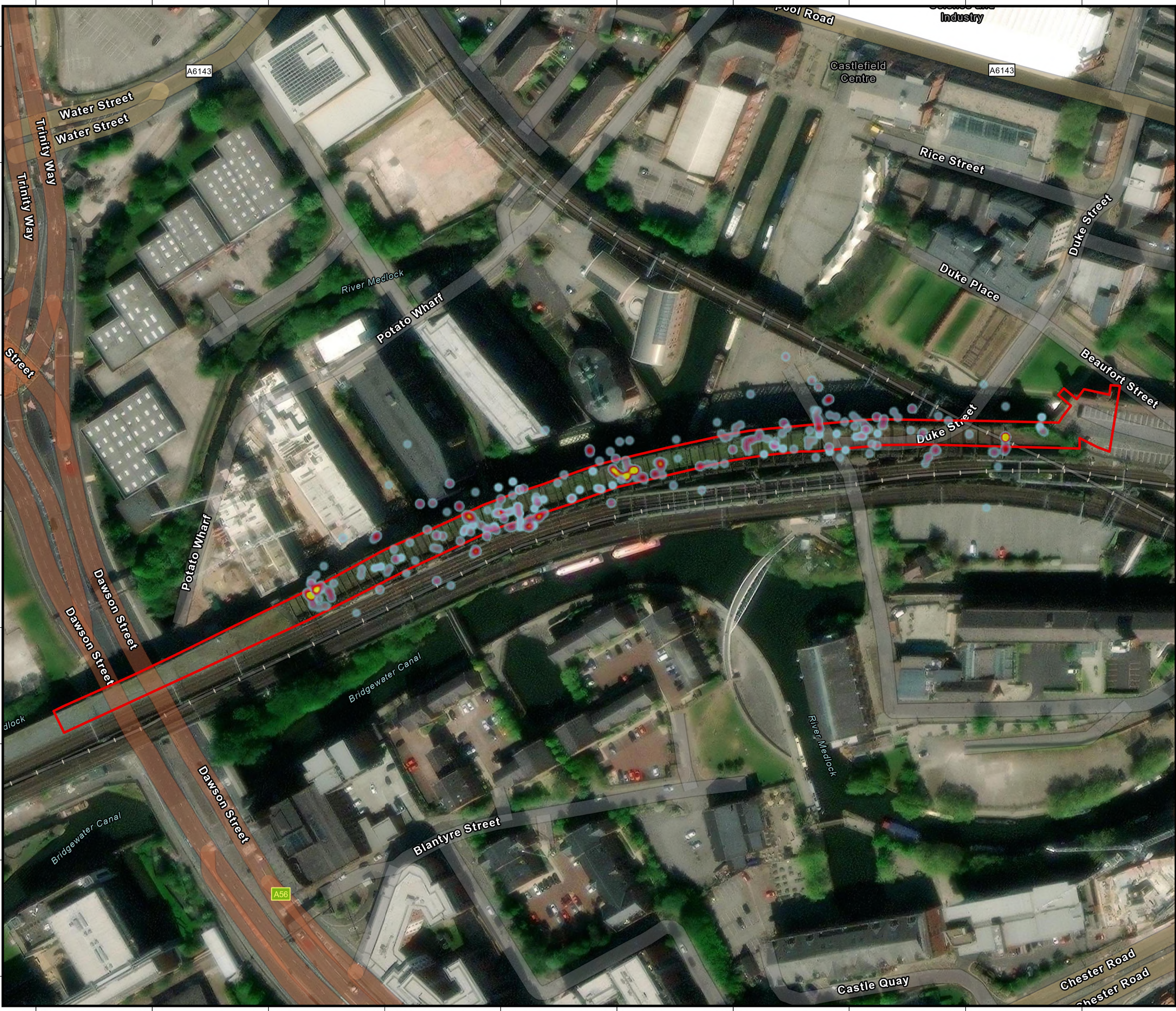
Legend

- Red Line Boundary
- SurveyorPosition
- IR Camera



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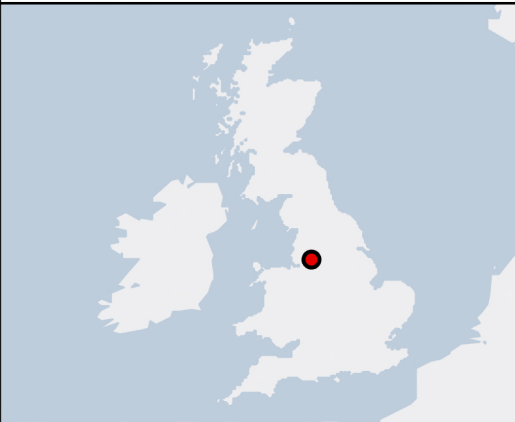
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Project: Castlefield Viaduct		
Title: Surveyor Positions		
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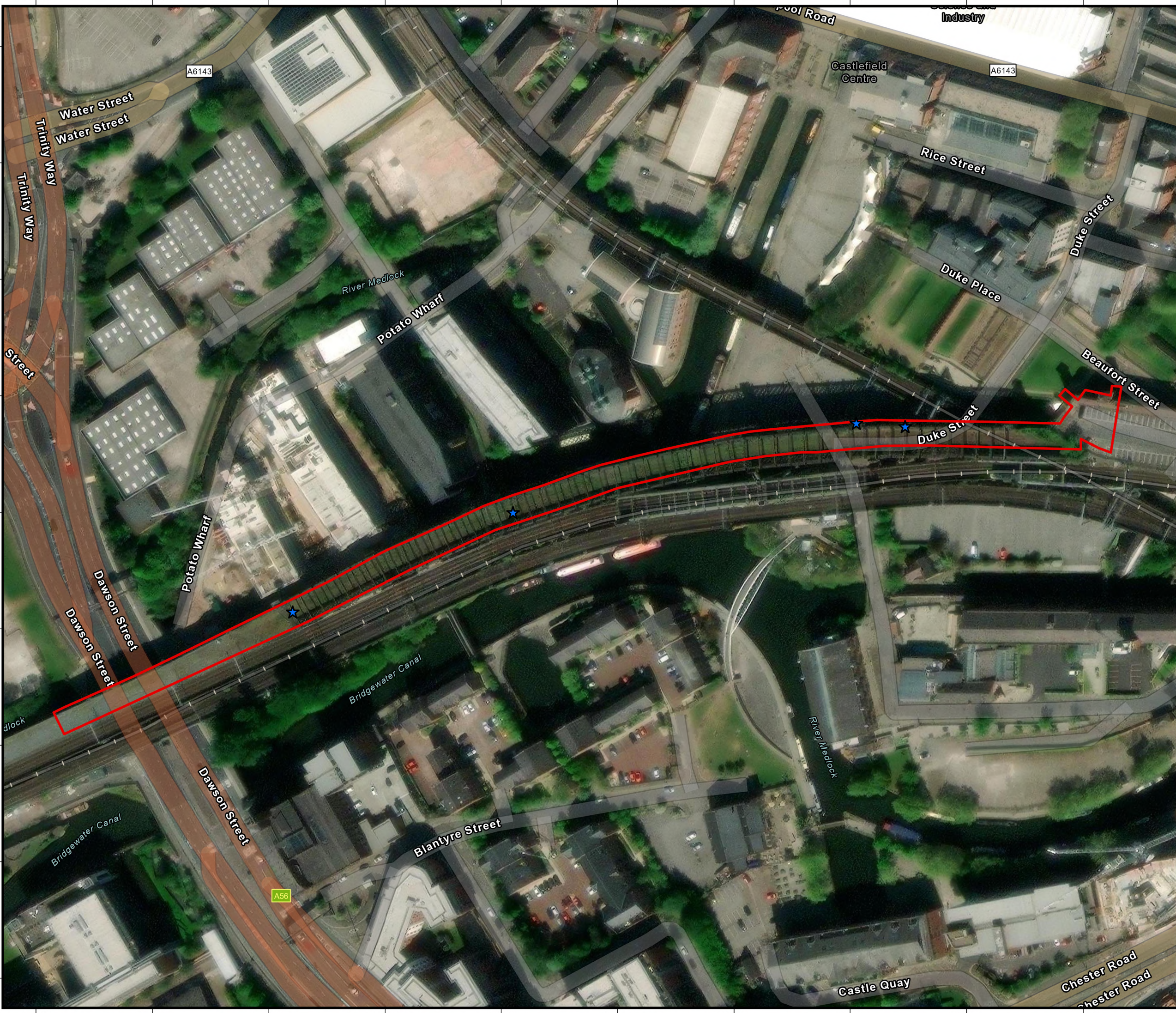
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- Red Line Boundary
- Low
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Client: National Trust		
Project: Castlefield Viaduct		
Title: Bat Activity Map		
Issue: 01	Figure: 00	
Drawn: CL	Checked: BG	Approved: BG
Project: UG922	Scale @ A3: 1:1500	Date: 06/08/2024
Dwg No: UG_922_ECO_BAM_01		Revision: 01



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Legend

- Red Line Boundary
- Static Detector

N



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Client: National Trust		
Project: Castlefield Viaduct		
Title: Static Detector Locations		
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Dwg No: UG_922_ECO_SDL_01	Revision: 01	

2 Introduction

2.1 Background to the Scheme

- 2.1.1.1 The National Trust has developed land at Castlefield Viaduct in Castlefield (hereafter referred to as ‘the site’) and are proposing further development which includes the extension of the opened urban park into the presently undeveloped section, with stairway and lift connectivity to Egerton Street.
- 2.1.1.2 Urban Green has been appointed to undertake a monitoring scheme on bat activity on following nocturnal and activity surveys undertaken at the site by Urban Green in 2021 and 2023.
- 2.1.1.3 The author of the report is Barnaby Indio Gardner, MEnvSci BSc, Assistant Ecologist at Urban Green. Barney has experience providing ecological consulting services for a range of development schemes across the UK, including residential and commercial schemes.

2.2 Site Context

- 2.2.1.1 The site is located at National Grid Reference SJ 83013 97624 and comprises a total area of 0.69ha. Figure 1 shows the site’s extent, including the extent of development as of this report.
- 2.2.1.2 The site is located in a densely urban area of Manchester city centre, adjacent to an active tram line. The site is also located above the Bridgewater Canal and approximately 260m east of the River Irwell. Buildings surrounding the site are mixed commercial and residential buildings to the north, with high-density residential apartments to the south. Due to the site’s location close to the city centre, there is a high level of disturbance present from main roads and public transport, such as the A635 (M) present approximately 75m west of the site.

2.3 Purpose of this Report

- 2.3.1.1 This report has been produced to demonstrate the results of nocturnal bat surveys which were completed at the site. The surveys were conducted to confirm presence of roosting bats, and nocturnal bat activity surveys which were conducted to confirm the presence of bats utilising the sites habitats for foraging and commuting. Comparison to previous bat surveys to assess whether the site is still actively being used will be conducted within this survey. Appropriate enhancements regarding results will be recommended. The report has been produced in as a part of the ongoing monitoring scheme.
- 2.3.1.2 Relevant UK legislation of the protection of all UK bats are detailed in Appendix 1.

3 Previous Surveys

3.1 Bat Survey Report (Urban Green, 2021b)

- 3.1.1.1 Following the assessment of Structure (S) 1 featuring moderate bat roosting potential, three emergence surveys were undertaken on site. Bat activity was recorded throughout the emergence surveys, with all activity attributed to common pipistrelle (*Pipistrellus pipistrellus*). Foraging activity was mainly recorded around S1 and along the viaduct.
- 3.1.1.2 In total, two common pipistrelle roosts were located along the northern aspect of Structure 1, with a peak count of three individuals foraging on site at one time. The low number of bats recorded using these roosts indicated that they are non-breeding summer roosts for low numbers of common pipistrelle, which is a relatively common and widespread species of bat.
- 3.1.1.3 A total of five activity surveys were conducted, including the deployment of four static bat detectors, over four months, from 14/06/21 to 01/09/21. Only activity pertaining to common pipistrelle was recorded during each activity survey. The peak count of bats at any one time was three, with that peak being recorded during every activity survey. A total of thirty-eight passes was the highest recorded at a listening point, which occurred during Activity Survey 2, at listening point 9.
- 3.1.1.4 Common pipistrelle also contributed to the majority of calls recorded through the static detectors, with only three calls relating to noctule (*Nyctalus noctula*) and two calls relating to unidentified *Myotis* species. Overall, a total of 7751 common pipistrelle calls were recorded, with an average of 310 calls per night.

3.2 Bat Survey Report (Urban Green, 2023)

- 3.2.1.1 Bat surveys were repeated throughout the 2023 survey season, from April-September, following the public opening of the viaduct and the lapse in lifespan of the 2021 report.
- 3.2.1.2 The presence of one non-breeding summer roost for common pipistrelle within S1 was reaffirmed.
- 3.2.1.3 A total three dusk/dawn emergence/re-entry surveys, and six monthly transects and static detector deployments, were conducted from April-September. Across the suite of surveys, common pipistrelles accounted for over 99% of calls throughout the season, with a maximum of three individual bats observed at any given time. A minimal proportion of soprano pipistrelle (*Pipistrellus pygmaeus*) were recorded alongside.
- 3.2.1.4 The surveys found less emergences from the roost in comparison with the 2021 surveys, though not to any significant degree. Activity on the viaduct was found to be consistent from 2021-2023 on the undeveloped section of the viaduct, with lesser activity recorded on the newly developed eastern end in comparison.

4 Methods

4.1 Nocturnal Bat Surveys

4.1.1 Emergence/Re-entry surveys

- 4.1.1.1 Three emergence surveys were undertaken following guidance set out in Collins (2023). All surveys were conducted by suitably qualified ecologists. The surveys were conducted using handheld Echo Meter Touch detectors, and Canon XA60 4K Infrared camcorders. Surveyors and cameras were positioned around the feature to observe the roost that had been identified in previous surveys. The emergence surveys began at least 15 minutes before sunset until approximately 1.5 to 2 hours after sunset.
- 4.1.1.2 Summary of survey details are provided in Table 1, and Figure 2 provides a plan illustrating surveyor position. Surveyor survey results sheets are available upon request.

Table 1 - Emergence/Re-entry Survey Details

Date	Sunset time	Survey time	Surveyors	Weather conditions at start
09/05/24	20:53	20:38 – 22:23	S1 – Toby Mills S2 – Olivia Jones S3 – Jo Reeves S4 – Kaitlynn Harrison S5 – IR Camera	Temp: 17°C Cloud cover: 5/8 oktas Wind: 1 Beaufort Precipitation (Ppt): None
04/06/24	21:31	21:16 – 23:01	S1 – Toby Mills S2 – Olivia Jones S3 – Jo Reeves S4 – Siobhan Gandee S5 – IR Camera	Temp: 10°C Cloud cover: 0/8 oktas Wind: 2 Beaufort Precipitation (Ppt): None
16/07/24	21:28	21:13 – 22:58	S1 – Barnaby I. Gardner S2 – Toby Mills S3 – Kaitlynn Harrison S4 – IR Camera	Temp: 16°C Cloud cover: 7/8 oktas Wind: 2 Beaufort Precipitation (Ppt): None

- 4.1.1.3 **Barney Gardner** – Assistant Ecologist with three years’ bat survey experience.
- 4.1.1.4 **Toby Mills** – Assistant Ecologist with three years’ bat survey experience.
- 4.1.1.5 **Olivia Jones** - Assistant Ecologist with one years’ bat survey experience.
- 4.1.1.6 **Jo Reeves** – Seasonal Ecologist with three years’ bat survey experience.
- 4.1.1.7 **Siobhan Gandee** – Seasonal Ecologist with one year’s bat survey experience.
- 4.1.1.8 **Kaitlynn Harrison** – Seasonal Ecologist with one year’s bat survey experience.

4.1.2 Bat Activity Surveys

- 4.1.2.1 Four activity surveys were undertaken following guidance set out in Collins (2023), spanning from April to July 2024 (inclusive) with a minimum period of two weeks between each survey, and at least one survey completed each month. All surveys were conducted by two suitably qualified ecologists. The survey effort involved two surveyors, initially waiting in place for 30 minutes after sunset at an expected area of emergence, before back-tracking bats as they emerge and commute throughout the site for the remaining 1.5 hours. During the survey, observations of bats, such as number of passes, peak count, species, and behaviour (e.g. commuting or foraging), were recorded using an Echometer Touch 2 bat detector, which also recorded activity for further analysis. The route is determined by surveyor intuition, with an aim to cover the site's breadth, stopping for listening points at noted activity hotspots and habitat features to record data.
- 4.1.2.2 The route ensured coverage of all habitat types and features along the viaduct.
- 4.1.2.3 Summary of the survey details are provided in Table 2. Surveyor results are available upon request.

Table 2 – Activity Survey Details

Survey	Date	Start (Sunset) - End	Surveyors	Weather conditions at sunset
Survey 1 (April)	25/04/24	20:28-21:58	Barnaby I. Gardner Jo Reeves	Temp: 9°C Cloud cover: 2/8 oktas Wind: 1 Beaufort Precipitation (Ppt): None
Survey 2 (May)	16/05/24	21:05-22:35	Olivia Jones Jo Reeves	Temp: 15°C Cloud cover: 6/8 oktas Wind: 1 Beaufort Precipitation (Ppt): none
Survey 3 (June)	20/06/24	21:41-23:11	Toby Mills Siobhan Gandee	Temp: 21°C Cloud cover: 0/8 oktas Wind: 1 Beaufort Precipitation (Ppt): None
Survey 4 (July)	18/07/24	21:25-22:55	Barnaby I. Gardner Jo Reeves	Temp: 23°C Cloud cover: 6/8 oktas Wind: 1 Beaufort Precipitation (Ppt): None

- 4.1.2.4 On each transect occasion, two Anabat Express static detectors were deployed at the site for a minimum of five nights. One static was placed on either the developed (east) side or the undeveloped (west) side of the viaduct on each deployment period.
- 4.1.2.5 Dates of deployment and associated weather conditions are detailed within Table 3.

Table 3 – Static Deployment Details

Deployment	Date	Sunset/sunrise time
Deployment 1 (May)	01/05/24	20:39/05:31
	02/05/24	20:41/05:29
	03/05/24	20:43/05:27
	04/05/24	20:44/05:25
	05/05/24	20:46/05:23
Deployment 2 (June)	26/06/24	21:41/04:42
	27/06/24	21:41/04:42
	28/06/24	21:41/04:43
	29/06/24	21:41/04:44
	30/06/24	21:40/04:44
Deployment 3 (July)	18/07/24	21:25/05:05
	19/07/24	21:24/05:06
	20/07/24	21:23/05:08
	21/07/24	21:21/05:09
	22/07/24	21:20/05:11

- 4.1.2.6 The data collected on the static detector was analysed to provide further evidence of the sites use by foraging and commuting bats, using Kaleidoscope Pro software. Please refer to Figure 3 for static location points.

4.2 Constraints to the Survey

- 4.2.1.1 Due to the surveys being conducted by observation during low light conditions, this may cause constraint of visual assessments. No surveyors were visually constrained during the survey, other than that of low light conditions, and all potential roosting features were observed throughout the survey period.

4.3 Lifespan of Reports

- 4.3.1.1 In accordance with the BCT guidance (Collins, 2023), the details of this report will remain valid for a period of **18 months** from the date of the first survey (i.e. until 26th October 2025). After this date, this assessment should be reviewed to determine whether any update surveys are required.
- 4.3.1.2 It should be noted that the findings of the 2023 Bat Survey Report (Urban Green, 2023) – which details a full season - remains in date at the time of writing, until 11th October 2024.

5 Results

5.1 Emergence/re-entry Surveys

5.1.1 Dusk Emergence – 09/05/24

- 5.1.1.1 Intermittent bat activity, exclusively of common pipistrelle, was recorded consistently throughout the survey, beginning from ~21:11 and continuing through to ~22:03. Though all surveyors were spaced out around the known roosting feature and its surrounding area, a similar degree of bat activity was recorded by each, all noting roughly ~7 ‘bursts’ of intermittent activity, each detailing ~2-3 passes of individual bats.
- 5.1.1.2 Most passes were heard and not seen, though crucially, two separate surveyors noted an emergence and a re-entry of a single common pipistrelle to and from the known roost around ~21:30, roughly 30 minutes after sunset – the generally accepted timeframe for common pipistrelle emergences. Other observed activity was generally noted to feature passes out towards the Castlefield Urban Heritage Park.
- 5.1.1.3 The roost (Roost 1) previously identified was reconfirmed, by emergence and re-entry of a single common pipistrelle. The roost was again located within the viaduct arch, Structure 1 - the same feature previously identified.

5.1.2 Dusk Emergence – 04/06/24

- 5.1.2.1 A similar, though lesser degree of activity was recorded on the second occasion. Sporadic passes of common pipistrelle were most commonly recorded, with three surveyors situated at the ground level recording ~5-7 periods of activity by individual bats, each comprising ~1-2 passes at most. One surveyor situated atop the viaduct, over the roosting feature, recorded only two noctule passes in the survey’s duration.
- 5.1.2.2 Common pipistrelle activity generally begun at 22:04, at roughly the known emergence time for the species, though no surveyor noted an emergence from the confirmed roost. However, review of IR Camera footage recorded during the survey confirmed emergences from the roost at ~22:04, exactly as activity recording began, and again at 22:09. Several return passes to the roost were made by several bats over the following 20 minutes, though no re-entries were clear.
- 5.1.2.3 Activity of individual bats was recorded sparsely, though consistently, from this time until ~22:53.

5.1.3 Dusk Emergence – 16/07/24

- 5.1.3.1 Consistent with prior surveys, a low level of common pipistrelle activity was recorded throughout the survey. All surveyors noted activity beginning at ~21:30, only two minutes after sunset – an early time for the species to be active. In accordance with this anomaly, one surveyor recorded a potential re-entry to the roost at this time, of a single bat, remaining in line with prior findings, though this could not be clarified by camera review.
- 5.1.3.2 Activity thereafter was sporadic, limited to lesser foraging of the Castlefield Urban Heritage Park. At most, only seven periods of activity were recorded throughout the survey, each limited in activity with a maximum of three passes in any given five-minute period. Unlike other surveys, at least two individuals were observed simultaneously during the survey, though for a minimal time at ~21:56.
- 5.1.3.3 No confirmed emergence nor re-entry activity was recorded in relation to the viaduct structure.

5.2 Nocturnal Bat Activity Surveys

5.2.1 Activity Survey 1 – 25/04/24

- 5.2.1.1 Throughout the survey, 258 passes of exclusively common pipistrelle were recorded. Activity began sparsely at 20:45, 18 minutes after sunset, when three passes of a common pipistrelle foraging were noted. From 21:11 onwards, foraging activity of common pipistrelles was consistent and unwavering. Just one bat at any given time was noted until 21:42; thereafter a peak of three individual pipistrelles were recorded until the survey end.

5.2.2 Activity Survey 2 – 16/05/24

- 5.2.2.1 Throughout the survey, a total of 289 passes were recorded, of exclusively common pipistrelle. A peak count of two individual common pipistrelle were recorded, at 21:31. The first activity was recorded at 21:31 (26 minutes after sunset), when a burst of activity recorded 15 passes in a five-minute period. Activity was constant thereafter, spatially and temporally, rarely breaking for any longer than a minute, besides an anomalous ~13-minute gap in recordings at ~22:12. Bats were recorded consistently along the viaduct's entire length, though flight lines were clearer in the undeveloped half.
- 5.2.2.2 A peak of three individual bats were simultaneously recorded consistently from 22:06 – 22:44.

5.2.3 Activity Survey 3 – 20/06/24

- 5.2.3.1 A total of 207 calls were recorded throughout the survey, again attributed solely to common pipistrelle. The first activity was recorded at 22:09, 27 minutes after sunset, when a single common pipistrelle was recorded passing four times. Activity was recorded consistently throughout the survey to its end, with 2-3 bats consistently observed foraging whilst sporadically social calling.
- 5.2.3.2 Activity was recorded along the entire viaduct, though was again lesser in the developed section.

5.2.4 Activity Survey 4 – 18/07/24

- 5.2.4.1 A total of 181 calls were recorded throughout the survey, again attributed entirely to common pipistrelle. The first recorded pass was identified at 21:37. Activity thereafter was much alike all surveys prior; with consistent activity for the entire survey duration, localised predominantly within clear, undeveloped habitat, and lesser, though still ever-present in the developed half.
- 5.2.4.2 Social calling was noted from bats during the survey, and a maximum three bats were noted at any given time, though for most of the survey duration bats were noted alone.

5.3 Automated Static Detector Surveys

- 5.3.1.1 Overall, species calls identified by static detectors were, expectedly, dominated by common pipistrelle, which accounted for ~99.7% of all recorded bat calls. Other bat species, recorded exceptionally rarely, comprised a total of nine noctule calls, and eight soprano pipistrelles. There were 5488 common pipistrelle calls of a total of 5497.
- 5.3.1.2 Call frequency varied from month to month. The highest activity was recorded during June, with a total of 2787 calls recorded collectively by both statics during this month. Calls were comparatively lesser in May (891) and July (1819). Though July featured the single-most active night, with a total 1136 calls recorded on July 19th. In contrast, several nights in May and July featured no bat calls at all, possibly due to weather conditions. Noctules and soprano pipistrelles did not feature in May and equated to only <1% of all calls recorded throughout the entire deployment survey suite.

- 5.3.1.3 Social calls pertaining to common pipistrelle were identified rarely, with increasing levels of activity through July.

5.4 Assessment

5.4.1 Nocturnal Emergence/Re-entry Surveys

- 5.4.1.1 Bat activity – overwhelmingly common pipistrelle - was recorded consistently throughout all surveys. Commuting and foraging activity was consistently and frequently recorded on both the viaduct, and to a lesser degree at Structure 1 in the Castlefield Urban Heritage Park, around the roosting feature.
- 5.4.1.2 Through an emergence recorded during the first emergence bat survey, and a potential re-entry during the third, the non-breeding summer roost identified during the original 2021 surveys can be confirmed to still be active. The roost is thought to host individual bats.
- 5.4.1.3 The maximum number of individual bats recorded at any given time was between 3-5, though only 1-2 have been recorded to use the roost in this survey season. It is likely then, that bats commute to the site from other roosts in the surrounding area.
- 5.4.1.4 The low number of bats recorded emerging from the roost indicates that it is still a non-breeding summer roost for low numbers of common pipistrelle.

5.4.2 Nocturnal Bat Activity and Static Surveys

- 5.4.2.1 Bat activity recorded throughout both the activity surveys and static deployments indicate that the site is still used predominantly by small, yet potentially growing, populations of common pipistrelle for foraging purposes. In previous survey seasons, a maximum 3 individual bats were observed simultaneously, with activity significantly concentrated in the undeveloped half. In the 2024 surveys, a maximum of 5-6 individuals were simultaneously observed, with a greater proportion of observations in the developed section than prior years. This suggests a growing population of local bats are discovering the site and acclimatising to the developed section. This suggests the potential for positive impact as the viaduct's length is developed further.
- 5.4.2.2 Noctule and soprano pipistrelle were also recorded on site very rarely, suggesting the site is of limited value to these species.
- 5.4.2.3 These results reaffirm the conclusions of the previous surveys, which assessed that the successional scrub on the undeveloped site has moderate value for foraging.

6 Comparison with previous surveys

6.1 Nocturnal Emergence/Re-entry Surveys

- 6.1.1.1 Throughout the original suite of surveys completed in 2021, emergences were recorded during two of the three surveys, relating to three common pipistrelle on each occasion.
- 6.1.1.2 Foraging was also recorded on each occasion, with activity recorded around the roost and throughout the viaduct.
- 6.1.1.3 Fewer bat emergences were observed during the 2023 surveys, though in 2024, emergence or re-entry was again noted during at two of three surveys, with foraging activity recorded, albeit sparsely, on all occasions.

6.2 Activity Surveys and Static Deployment

- 6.2.1.1 The activity recorded during the updated surveys was similar to that of previous seasons. For example, the general nature of foraging activity – small common pipistrelle populations preferentially foraging the undeveloped viaduct – was consistent. However, a greater count of simultaneous bats than previous years was recorded several times, and a greater proportion of use in the developed viaduct than previous years was also noted.
- 6.2.1.2 There was no noted reduction in activity on the developed side of the viaduct from the 2023 surveys, though the peaks of the 2021 surveys, when the entire viaduct remained undeveloped, remain untouched.
- 6.2.1.3 Data collected during static deployments also aligned with previous years. The abundance of passes recorded per night by the statics were, on average, similar between the original and the updated deployment surveys completed on the undeveloped side, and, other than the rare occurrences of *myotis* species during the original deployment, or soprano pipistrelle during the updated deployment, featured similar species composition. Details on the average number of common pipistrelle passes per night between the original and updated deployments are available in Table 4.

Table 4 – Comparing the average number of common pipistrelle passes per night between static deployments

Month of deployment	Average no. of common pipistrelle passes per night		
	2021 Deployment	2023 Deployment	2024 Deployment
May	N/A	317	557
June	322	89	178
July	348	357	364

- 6.2.1.4 Detectors recorded a similar number of passes as the previous years, whereas the statics placed on the developed side recorded less than both the original and undeveloped side on most occasions.
- 6.2.1.5 The data returned from the updated June deployments provided outlying data, as there was no significant difference in average number of calls per night between either side of the viaduct, and the average number of calls overall were significantly lower than other data sets collected throughout the 2023 survey suite.

- 6.2.1.6 The lesser activity throughout the developed side of the viaduct may be the result of artificial lighting, which can have an impact on bat activity and foraging. Bat Activity and Artificial Lighting in the UK (BCT and ILP, 2023) states that slower-flying, broad winged species, such as *myotis* species, avoid illuminated commuting and foraging routes. The introduction of light into a previously low-lit environment may have fragmented flightpaths or foraging habitats, causing bats to forage on the undeveloped side.
- 6.2.1.7 Another key factor in foraging preference in bat species is presence of invertebrate prey. The shrubby, sparsely vegetated land, minimal management, and larval plants such as ragwort (*Senecio jacobaea*) provides sufficient habitat for invertebrate prey to develop, in turn providing suitable foraging opportunities for bats. The colonisation of newly created garden habitats by invertebrates may take time, and could be limited by several factors, including connectivity to similar surrounding habitats, and habitat suitability amongst other factors.

7 Recommendations

- 7.1.1.1 During surveys undertaken in 2024, a previously identified non-breeding summer roost was confirmed to remain active on site, supporting a low number of common pipistrelles. Bat activity was recorded foraging and commuting, attributed to common pipistrelle, with similar activity recorded within activity and static deployment surveys, with higher levels of activity identified within the undeveloped side of the viaduct.
- 7.1.1.2 The results of the activity surveys highlight that the native, unmanaged scrub on the viaduct provides greater foraging value for bat species on site than the ornamental habitats found in the developed side, though the activity difference between sections was notably lesser than observed in the 2023 surveys, with greater levels of activity recorded in the developed viaduct than the previous year. This suggests the potential for positive impact as the viaduct's length is developed further.
- 7.1.1.3 The undeveloped section is proposed for developments alike that of the developed section in Stage 1 of the proposals. Whilst the post-development habitats are likely to offer continued support for foraging bats once development has completed, it is likely that there will be a significant impact to foraging bats throughout the construction phase in the absence of effective mitigation measures.
- 7.1.1.4 Lighting mitigation should be implemented throughout the development phase, to follow the lighting scheme produced by Arup (Arup 2024).
- 7.1.1.5 The lighting strategy details the following principles:
- Only illuminate task areas and avoid over-illumination by designing to the relevant design guidance.
 - Incorporate warm light sources (2700K) to avoid blue spectral components which negatively impact ecology
 - Specify luminaires with zero upward light and good optical control.
 - Use of integrated fittings that effectively contain light spill from unintended areas.
 - The luminous intensity of all luminaires shall comply with the recommended limits in ILP GN:01 Table 4.
 - Avoid direct illumination of any bat habitats particularly the Bridgewater Canal
- 7.1.1.6 Habitats created on the developed side should consist of more native and shrubby species to provide a better habitat for foraging bats, and that will attract high numbers of invertebrates on site, for similar foraging opportunities.
- 7.1.1.7 The continued affirmation of a non-breeding summer roost suggests that there may be no suitable locations for maternity roosts to form on the viaduct. Therefore, it is recommended that bat boxes be installed to provide more suitable habitats for local bat populations. These should include both standard bat boxes and maternity bat boxes, which will increase the abundance and diversity of roosting spaces on site, and in turn, encourage more bat roosting on site. Boxes may be suitably placed on the structure of the information centre, currently located at the centre of the viaduct. Examples of suitable bat boxes are listed within Table 5.

Table 5 – Bat Box specification

Bat Box Type	Image
Vivara Pro Causa Maternity Bat Box Specifications: Height: 780mm Width: 510mm Depth: 165mm Weight: 12kg	
Improved Crevice Bat Box – double chamber Specifications: Height of back panel: 335mm Internal height of roost chamber: 197mm External depth of roost chamber: 69mm External depth including roof overhang: 101mm External width: 166mm Weight: 1.4kg	

8 Conclusion

- 8.1.1.1 This Bat Survey Report has met its objectives, by demonstrating the following:
- 8.1.1.2 The results of the nocturnal bat surveys, including emergence/re-entry, activity, and static deployment surveys, detailed in Section 4.
- 8.1.1.3 A comparison of the results gathered from the updated surveys with results from the surveys previously completed in 2021, and 2023, detailed in Section 5.
- 8.1.1.4 Recommendations for mitigation during the construction phase, detailed in Section 6.

9 References

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- Urban Green (2024). Preliminary Ecological Appraisal of Castlefield Viaduct Urban Park (Phase 2). Ref: UG_922_ECO_PEA_02_2024.
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Appendix 1 - Relevant Legislation

Legislation relating to European Protected Species (e.g. bats)

European Protected Species and their resting places (e.g. bat roosts) are protected under the Wildlife and Countryside Act 1981 (as amended), the Countryside and Rights of Way (CROW) Act 2000, and the Conservation of Habitats and Species Regulations 2017.

The Conservation of Habitats and Species Regulations 2017 transpose the European Union's 'Habitats Directive' (Council Directive 92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora (EC Habitats Directive) into UK law. The Regulations provide for the designation and protection of 'European Sites', the protection of 'European Protected Species' (EPS), and the adaptation of planning and other controls for the protection of European Sites. EPS are listed on Schedule 2 of the Conservation of Habitats and Species Regulations 2017.