

INTERIM BIODIVERSITY MONITORING REPORT

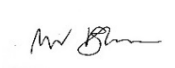
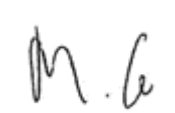
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Castlefield Viaduct,
Castlefield
Manchester

U R B A N
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1 Introduction

1.1 Background to the Scheme

The National Trust have partially developed a section of a viaduct in Castlefield, Manchester (hereafter referred to as ‘the site’). An urban park has been constructed on the site that is open to the public.

Urban Green produced a monitoring strategy to be implemented within the first year of the Viaduct opening; this report has been produced to document the first six months of monitoring that has been conducted.

The author of the report is Mark Blacker MSc, ACIEEM, Senior Ecologist at Urban Green. Mark has experience providing ecological consulting services for a range of development schemes across the UK, including residential, commercial, and large infrastructure schemes.

1.2 Site Context

The site is located at National Grid Reference SJ 83013 97624 and comprises a total area of approximately 0.59ha (see Figure 1).

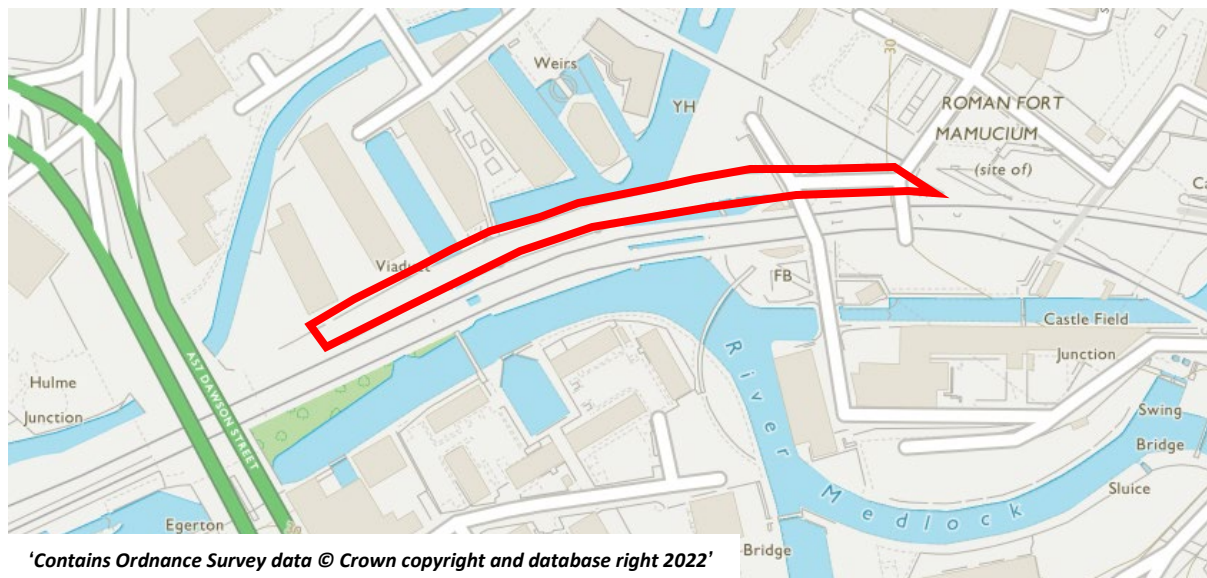


Figure 1 – Site Extent

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 mostly commercial offices to the north and 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 such as the A635 (M) present approximately 75m west of the site.

1.3 Purpose of this Report

This report has been produced to set out the methods, results, and conclusions at the halfway stage within the period covered by the monitoring strategy.

The monitoring strategy was produced to discharge Condition 15 of the planning application associated with this site (ref: 131621/FO/2021) which states:

“No development shall; take place, until a biodiversity monitoring strategy has been submitted to and approved in writing by the City Council as local planning authority. The purpose of the strategy shall be to monitor bat foraging activity across the site. The content of the strategy shall include the following:

- a) Aims and objectives of monitoring to match the stated purpose;*
- b) Identification of adequate baseline conditions prior to the start of development;*
- c) Appropriate success criteria, thresholds, triggers, and targets against which the effectiveness of the various conservation measures being monitored can be judged;*
- d) Methods for data gathering and analysis;*
- e) Location of monitoring;*
- f) Timing and duration of the monitoring*
- g) Responsible persons and lines of communication;*
- h) Review and, where appropriate, publication of results and outcomes.*

A report describing the results of monitoring shall be submitted to the City Council as local planning authority at intervals identified within the strategy. The report shall set out (where results from monitoring show that conservation aims, and objectives are not being met) what contingencies and/or remedial action shall be taken so that the development still delivers the fully functioning biodiversity objectives of the originally approved scheme and shall be agreed in writing by the City Council as local planning authority.

The monitoring strategy shall be implemented in accordance with the approved details.”

This report will present data collected from the monitoring surveys conducted in 2022 and a further report will be presented in July 2023 once monitoring has been completed.

Monitoring was proposed for four biodiversity groups most likely to be present and using the Viaduct: Plants, Invertebrates, Birds, and Mammals (Bats and other urban mammals). The objectives of the monitoring are as follows:

1. Identify and assess changes in activity levels of bats at defined ‘listening points’ across the scheme.
2. Identify and assess changes in activity levels of bats within habitats created, maintained and / or enhanced in relation to this scheme;
3. Identify and assess changes in activity levels of bats within the known roosts located at the base of the Viaduct;

This monitoring strategy provides an excellent opportunity to monitor all aspects of urban biodiversity that may be present on or utilise the Castlefield Viaduct. Therefore, this monitoring strategy will contain recommendations on methods for monitoring plants, invertebrates, birds, and other urban mammals. Therefore, data will also be gathered to meet the additional following objectives:

4. Identify plant species distribution, diversity, and abundance within the retained habitat areas of Phase 1 and Phase 2 and assess changes throughout the year;

5. Identify invertebrate species present on site and assess changes in distribution, diversity, and abundance throughout the year;
6. Identify bird species present on site and assess changes in distribution, diversity, and abundance throughout the year;
7. Identify other urban mammal species that utilise the site and assess changes in distribution, diversity, and abundance throughout the year.

Success criteria were outlined within the monitoring strategy and are defined as:

1. No decrease in levels of bat activity recorded at listening points within the developed section of the Viaduct.
2. No decrease in levels of bat species diversity recorded within the developed section of the Viaduct.
3. No decrease in number of bats recorded using the identified roost.
4. No decrease in number of plant species recorded on site within the retained sections of the Viaduct habitat.

2 Methods

This interim monitoring report focuses on four main groups of species known to be present and using the Viaduct:

- Plants;
- Invertebrates;
- Birds;
- Bats

Detailed information on how these groups of species use the Viaduct was gained through detailed survey effort during the open period of the Viaduct in 2022.

Two detailed survey visits were undertaken during the daytime and lasted for approximately 2 hours each. The purpose of these surveys was to record all plant species present within the natural habitat sections of the developed side and within the undeveloped side; to record any invertebrate (specifically butterfly) species using the Viaduct; and to record any bird species using or flying over the Viaduct. A comparison will be made of how these different species group utilise the developed and undeveloped sections of the Viaduct. The dates and weather conditions of these surveys are recorded below:

- Monitoring Survey Visit 1: 5th September 2022, clear, sunny, 16°C
- Monitoring Survey Visit 2: 29th November 2022, clear, dry, 8°C

Bat activity surveys to assess how bats are using the site were conducted in September and October. These surveys followed good practice guidance within Collins (2016) and started at sunset and continued for approximately 2 hours. The survey route used covered both sides of the viaduct to allow comparisons between level of use.

September:

- Date: 13th September 2022,
- Sunset: 19:30
- Survey start: 19:30
- Survey finish: 21:25
- Weather: clear, dry, 14°C at sunset

October:

- Date: 12th October 2022
- Sunset: 18:20
- Survey start: 18:20
- Survey finish: 20:10
- Weather: overcast, light rain at the end, 12°C at sunset

3 Plants

3.1 Monitoring Strategy

To understand the success of plant species and habitats present within the site, the viaduct will be subject to four in depth survey visits over the course of a year to record plants that are present on site in the natural habitat sections. A detailed species list and relative abundance will be recorded each time, to monitor the level of colonisation of the site since previous surveys and to also understand what plant species are naturally succeeding within this habitat. Monitoring of the undeveloped side will provide comparative data and inform future planting decisions.

Non-native invasive species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) were identified on site during the initial site survey, namely rockspray cotoneaster (*Cotoneaster horizontalis*). Surveyors carrying out the monitoring of this site should be aware of how to identify this species and other species listed on Schedule 9. If any of these species are identified on site, they should be immediately reported to the site staff and the National Trust project lead.

3.2 Results

During the first monitoring survey visit, 41 plant species were recorded on the undeveloped section of the site, and 19 species were recorded within the natural sections of the developed viaduct site.

During the second monitoring survey visit, 26 plant species were recorded on the undeveloped section of the site, and 24 species were recorded within the natural section of the developed viaduct site.

In total, 30 different plant species were recorded within the natural habitat sections of the developed Viaduct. Of these species recorded, seven of them were recorded to still be flowering during the second monitoring survey visit.

In total, 45 different plant species were recorded within the undeveloped side of the Viaduct. Of the species recorded, nine of them were recorded to still be flowering during the second monitoring survey visit.

The results showed that the initial large gap in species richness and abundance between the undeveloped and developed sections of the Viaduct that was present during the first monitoring survey visit had reduced by the November survey visit. A full species list recorded during the monitoring survey visits is available within Appendix 1.

A summary of the plant monitoring survey results is shown below in table 1.

Table 1 – Results of plant monitoring surveys undertaken at Castlefield Viaduct

Viaduct section	Species recorded in 1 st visit	Species recorded in 2 nd visit	Total number of species	Number recorded flowering		Number of species recorded not present within rest of viaduct
				1 st visit	2 nd visit	
Developed section	19	24	30	0	7	14

Viaduct section	Species recorded in 1 st visit	Species recorded in 2 nd visit	Total number of species	Number recorded flowering		Number of species recorded not present within rest of viaduct
				1 st visit	2 nd visit	
Undeveloped section	41	26	45	13	9	29

Due to the different management and disturbance histories inherent as part of the two separate sections of the Viaduct, some differences in the species recorded was found. Within the developed section of the Viaduct, 14 plant species were present which were not present on the undeveloped section, similarly the undeveloped section had 29 plant species that were not present within the developed section.

4 Invertebrates

4.1 Monitoring Strategy

To monitor for butterflies, a walk of the site, including both the developed and undeveloped sections of the viaduct should be undertaken, following guidance set out by the UK Butterfly Monitoring Survey (UKBMS). Surveys should be carried out four times during the open period of Phase 1 of the Viaduct. The surveys should cover the entire viaduct and therefore enable the surveyor to observe all habitats present.

The survey should be undertaken in weather that is suitable for butterflies i.e., warm (13°C or above and sunny), windspeed no greater than 5 (Beaufort Scale) and not raining. The surveyor should walk the same pre-determined route at a standard pace and record any species of butterfly that are observed, including any important behaviours i.e., feeding, or in a pair, as well as the location of the sighting. The same route is to be used within the bat activity transect surveys

If butterflies are recorded on a particular plant on site, then the species of plant should be identified and recorded. These results should then be collated and used to analyse the areas of the site that are used most by butterflies and which plant species on site are of greatest value to this group.

Any other invertebrate species that are observed on site will be recorded.

4.2 Results

A higher number of invertebrate/butterfly species were seen during the first monitoring survey visit compared to the second monitoring survey visit, with seven species seen on the first visit and one seen on the second visit. This comprised three species of butterfly seen in total during the first monitoring survey visit.

Monitoring Visit	Viaduct section	Species seen	Conservation status	Total number of species
1	Developed section	Small white butterfly Honey bee Wasp Seven-spot ladybird	No species of conservation concern recorded	4
	Undeveloped section	Small tortoiseshell Green-veined white Grasshopper	No species of conservation concern recorded	3
2	Developed section	Wasp	No species of conservation concern recorded	1
	Undeveloped section	-	-	-

The butterfly species observed on site are common and widespread within the UK as a whole, however are not regularly seen within the city centre.

5 Birds

5.1 Monitoring Strategy

Nesting habitat within the Viaduct prior to development was limited, due to the lack of dense vegetation and the open nature of the Viaduct. Although it is noted that the viaduct structure itself provided some suitable habitat for nesting birds, with feral pigeons (*Columba livia domestica*) seen on the structure.

As part of the development, bird boxes were installed on poles in raised planting beds within the developed section of the Viaduct.

To understand the level of usage of the site by birds, four detailed monitoring visits of the site will be carried out throughout the year. This will capture seasonal variability in use of the viaduct by urban bird species

5.2 Results

Bird activity within the Viaduct was similar to levels observed during the pre-development walkover and further bat surveys.

The most commonly observed bird within the site was feral pigeon, with common gull and magpie also observed overhead. Additionally, a wren (*Troglodytes troglodytes*) was observed within the planted beds at the western end of the developed section of the viaduct. Feral pigeon were also confirmed to be nesting and breeding within the site, with pigeons observed to be nesting on the viaduct structure during the august monitoring visit, and a broken eggshell observed within the undeveloped side of the Viaduct during the November monitoring visit.

No birds were observed using the nest boxes that have been placed within the site.

Table 3 – Summary of birds observed in relation to Castlefield Viaduct

Visit date	Species observed	Activity	Breeding status	Conservation status
05/09/2022	Feral pigeon	40+ observed on viaduct structure	Nesting and breeding on site	Green list (BoCC 5)
	Common gull	3 flying over head	Not breeding or nesting within site	Amber list (BoCC 5)
	Magpie	2 flying over head	Not breeding or nesting within site	Green list (BoCC 5)
29/11/2022	Feral pigeon	30+ observed on viaduct structure	Nesting and breeding on site	Green list (BoCC 5)
	Magpie	1 flying over head	Not breeding or nesting within site	Green list (BoCC 5)
	Wren	Observed foraging within planter	No sign of nesting within site	Amber list (BoCC 5)
	Black-headed gull	2 observed flying overhead	Not breeding or nesting within site	Amber list (BoCC 5)

6 Mammals

6.1 Bat Monitoring Strategy

It is proposed that emergence and re-entry surveys are carried out at the confirmed roosts in the viaduct supporting structure to monitor the level of usage post development. These will be carried out three times during summer 2023, following guidance within Collins (2016).

To understand the level of bat activity using the site and any changes that have occurred post-development, bat activity transects were carried out in September and October of 2022. Further surveys will be conducted on site once per month during the period that the Viaduct is open and when bats are most active, i.e. April through to September. This will include both the developed and the undeveloped section of the viaduct. One transect route was determined to be appropriate for this development and the route used is provided within the Bat Survey Report for this scheme (Urban Green, 2021b).

6.2 Results

Two bat transects were conducted on the Castlefield Viaduct site in 2022, with the remaining bat activity transects to take place in 2023, alongside the bat roost surveys. Although this has provided limited data, a comparison can be made with data collected during the pre-construction phase of the development.

The only species recorded using the Viaduct during the 2022 activity surveys conducted was common pipistrelle. This is consistent with the results of surveys conducted in 2021.

A peak count of three bats was recorded at listening point seven during the September survey. Whilst a peak count of two bats was recorded at listening point 9 during the October survey. Both of these listening points are located at the western extent of the undeveloped section of the Viaduct.

The highest level of activity recorded during the September survey visit was recorded at listening point 7, with 180 bat passes recorded. This listening point is located on the undeveloped side of the viaduct. The lowest level of activity recorded during the September survey visit was at listening point 16 with 1 pass recorded. Additionally, listening points 1, 2, 3 and 15 did not record any activity. All these listening points are located on the developed side of the Viaduct.

The highest level of activity recorded during the October survey visit was at listening point 11 with 120 passes recorded. This listening point was located on the undeveloped side of the Viaduct. The lowest level of bat activity was located at listening point 2, with 2 bat passes recorded. This listening point was located on the developed side of the Viaduct. Additionally, listening points 16, 17, and 18 did not record any activity at all.

A breakdown of bat activity recorded per survey is provided below, then a comparison of the proportion of bat calls recorded on the developed side of the Viaduct compared to the undeveloped side has also been made. These are shown in Figure, 1, 2, and 3.

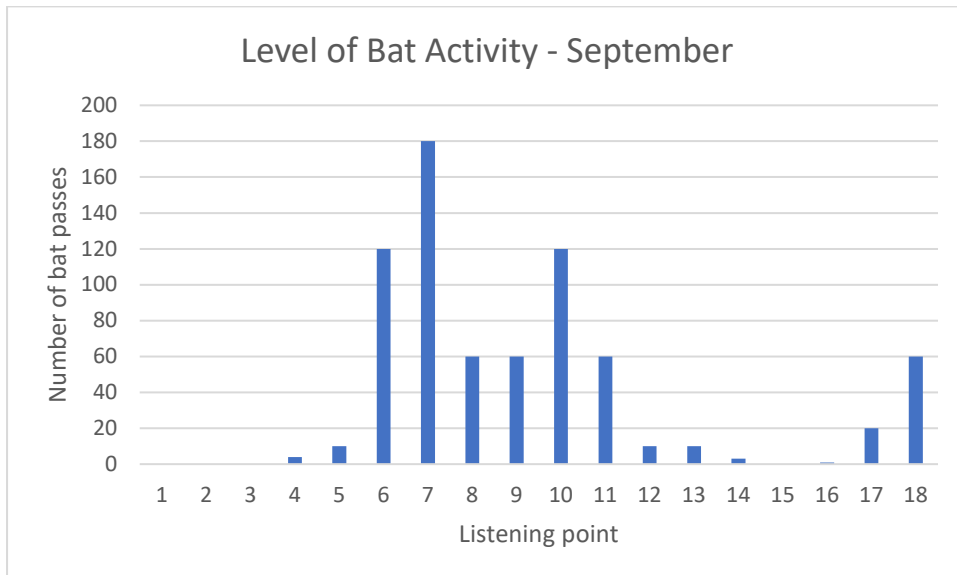


Figure 1 – Summary of bat calls recorded during the September activity transect

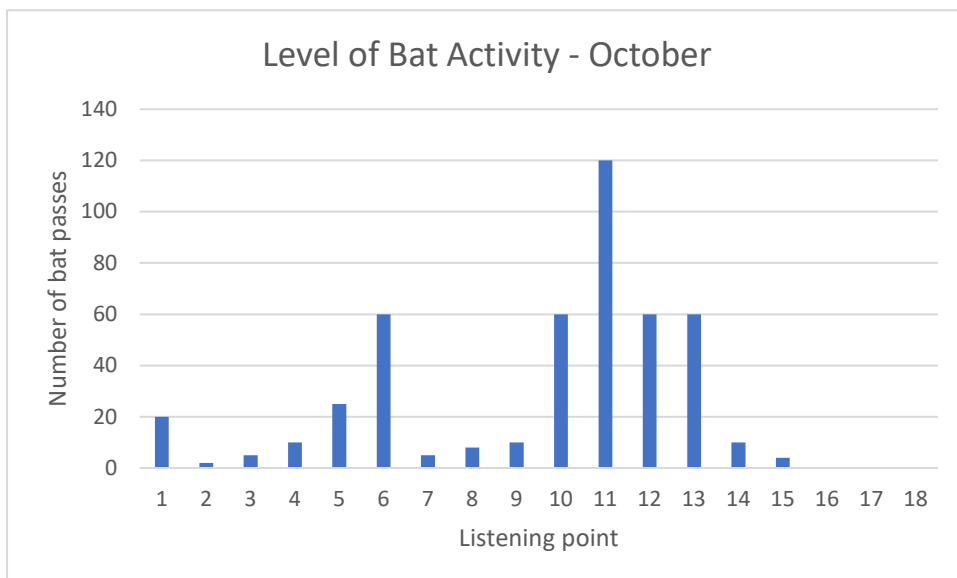


Figure 2 – Summary of bat calls recorded during the October activity transect

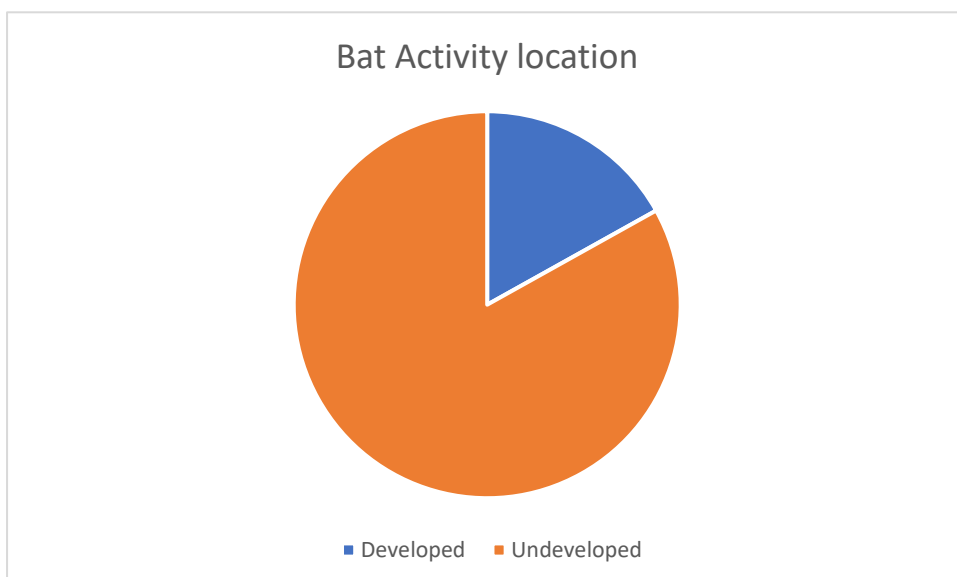


Figure 3 – Proportion of bat calls recorded at listening points on the developed side compared to undeveloped side.

The graph shown in figure 3 highlights that the majority of bat passes recorded during the October and September survey visits were recorded at listening points within the undeveloped section of the Viaduct, with 978 bat passes recorded on the undeveloped side, compared to 199 on the developed side.

This level of activity is similar to that recorded during the bat activity transects carried out during 2021, with the highest level of bat activity recorded at listening point 9, where a peak count of 3 bats was regularly recorded. This listening point was located in what is now labelled as the undeveloped side of the viaduct.

7 Summary and Conclusion

Initially, a greater level of plant species diversity and abundance was recorded within the undeveloped side of the Viaduct. This trend however was almost non-existent by the second survey visit, with almost equal numbers of species observed on each side. The species found on the undeveloped side tended to be more mature, with saplings of some common tree species such as oak, grey willow, and rowan present, whilst the plants within the developed side tended to be smaller, reflecting the greater level of disturbance that has occurred.

It is recommended that a rotational mow or strim is carried out within the natural habitat sections of the developed viaduct to ensure that a high level of species diversity is maintained, and vigorous plant species do not become overly dominant.

The first monitoring survey visit showed a higher level of invertebrate/butterfly abundance and diversity compared to the second monitoring survey visit. This was likely a factor of the warmer weather and greater abundance of flowering plant species observed during the first visit.

To further encourage the butterfly species observed to use the site, it is recommended that the plant species the larval stages of each butterfly species requires should be planted and encouraged within the site. Both small white and green-veined white caterpillars feed exclusively on plants belonging to the cabbage family, such as garlic mustard (*Alliaria petiolata*) and cuckoo flower (*Cardamine pratensis*). The caterpillars of the small tortoiseshell (*Aglais urticae*) butterfly feed exclusively on common nettle (*Urtica dioica*); this plant was noted within the developed section of the site, and evidence of invertebrate damage to the leaves was observed.

The level of bird activity observed within the site has remained consistent across the two monitoring visits conducted within the site, with species recorded that would be expected to be encountered within the dense urban setting of the site. However, the November visit did show a slight increase in the activity level within the site itself. This could be due to the site being established for longer by this period and the local bird population becoming habituated to it, and the reduced level of visitors to the site at this time of year making it a more attractive foraging location.

It is recommended that the nesting boxes installed on site are re-located to an area which experiences less disturbance and are therefore more likely to be used by nesting birds.

Bat activity transects conducted on the site recorded exclusively common pipistrelle bats using the viaduct, as was recorded in 2021. A peak count of three bats was seen foraging within the undeveloped section of the Viaduct, which is similar activity levels to that which was recorded during the 2021 surveys.

After two survey visits there appears to be a higher level of bat activity recorded on the undeveloped side of the Viaduct compared to the developed side. A full set of surveys should be completed before definite conclusions can be drawn as to which side of the Viaduct bats are using preferentially. Previous surveys regularly recorded higher levels of bat activity at the western end of the viaduct, likely due to the lower light levels present, a pattern which has continued to be seen during 2022 surveys.

Bat activity levels decreased slightly during the October survey visit compared to that conducted in September, however regular use along the whole length of the viaduct was still recorded, suggesting that the Viaduct is still an important resource for local bat populations.

The results of the monitoring surveys have highlighted the importance of the Viaduct as a sheltering and foraging resource to a wide variety of flora and fauna within the dense urban setting. The presence

of flowering plants (within the natural habitat sections, undeveloped section, as well as the horticultural planters) at almost all times of the year provides high level of foraging and sheltering habitat for all the monitored species groups. As the natural habitat sections of the viaduct continue to become colonised by native plant species, the diversity of flowering plants present will increase and the value of the site towards the local environment will also increase.

Appendix 1 – Full Species List from plant Monitoring Surveys

Table 1 lists plant species recorded during the first and second monitoring survey undertaken at the Castlefield Viaduct within the natural habitat sections created as part of the development.

Table 2 shows plant species recorded as present within the undeveloped section of the Castlefield Viaduct

Table 1 – Plant species recorded within the developed sections of the Viaduct

Species recorded	Visible during visit 1?	Visible during visit 2?	Flowering?	Invertebrate damage present?
Colts foot	X	X		
Groundsel	X			
Bramble	X	X		X
Prickly sow thistle	X	X	X	
Dandelion	X			
Greater plantain	X	X		
Buddleia	X	X		
Wild strawberry	X	X	X	
Common chickweed	X			
White clover	X			
Sun spurge	X	X	X	
hemp agrimony	X	X		
Herb robert	X	X		
Bristly oxtongue	X	X		
Slender tare	X	X		
Hairy bittercress	X	X		
Ragwort	X	X		
Greater willowherb	X			
Rowan	X			
Daisy		X		

Species recorded	Visible during visit 1?	Visible during visit 2?	Flowering?	Invertebrate damage present?
Red fescue		X		
Smooth sow thistle		X	X	
Scentless mayweed		X	X	
Thyme-leaved speedwell		X	X	
Cocks foot		X		
Spear thistle		X		
Creeping thistle		X		
Tufted hair grass		X		
Narrow leaved hawkweed		X	X	
Common nettle		X		X

Table 2 – Plant species recorded within the undeveloped section of the Viaduct.

Species recorded	Visible during visit 1?	Visible during visit 2?	Flowering?	Invertebrate damage present?
Bramble	x	x		
Prickly sow thistle		x		
Dandelion	x	x		
Buddleia	x	x		
Wild strawberry	x	x		
Sun spurge		x		
Herb robert	x	x		
Slender tare		x		
Hairy bittercress		x		
Ragwort	x	x		

Species recorded	Visible during visit 1?	Visible during visit 2?	Flowering?	Invertebrate damage present?
Greater willowherb	x			
Rowan	x			
Daisy	x	x		
Red fescue	x	x		
Smooth sow thistle		x		
Narrow leaved hawkweed	x	x		
yellowwort	x	X	x	
wall cotoneaster	x	x	x	
franchets cotoneaster	x			
perforate leaved st john's wort	x	x		
ash saplings	x			
polygonum moss	x	x		
mouse ear hawkweed	x	x		
silver birch sapling	x			
grey willow sapling	x			
male fern	x	x		
hairy willowherb	x			
oak sapling	x			
maidenhair spleenwort	x	x		
broom	x			
pine sapling	x			
oxeye daisy	x			

Species recorded	Visible during visit 1?	Visible during visit 2?	Flowering?	Invertebrate damage present?
creeping bent	x			
common fleabane	x			
shining cranesbill	x			
goat willow	x			
aster	x	x	x	
dogwood	x			
berberis aquifolium	x			
wild cherry sapling	x			
lesser trefoil	x			
dog rose	x			
cladonia lichen species		x		
Yorkshire fog		x		
Red clover		x		

Appendix 2 – Bat Activity Survey Data

Table 1 – Bat activity transect results from 13/09/2022

Listening Point	Time start	Time finish	Species	Activity	Number of bats	Number of passes
1	19:30	1935	-	-	-	-
2	19:36	1941	-	-	-	-
3	1942	1947	-	-	-	-
4	1948	1953	Common pipistrelle	foraging	1	4
5	1955	2000	Common pipistrelle	Commuting/ foraging	1	10
6	2001	2006	Common pipistrelle	constant foraging with social calls	2	120
7	2007	2012	Common pipistrelle	constant	3	180
8	2013	2018	Common pipistrelle	constant calls with social	1	60
9	2019	2024	Common pipistrelle	constant calls with social calls	1	60
10	2025	2030	Common pipistrelle	constant with social calls	2	120
11	2031	2036	Common pipistrelle	constant with social calls	1	60
12	2037	2042	Common pipistrelle	occasional commuting with social calls	1	10
13	2043	2048	Common pipistrelle	foraging	2	10
14	2049	2054	Common pipistrelle	foraging with social calls	1	3
15	2055	2100	-	-	-	-
16	2101	2106	Common pipistrelle	social calls	1	1
17	2107	2112	Common pipistrelle	Commuting with social calls	1	20
18	2113	2118	Common pipistrelle	Constant with social calls	1	60

Table 2 – Bat activity transect results from 12/10/2022

Listening Point	Time start	Time finish	Species	Activity	Number of bats	Number of passes
18	1820	1825	-	-	-	-

Listening Point	Time start	Time finish	Species	Activity	Number of bats	Number of passes
17	1826	1831	-	-	-	-
16	1833	1838	-	-	-	-
15	1840	1845	P45	Commuting	1	4-
14	1846	1851	P45	Commuting	1	10
13	1852	1857	P45	Constant	1	60
12	1859	1904	P45	Constant	1	60
11	1906	1911	P45	Constant	2	120
10	1912	1917	P45	Constant	1	60
9	1919	1924	P45	Foraging	2	10
8	1926	1931	P45	Commuting	1	8
7	1932	1937	P45	Foraging and commuting	1	5
6	1938	1943	P45	Constant foraging	1	60
5	1945	2000	P45	Commuting	2	
4	2001	2006	P45	Commuting	1	10
3	2008	2013	P45	Commuting	1	5
2	2014	2019	P45	Commuting	1	2
1	2020	2025	P45	Foraging	1	20