

BIODIVERSITY MONITORING REPORT

SEPTEMBER 2023

Castlefield Viaduct,
Castlefield
Manchester

U R B A N
G R E E 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 twelve months of monitoring that has been conducted.

The author of the report is Barnaby Indio Gardner at Urban Green. Barney 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).

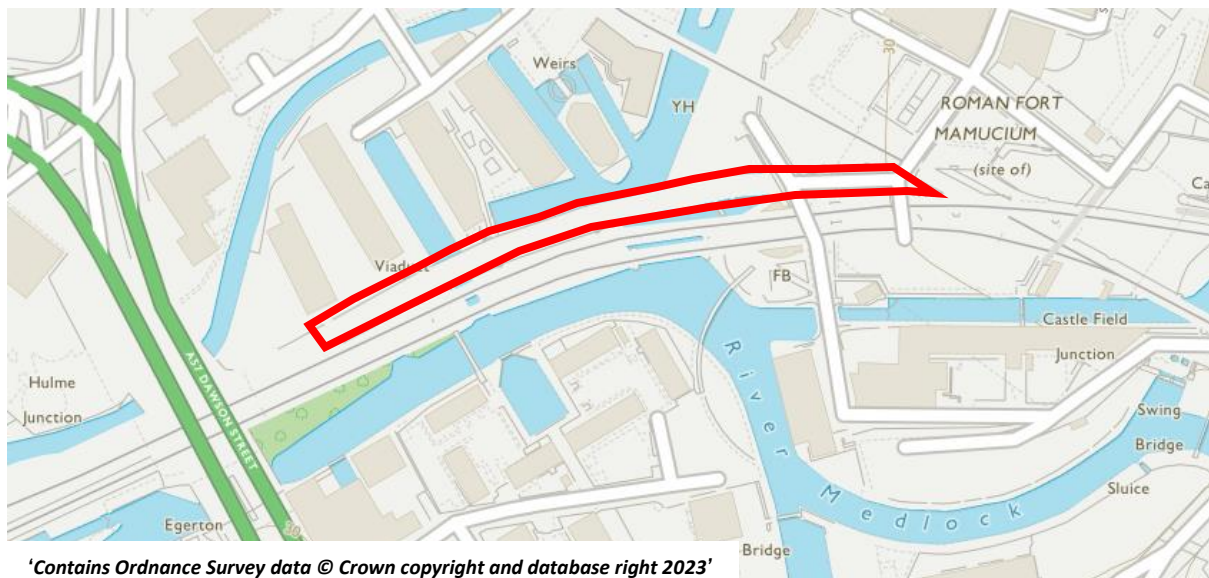


Figure 1 – Site Extent

The site is 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.

The site comprises a renovated section of the previously derelict Castlefield viaduct, now a publicly open urban green space, with plans for further development. This constitutes several sections. The focus of the report delineates sections either side of a newly-built visitor centre at the centre of site; the ‘developed section’ – a publicly open path lined by planted and actively managed successional vegetation habitat to either side; and the ‘undeveloped section’ – a wider stretch of sparsely vegetated land left entirely to natural successional processes. Between the ‘developed’ section and the visitor centre, a recreational area of ornamental planters features a diverse range of exotic and native trees.

and shrubs, as well as artificial water features aimed at boosting biodiversity, and benches & chairs for visitors.

1.3 Purpose of this Report

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

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

“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 throughout 2022 - 2023.

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:

1. Identify plant species distribution, diversity, and abundance within the retained habitat areas of Phase 1 and Phase 2 and assess changes throughout the year;
2. Identify invertebrate species present on site and assess changes in distribution, diversity, and abundance throughout the year;
3. Identify bird species present on site and assess changes in distribution, diversity, and abundance throughout the year;

4. 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 having no decrease in number of plant species recorded on site within the retained sections of the Viaduct habitat.

2 Methods

This 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 and 2023.

Four 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 (Autumn): 5th September 2022, clear, sunny, 16°C
- Monitoring Survey Visit 2 (Winter): 29th November 2022, clear, dry, 8°C
- Monitoring Survey Visit 3 (Spring): 16th March 2023, cloudy, dry, 10°C
- Monitoring Survey Visit 4 (Summer): 6th July 2023, clear, dry, 19°C

Bat activity surveys to assess how bats are using the site were conducted in September and October of 2022, and from April through to September 2023. These surveys followed good practice guidance within Collins (2016), starting at sunset and continuing for approximately 2 hours. The survey route used covered both sides of the viaduct to allow comparisons between level of use. The results of these surveys are detailed in a separate Bat Activity report.

3 Plants

3.1 Monitoring Strategy

To understand the success of plant species and habitats present within the site, the viaduct was subject to four comprehensive, seasonal survey visits over a year between Autumn 2022 and Summer 2023 to record plants that are present on site in the natural habitat sections. A detailed species list and relative abundance were 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.

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. Notably, wild strawberry was present.

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.

During the third monitoring survey visit, 29 plant species were recorded on the undeveloped section of the site, and 22 species were recorded within the natural sections of the developed viaduct site. Notably, new flowering plants such as forget-me-nots and daisies were present.

During the fourth monitoring survey visit, 34 plant species were recorded on the undeveloped section of the site, and 38 species were recorded within the natural section of the developed viaduct site.

In total, 101 different plant species were recorded throughout the entire viaduct and monitoring period. 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. In subsequent visits, the magnitude of this divide remained consistent whilst new species were recruited, and species richness increased. 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	Species recorded in 3 rd visit	Species recorded in 4 th visit	Total number of species	Number of species recorded not present within rest of viaduct
Developed section	19	24	22	39	30	29
Undeveloped section	41	26	29	34	45	43

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 – expectedly, the undeveloped section features a greater proportion of opportunistic and early successional species, whereas the developed side has allowed management for a greater proportion of grasses and herbs. In earlier surveys, the undeveloped section hosted a greater species richness than the developed, controlled side, though by summer 2023 this had reversed, and the developed side hosted more. This may be reflective of the unmanaged invasive and early successional species present in the undeveloped side. Within the developed section of the Viaduct, 29 plant species were present which were not present on the undeveloped section, similarly the undeveloped section had 43 plant species that were not present within the developed section. The greater proportion of unique species to the undeveloped section is reflective of the lack of management.

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 on the 5th September 2022 - namely rockspray cotoneaster (*Cotoneaster horizontalis*) – and were further noted to have spread across the undeveloped site on all successive visits. Site staff and the National Trust project lead were to be notified of their presence. Invasive species removal may become necessary for future development, for which the consultation of an invasive species removal specialist is recommended.

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 was 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 surveyors walked the same pre-determined route at a standard pace and recorded 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.

When butterflies were recorded on a particular plant on site, then the species of plant was identified and recorded. These results were then 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 were also 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. Invertebrates were seen broadly throughout the site, though expectedly surrounded flowering plants such as daisies and hawkweeds, with many attracted to the horticultural planters. In the undeveloped section, groups were seen more often at denser assemblages of vegetation.

Monitoring Visit Date	Viaduct section	Species seen	Conservation status	Total number of species
05/09/2022	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
29/11/2022	Developed section	Wasp	No species of conservation concern recorded	1
	Undeveloped section	-	-	-

Monitoring Visit Date	Viaduct section	Species seen	Conservation status	Total number of species
16/03/2023	Developed section	Honey Bee	No species of conservation concern recorded	1
	Undeveloped section	-	-	-
06/07/2023	Developed Section	Honey Bee White-tailed bumblebee Seven-Spot Ladybird Small White Wasp	No species of conservation concern recorded	5
	Undeveloped Section	Honey Bee White-tailed bumblebee Small White	No species of conservation concern recorded	3

The butterfly species observed on site are common and widespread within the UK, 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 (*Larus canus*) and magpie (*Pica pica*) 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 during any of the visits.

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

Monitoring 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)

Monitoring Visit Date	Species observed	Activity	Breeding status	Conservation status
16/03/2023	Feral pigeon	At least 8 individuals observed; probably nesting in the viaduct beams	Nesting and breeding on site	Green list (BoCC 5)
	Wren	Observed in horticultural planters	No sign of nesting within site	Amber list (BoCC 5)
	Magpie	Flying overhead	Not breeding or nesting within site	Green list (BoCC 5)
	Black-headed gull	Flying overhead	Not breeding or nesting within site	Amber list (BoCC 5)
06/07/2023	Goldfinch	Heard from metal arches	No sign of nesting within site	Green List (BoCC 5)
	Magpie	Observed several times watching over site, and within the undeveloped section	Not breeding or nesting within site	Green list (BoCC 5)
	Feral pigeon	Observed frequently across site	Nesting and breeding on site	Green list (BoCC 5)
	Wren	Observed foraging within planter	No sign of nesting within site	Amber list (BoCC 5)

Several staff at the viaduct have also noted the persistent presence of a sparrowhawk (Amber list (BoCC 5)) foraging within the undeveloped section of the viaduct, as well as mallard (Amber list (BoCC 5)) making use of artificial water features introduced on the recommendations of the interim report – a large water-filled barrel, and a small ornamental pond.

6 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. Into 2023, the difference in richness between sides remained similar, though generally species richness increased across the entire site. By the latest surveys, the developed side featured more species than the undeveloped for the first time, a trend likely reflective of the unmanaged dominance of invasive and early successional species left undeveloped. The species found on the undeveloped side tended to be more mature, with saplings of some common tree species such as oak (*Quercus* spp.), grey willow (*Salix cinerea* subsp. *oleifolia*), and rowan (*Sorbus aucuparia*) 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, as may be evident in the undeveloped. Following successional ecology, it is likely in time that the dominant early successional species will be gradually replaced, though future plans may aim to likewise develop this section.

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, a trend backed in the summer survey of 2023, during which a greater proportion of invertebrate species were again seen. Little difference in species richness was observed between the sections.

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 four 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.

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 Viaduct

Species recorded	Visible during visit 1?		Visible during visit 2?		Visible during visit 3?		Visible during visit 4?	
	Developed	Undeveloped	Developed	Undeveloped	Developed	Undeveloped	Developed	Undeveloped
annual meadowgrass							X	X
ash		X						X
autumn hawk bit						X		
beech								X
Bent spp.							X	X
berberis aquifolium		X		X				
Hairy bittercress	X		X	X	X			
Bramble	X	X	X	X				X
brassica								
bristly oxtongue			X		X			
broadleaved plantain							X	
broom				X		X		
buddleia	X	X	X	X	X	X	X	X
cocks foot							X	X
colts foot	X		X		X		X	
common chickweed	X							
common fleabane		X		X				

Species recorded	Visible during visit 1?		Visible during visit 2?		Visible during visit 3?		Visible during visit 4?	
	Developed	Undeveloped	Developed	Undeveloped	Developed	Undeveloped	Developed	Undeveloped
common groundsel	X		X		X	X	X	X
common polydopy						X		
common ragwort					X			
common sow thistle					X			
creeping bent		X		X		X	X	
creeping thistle			X		X			
daisy		X	X	X			X	X
dandelion	X	X	X	X	X	X	X	X
dogwood						X		X
euphorbia sp.	X							
false oat grass							X	X
fern				X		X		X
forget-me-not							X	
franchets cotoneaster		X		x		X		X
fringed willowherb							X	X
garden sorrel							X	
goat willow		X						X
greater willowherb	X	X	X		X	X		
greater plantain	X		X					
grey willow		X						X
hairy chickweed					X			
hairy willowherb		X		X			X	

Species recorded	Visible during visit 1?		Visible during visit 2?		Visible during visit 3?		Visible during visit 4?	
	Developed	Undeveloped	Developed	Undeveloped	Developed	Undeveloped	Developed	Undeveloped
hare's foot clover								X
hawksbeard							X	
hawkweed sp		X						
hemp agrimony	X		X					X
herb robert	X	X	X	X	X	X	X	X
honeysuckle								X
lesser trefoil		X						
maidenhair spleenwort		X		X		X		
manner ash						X		
mares tail					X			
mouse ear chickweed						X		
mouse ear hawkweed		X		X				X
narrow leaved hawkweed			X	X		X		
narrow leaved ragwort		X						
nettle							X	
new York aster		X						
oak sapling		X		X				
onion						X		
oxeye daisy		X		X				
perennial ryegrass					X		X	X
pine		X		X		X		

Species recorded	Visible during visit 1?		Visible during visit 2?		Visible during visit 3?		Visible during visit 4?	
	Developed	Undeveloped	Developed	Undeveloped	Developed	Undeveloped	Developed	Undeveloped
polygonum moss		X		X				
prickly lettuce							X	
Prickly sow thistle	X		X	X		X	X	
ragwort	X	X	X	X		X	X	X
Red Clover				X				
Red fescue		X	X	X			X	X
red valerian							X	
ribwort plantain		X			X		X	
rockspray cotoneaster								X
rose		X						
rowan	X						X	X
scotch brome								X
scot's pine								X
self heal							X	
shining cranesbill		X						
silver birch								X
Scentless Mayweed			X					
slender tare	X		X	X		X		
smooth cats ear						X		
soft-brome					X			
spear thistle			X				X	
spreading cotoneaster								X

Species recorded	Visible during visit 1?		Visible during visit 2?		Visible during visit 3?		Visible during visit 4?	
	Developed	Undeveloped	Developed	Undeveloped	Developed	Undeveloped	Developed	Undeveloped
st johns wort				X			X	X
Sun Spurge			X	X				
sweet briar		X						
tiny vetch							X	
Thyme-Leaved Speedwell			X					
Tufted hair Grass			X					
vetch						X	X	X
wall cotoneaster		X		X		X		
weld							X	
wheat							X	
white clover	X						X	
whitebeam								X
wild camomile							X	
wild cherry sapling		X						
Wild strawberry	X		X	X	X	X	X	X
wild thyme					X		X	
willow saplings						X		
yarrow								X
Yellowwort		X		X			X	
yorkshire fog				X		X	X	

