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1 INTRODUCTION

York Archaeological Trust was commissioned by Arup to undertake an archaeological baseline assessment of the likely archaeological deposit sequence, and the history, descriptions and significance of the buildings and structures on the site of the proposed York Central Development Area (Figure 1). This was carried out during January and February 2018. The aim of this study is to provide a baseline of information to inform future planning proposals within this area.

2 METHODOLOGY

2.1 Research

The bulk of the data was collected using the York Historic Environment Record (HER), the YAT site gazetteer, the York Royal Commission on Historic Monuments Survey (RCHMY 1, 1962) and the earlier York Central Desk-Based Assessment (Archaeological Services 2005). Additional information was taken from the City of York Council's Heritage Topic Paper (2013) and York Central Audit of Heritage Assets (2013).

A 900m radius search, agreed with the City of York Archaeologist John Oxley, was undertaken of the York HER to focus on the York Central Development Area and the immediate vicinity. These are the sites detailed in Table 2. To fully contextualise the York Central Development Area, a wider study area including York city centre and its surroundings was used for the historical background in Section 6.

A map regression study was also undertaken using information collated from Ordnance Survey and historic maps between the dates of 1545 and 1941.

A search was also made of readily available online resources, details of which are listed in the references below.

2.2 Guidance

This baseline study was written in accordance with CIfA's Standard and Guidance for Historic Environment Desk-Based Assessment (2017).

Significance of heritage assets was determined using Historic England's Conservation Principle Policies and Guidance (2008). The guidance highlights four main values when determining significance:

> Historical value: the ways in which past people, events and aspects of life can be connected through a place to the present - it tends to be illustrative or associative.
>
> Aesthetic value: the ways in which people draw sensory and intellectual stimulation from a place.
>
> Communal value: the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory.
>
> Evidential value: the potential of a place to yield evidence about past human activity.

Heritage assets hold meaning for society over and above functional utility. The value of a heritage asset may be derived from many different factors.

Table 1 Examples of heritage significance

Significance	Heritage Asset (examples)	Note
Very High	World Heritage Sites (including nominated sites). Assets of acknowledged international importance. Assets that can contribute significantly to acknowledged international research objectives. Scheduled Monuments (including proposed). Undesignated assets of schedulable quality and importance. Grade I and II* Listed Buildings, Registered Parks & Gardens Other substantial or very legible historic landscapes of note	Substantial harm to, or loss of, these assets should be wholly exceptional Any harm or loss to a heritage assets requires clear and convincing justification (NPPF para 132 & 152)
High	Assets that can contribute significantly to acknowledged national research objectives. Conservation Areas Undesignated assets of clear regional or national importance Locally Listed buildings Grade II Listed Buildings, Registered Parks & Gardens Other legible historic landscapes	Substantial harm to, or loss of, these assets should be exceptional (NPPF para 132) Any harm or loss to a heritage assets requires clear and convincing justification (NPPF para 132 &152)
Medium	Undesignated assets that contribute to regional research objectives	Any harm or loss to a heritage assets requires clear and convincing justification
Low	Undesignated Assets of limited value, but with potential to contribute to local research objectives. Assets compromised by poor preservation and/or poor survival of contextual associations. Historic (unlisted) buildings of modest quality in their fabric or historical association. Fragmented historic landscapes	Any harm or loss to a heritage assets requires clear and convincing justification (NPPF para 132 &152)

Negligible	Assets with very little or no surviving archaeological/heritage interest Buildings of no architectural or historical note Buildings of an intrusive character Areas of known ground disturbance	
Unknown	The importance of the resource (below ground deposits, landscape, setting or historic building) has not been ascertained.	Field evaluation may be required to evaluate potential buried assets (NPPF para 128)

3 LOCATION, GEOLOGY & TOPOGRAPHY

The study area is located to the south-west of the River Ouse and west of the medieval city of York. The red line boundary for the study area (Figure 1) stretches north west / south east from the rear of the present railway station to Water End bridge, with a narrow corridor along Leeman Road to where it meets Station Road. The north eastern extent of the area reaches the River Ouse, and stretches to the south west towards Holgate Road. The study area covers an area of approximately 57 hectares centred on NGR SE 5920 5190.

The underlying bedrock is sandstone from the Sherwood group formed approximately 229 to 271 million years ago in the Permian and Triassic periods. Above this, superficial deposits of glacial moraine are present consisting of clay, sand and gravel. These were formed during the last Ice Age as glaciers moved over the landscape and deposited moraine till combined with gravel and sand from seasonal and post glacial outwash (www.bgs.ac.uk – accessed 24/01/2018).

The study area is presently occupied by infrastructure related to the railway industry including railway lines, warehouses, car parks as well as the site of the National Railway Museum. The north western end of the study area is occupied by Holgate Beck. Along the northern and southern boundaries of the York Central Development Area are the residential areas off Leeman Road and the A59.

4 PLANNING AND LEGISLATIVE FRAMEWORK

4.1 National Policy

In March 2012 the Government published the National Planning Policy Framework (NPPF) in an effort to make the overall planning system less complex and more accessible. In this document Chapter 12 titled “Conserving and enhancing the historic environment” deals with archaeological and historic issues. This section supersedes the previous planning legislation, Planning Policy Statement 5: “Planning for the Historic Environment” (PPS5). However, in a revision note published by English Heritage in June 2012 it is stated that “the PPS5 Practice Guide remains a valid and Government endorsed document pending the results of a review of guidance supporting national planning policy”. It also states that “the policies in the NPPF are very similar and the intent is the same, so the Practice Guide remains almost entirely relevant and useful in the application of the NPPF”.

The relevant paragraphs of NPPF Chapter 12 are 126 – 141.

4.2 Regional and Local Policy

City of York Council is currently working towards a new Local Plan that is fully compliant with NPPF and other relevant statutes.

The City of York Local Plan pre-publication (Reg 18 consultation) Heritage Impact Appraisal (2017) and Annex A Final Changes to Policies (2017) have designated the York Central Area as Site Ref ST5 and identified a number of principles of development, as well as negative impacts likely as a result of developing in this location.

4.3 Policy SS4: York Central

"York Central (ST5) will enable the creation of a new piece of the city; with exemplar mixed-use development including a world class urban quarter forming part of the city centre. This will include; a new central business district, expanded and new cultural and visitor facilities, residential uses and a new vibrant residential community."

"Development within the York Central site will be permitted in accordance with the principles of development set out below." The relevant sections v-vi are included below.

> v) Create a distinctive new place of outstanding quality and design which complements the existing historic urban fabric of the city and respects those elements which contribute to the distinctive historic character of the city and assimilates into its setting and surrounding communities.
>
> vi) Conserve and enhance the special character and/or appearance of the adjacent Central Historic Core Conservation Area and St Paul's Square/Holgate Road Conservation Area.

4.3.1 Strong Urban Form

"Inappropriate development on this site may compromise the views to and from the area - in particular of the Minster and City Walls as well as impact on the setting of some of the listed buildings. The policy promotes development creating a new place of outstanding quality and design which complements and enhances the existing historic urban fabric of the city, respects those elements which contribute to the distinctive historic character of the city, and assimilates into its setting and surrounding communities. Views appraisal should inform forthcoming SPD and master-planning to mitigate potential harm. There is also the potential for this policy to have a positive impact on strong urban form, creating a new part of the city representing the best in contemporary design."

4.3.2 Compactness

"Inappropriate development may obscure views of city landmarks such as the Minster or significant elements of the railway infrastructure from within the site and further afield. The policy promotes development creating a new place of outstanding quality and design which complements and enhances the existing historic urban fabric of the city, respects those elements which contribute to the distinctive historic character of the city, and assimilates into its setting and surrounding communities. Views and site appraisal should inform forthcoming SPD and master-planning to mitigate potential harm. There is also the potential for this policy

to have a significant positive impact on compactness offering a mixed use development opportunity within the heart of the City."

4.3.3 Landmark Monuments

"Development may subsume or seek to demolish significant buildings which would have a negative impact on the character of the area. Potential for significant negative impact from development on the setting of listed buildings or may impact upon the clustering of the monuments in this area. Policy acknowledges the potential for harm and is clear that future development of the site must safeguard those elements which contribute to the distinctive historic character of the city. This is likely to mitigate against potential harm. Policy seeks outstanding quality in new design, which is likely to deliver a scheme which adds to the diversity of existing buildings and significant historic structures."

4.3.4 Architectural Character

"Poor architectural design and craftsmanship on this site would be detrimental to the high quality of buildings in York city centre. It may also impact on the setting of the Central and St. Paul's Square Conservation Areas, and on the setting of the grouping of railway heritage assets. Note that scale of development proposed has changed from min 410 dwellings/80,000 sqm B1a to 1,250 dwgs/61,000sqm B1a in the Plan period. Policy seeks outstanding quality in new design. Must ensure that urban design principles are established to guide an appropriate scale, massing and height of development on site. "

4.3.5 Archaeological Complexity

"The HIA (SITES) recognises the potential for significant harm to surviving archaeological deposits, and to extant heritage assets if area not fully understood. No policy reference to archaeological investigation or mitigating measures – this should be addressed. Desk-based assessment has been completed ahead of further archaeological investigation. A WSI was agreed for trenching in c.2008 but has yet to be implemented. "

4.3.6 Landscape and Setting

"No likely impacts identified."

5 DESIGNATIONS AND CONSTRAINTS

5.1 Archaeology and heritage designations

York is one of five cities that has been designated an Area of Archaeological Importance (AAI) under Part 2 of the 1979 Ancient Monuments and Archaeological Areas Act. The eastern part of the study area lies within York's (AAI) City Centre area. The historic nature of this area is discussed in Section 6 below.

An operations notice must be completed and returned to the Design, Conservation and Sustainable Development team before any work can start in an Area of Archaeological Importance, including: disturbance of ground; tipping on the ground; flooding of the ground.

It is an offence to carry out work in an AAI without an operations notice or within 6 weeks of submitting the notice.

It is an offence to use a metal detector within an AAI.

5.2 Conservation Areas

The York Central Historic Core Conservation Area is one of the largest and most complex in England with 24 character areas forming the whole of the conservation area. Each one is considered in a separate character statement. The eastern part of the site is within Character Area Twenty Two: Railway Area. This area takes in the old and the current railway areas, covering an area both inside and outside the city walls up to the river Ouse to the north. The southern boundary of the study area borders Conservation Area Four: St Pauls Square/Holgate Road. This area encompasses York's only formally laid out square, St Paul's, which dates from the 1850s, as well as formal urban properties of a similar date which grew up on the road linking York with the hamlet of Holgate and the village of Acomb.

5.3 Scheduled Monuments

There are no scheduled monuments located within the boundary of the study area. However located 180m to the east of the boundary are the York City Walls. They are a listed scheduled monument and comprised the medieval defences of the historic core of York (List entry number 1259262).

5.3 Listed Buildings

There are four listed buildings within the boundary of the study area, all associated with the Railway Station. The Railway Station itself is a Grade II* listed building (DYO404), and the former North Eastern Railway Good Station, Weigh Office, and gate piers and gates to York Goods Station are all Grade II listed buildings (DYO1653, DYO1654, and DYO1655).

There are two listed buildings on the boundary of the site, associated with York's War Memorial Garden (DYO907, DYO908), as well as numerous other listed buildings surrounding the site.

5.4 Local Listings

Local Listings are not afforded the same protection as statutory listed buildings. However they aim to show important buildings usually nominated by local people and thus are usually discussed during the planning process.

The Heritage Protection White Paper, published in March 2007, endorses and recommends the production of Local Lists, indicating that "local designation provides a means for local communities to identify and to protect the buildings, sites and spaces that matter to them. It helps to build a sense of local identity and distinctiveness, a sense of history, place and belonging".

The Development Control Local Plan for York of 2005 contains a commitment by the Council to "develop and approve policy which will be supported by Supplementary Planning Guidance for a Local List". The commitment has been carried forward into the evolving Core Issues document of the Local Development Framework which will eventually replace the Local Plan.

The Iron Foundries, terrace houses on Carleton Street and Carlisle Street, Railway Stables, the Bullnose Building, Upper St Paul's Play Area, Alliance House and the Canteen Building are all on the Local List.

5.4 Battlefield Sites, Historic Parks and Gardens

There are no registered battlefield sites or registered Historic Parks and Gardens within the study area.

6 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Non-designated heritage assets from prehistoric to modern have been recorded within the York Central Development Area and represent successive phases of settlement, cemetery and industrial activity. These are discussed below by period.

Prehistoric Period

There is some evidence that York may have been a regional focus for activity from the Neolithic period, particularly in the area to the south west of the Ouse. York is located at the western end of the York glacial moraine, a ridge of high ground running east-west across the Vale of York. This would have provided an important communication route through the low lying waterlogged areas within the Vale, and links the foothills of the Pennines and the chalklands of the Yorkshire Wolds, two important areas of prehistoric activity in Britain.

Evidence for prehistoric occupation in York was recorded in excavations at Heslington East (2009/48). Neolithic activity was indicated by a stone axe within a pit feature as well as residual lithics. Bronze Age activity consisted of a series of large pits focused near a springhead.

Stray finds from the York area indicate that prehistoric remains have likely been disturbed by the extensive occupation within the city. Polished stone axes have been found at the Mount, Holgate, Dringhouses, Dunnington, Haxby, Stamford Bridge, Newton-on-Ouse and Aldwark. Perforated mace heads have been found in York and Strensall (Benson 1911 5).

Within the boundaries of the study area near the outlet of Holgate beck, a number of Neolithic to Early Bronze Age implements were found in 1868 (Benson 1911 5, Gazetteer No 9 & 24). These included flaked stone axes, backed knives, arrowheads and scrapers, and have become known as the 'York Hoard'.

A Neolithic stone axe and pottery dating from the Late Neolithic/Bronze Age was found within peat deposits at St Pauls Green, Holgate (Antoni & Hunter-Mann 1999, Gazetteer No 7), just to the south of the study area boundary. These rare finds for York seem to indicate that the areas of higher ground to the south west of the Ouse may have been important locations from the Neolithic period.

There is minimal evidence for Iron Age occupation within York; however a crouched burial uncovered below the Roman burials during the construction of the Railway Station in the 19th Century may be of Iron Age date (RCHMY 1962, Gazetteer No 27).

Roman period

The study area is located to the west and just outside of the Roman civil settlement or *colonia* located on the south side of the river Ouse. This was an important area of settlement from the late 1st Century AD onwards, following the founding of the legionary fortress on the opposite side of the Ouse. Growth of the civilian settlement was particularly rapid in the late 2nd Century, represented by the construction of new buildings and streets. To the south-west of

the Ouse these included a substantial bath-house at 1-9 Micklegate, a high status building-possibly another bath house at Station Road and temples to Mithras and Serapis (Ottaway 2011). The main Roman road from *Calcaria*/Tadcaster to the Legionary fortress also runs through the *colonia* in the Micklegate area.

In the early 3rd Century York was given the honorific status of *colonia.* This term has been used to describe the settlement on the south west side of the Ouse. However there is no reason to suppose that the settled areas on the north east of the Ouse did not also enjoy the designation as a *colonia*. In the 3rd and 4th Centuries the civilian settlement appears to have undergone a period of prosperity, with the expansion of town houses, some with mosaic floors. A gradual decline in population and the deterioration of standing buildings and streets seems to have occurred from the mid 4th Century (Ottaway 2011).

Roads

The closest approach roads to the study area are Road 10 running south west and linking the legionary fortress to *Calcaria* Roman Tadcaster, and Road 9 from the north west linking York and Aldborough (Gazetteer No 25).

Remains of a Roman road, designated 8 (RCHMY 1962 79) were found during works near the Royal Station Hotel in 1874. Only a 30 yard stretch was uncovered, and appeared to be a minor road approaching the *colonia* from the north west. The projected line of this road could pass through the northern part of the study area.

Burials

In Roman settlements it was customary to bury the dead outside of the civilian settlement and particularly along roadways. As the study area is located just outside the main civilian settlement it follows that much of the Roman material is related to inhumation burials.

One of the major Roman cemeteries of Roman York was uncovered by works in the 19th Century on the construction of the present York Railway station and ancillary buildings. The railway cemetery is shown as stretching from south west of Station Road and the Cholera Burial Ground to the present location of the National Railway Museum (RCHMY 192 78, Gazetteer No 27). In the Roman period the cemetery also extended up to Road 10, the main Roman Road to Tadcaster. This part of the cemetery was covered over by the later expansion of the *colonia* to the line of the medieval wall.

Anglo-Scandinavian period

Following the withdrawal of Roman administration at the end of the 4th century, there are no documentary references to York before the early 7th Century. Therefore there is a paucity of information on the immediate post-Roman period. There is little structural evidence from archaeological excavations for this period, but that which has been revealed suggests that the settlement was situated further downstream than the Roman city. Material remains are largely confined to deposits of 'dark earths'. However evidence for a large timber building built upon the remains of a previous Roman building has been found at Queens Hotel (YAT 1988-9/17). Also an important Anglian cremation cemetery was discovered in the 19th Century at Dalton Terrace (Tweddle et al 1999 167-170) approximately 500m to the south of the study area. Cremation urns have also been found to the north-east of the Roman city (Archaeological Services 2005).

In 866 a Viking army entered the York region and in 876 Halfdan made Eoforwic, now named Jorvik, the capital of the Viking Kingdom of York. The Roman city was fully re-occupied and expanded, with defences built on the north-eastern side of the settlement and a programme of urban planning undertaken (Archaeological Services 2005). Part of this programme of urban planning may have included Micklegate, to the east of York Central, one of the major thoroughfares into York in the Anglo-Scandinavian and medieval periods (RCHMY 3 1972). The Micklegate road was of particular significance as it leads to the Ouse Bridge, the only bridge over the Ouse in the medieval period.

No archaeological remains are known from this part of York dating to the Anglo-Scandinavian period, although a carved jet pendant was discovered in the Railway Station area in 1877 (Archaeological Services 2005). The pendant was shaped into a coiled snake, which has parallels with other Viking artefacts, and is thought to date from the 10th century.

Medieval period

The study area is located to the west of the medieval settlement, and is outside of the medieval walled city. During the medieval period it was occupied by land known as Bishop's Fields. This appears to have been an area of fields, which may relate to an endowment granted by King Edwin in the 7th century. After converting to Christianity, Edwin helped establish and construct the first York Minster, granting lands to the Minster. The Bishop's Fields area is thought to have been part of that grant (Tillot 1961: 4).

The earliest recorded reference to Bishop's Fields is in 1374-75, contained within a document listing the boundaries of York. The study area is referred to as '*le Bysshopfeld*' and the name is frequently referenced in documents outlining the Liberties of York (Archaeological Services 2005). In 1380 there is a reference to the Archbishop's granary in Bishop's Fields, located opposite Tofts tower, which is tower number 13 in the medieval city walls, positioned at the angle of Queen Street and at the top of Toft Green. The position of the granary is not known. During the medieval period the Bishop's Fields were part of the parish of St. Mary Bishophill Junior and records indicate that the fields appear to have remained mainly agricultural in nature, with the exception of 14th century documentary evidence for tile-making in Bishop's Fields (Tillot 1961: 89). There is also a mention of the presence of a tile house in 1374/5 (Raine 1955: 312).

Between 1533 and 1535 the city lodged a legal protest against the Archbishop, claiming rights of pasture in the Bishop's Fields (Tillot 1961: 500). This indicates that the citizens of York had no rights on this large area of land at this time (Percy 1973: 91). The legal protest was unsuccessful: only three grounds (Lathe Flat, Haver Closes and Brecken Hill) within the fields occur in later references to pasturage, and Bishop's Fields were not part of the city's 18th century average (Tillot 1961: 500).

Post-medieval period

Bishop's Fields remained agricultural land throughout the post-medieval period, with little domestic or industrial activity. During the 17th Century, military activity occurred on the site of Bishop's Field on two separate occasions. In 1640 the Royal army was forced back to York by the advance of Scottish forces, and made camp on Bishop's Field for several weeks (Tillot 1961: 187). York City had to petition against their continued presence before they were dispersed. During the Civil Wars of 1642-1651, York City was loyal to Charles I. The city was

besieged by Parliamentary forces in the summer of 1644, during which time artillery batteries were erected at Bishop's Field to fire upon York's defences (Tillot 1961: 190). The position of the artillery batteries, and any associated earthworks, are not known, although they must have been relatively close to the city walls, and therefore may lie within the eastern part of the York Central site.

Throughout the 18th-19th centuries, York functioned predominantly as a provincial town and a resort for the gentry (Archaeological Services 2005). The development of the railways in the latter half of the 19th century had a significant influence upon the growth and topography of York, developing the city into a thriving industrial core. York was an important centre, not only as the halfway point between London and Edinburgh, but also for railway administration, becoming the headquarters of the North Eastern Railway between 1854-1924 (Tillot 1961: 478). The York and North Midland Company was founded in 1835, with George Hudson as chairman, and begun constructing the city's first railway line from Normanton.

A temporary wooden station was initially constructed along Queen Street, intended for short-term use until what is now known as the Old Station could be built. This temporary station was later used as a workshop, and still stands as a Grade II listed building (Archaeological Services 2005). Construction of the Old Station began in 1839, situated within the city walls near Tanner Row. This required a major programme of works, including infilling the city ditch, levelling the rampart and building an arch into the city walls.

A second railway line was constructed by the Great North of England Company in 1841 (Tillot 1961: 478). This line connected York to Darlington and cut across the Bishop's Fields area, although there are no existing records detailing whether any archaeology was encountered during these works. The line of the track forms what is now the southern boundary of the York Central Development Area. A further short line was added to this track later in 1846, when a line turning to the south to meet the York and North Midland railway north of Holgate Bridge was added, creating the railway junction known as the 'York Triangle' (Archaeological Services 2005). From the mid-19th century onwards, the continued development of the railway industry saw further tracks constructed for depot lines across Bishop's Fields.

The facilities at the Old Station were soon put under strain by increasing traffic. Modifications were made to the layout of the station including the construction of three additional platforms and the drilling of a second arch through the City Walls. Despite these modifications, the lack of space within the city walls led to the construction of a new railway station in 1877 outside the city walls (Tillot 1961: 472). This project resulted in a large programme of alterations to this area of York, including two further arches in the city walls and landscaping of the entire area. The two new arches in the city walls provided access to the station from Thief Lane, which became Station Road and Station Avenue. The continuation of Thief Lane into Bishop's Fields was improved and provided access to the new coal and lime depots that were situated there. This street was renamed Leeman Road in 1885.

Modern period

The early 20th century saw the area of Bishop's Fields increasingly developed by works associated with railway and other industries. The North Eastern Railway took over the premises of the former Phoenix and Albion iron foundries in 1905 and adapted them for permanent way and signalling workshops. Development increased around the Leeman Road

area in the first decade of the 20th century. The York Engineering Works expanded westwards, and the railway lines serving the works were removed (Archaeological Services 2005). The tracks for the Goods Station were expanded to serve the station and a new concrete depot which was constructed to the south of Leeman Road. Former agricultural land opposite Carlisle Street and Carleton Street was developed to create the North York Stack Yard.

In 1923 the North Eastern Railway became part of a new London & North Eastern Railway (LNER), which resulted in a programme of enlarging the passenger station and modernising the workshops. In keeping with the railway heritage in this part of York, a railway museum was opened in 1928 which later became the National Railway Museum. The museum utilised the former locomotive works at Queen Street, which had closed in 1905, and displayed several famous locomotive engines.

Expansion westwards into the undeveloped lands of Bishop's Fields continued throughout the 1930s. The engineering works expanded, filling in the area to the west of Carlisle Street and Carleton Street and the northwards angle of Leeman Road. New railway tracks were built to serve the expanded works. Further engineering works were constructed against the northern boundary of the York Central Development Area and a new street of terrace houses was built on the northern side of the main line tracks. South of Leeman Road, a series of warehouses were built on the old football pitch, as well as an area of allotments. By the end of the 1930s, there is little undeveloped space left within the York Central Development Area.

The area around the station and associated industrial structures was a strategic target for German bombing raids during World War II. An image contained in the York library shows a photograph taken by a Luftwaffe plane, with the area around the railway carefully highlighted as a target. The station was heavily bombed during the Baedeker Raids by German bombers in 1942. The Railway Station was heavily damaged and the incoming Kings Cross to Edinburgh train was hit and set alight as it arrived at Platform 9. In another raid the Station Masters Booking Office and the Parcel Office were destroyed and the Refreshments Room was damaged. The engine sheds to the north of Leeman Road also suffered a direct hit, which caused extensive damage to the building and two engines. The shed was out of action for several weeks. The raids were part of a series of airstrikes aimed at important cultural and historical centres in the country, with the aim of destroying civilian morale and disrupting industry (Archaeological Service 2005).

Following the nationalisation of the railways, the latter half of the 20th century saw a considerable scaling-down of workshop and train-support facilities in York and a withdrawal from most classes of goods traffic, including the sundries traffic which required an urban goods station. In 1975, the Railway Museum was superseded by the National Railway Museum which was initially situated in the former York North engine shed and later taking on also the York goods station and horse stable, together with part of the former Albion Foundry.

To the south of the study area was the site of the former Holgate Road Carriageworks, this opened in 1884 and continued to manufacture carriages until its closure in 1996.

Summary of archaeological investigations

Below is a summary of the relevant archaeological investigations that have been carried out within the study area (Table 2, Figure 2). Many of these are evaluations and watching briefs carried out ahead of development on the railway and associated activities. They suggest that much of the area has been heavily impacted by the construction of the railway in the 1870s. There were however, areas where earlier material survives particularly where the ground levels were built up rather than levelled prior to the 1870s construction work.

Table 2 Summary of archaeological investigations

Number	Site Name	Date	
1	Land off Leeman Road, York	1998	In January 1998 a watching brief was undertaken adjacent to the National Railway Museum on Leeman Road. No deposits of archaeological interest were uncovered during the project. Deposits present were mainly associated with significant landscaping during the construction of the railway in the 19th century.
2	Former Foxton's Garage, Leeman Road	1998	In January 1998 four trenches and four boreholes were evaluated at the site of the former Foxton's Garage, Leeman Road. The earliest deposits encountered appeared to be redeposited material associated with the construction of the railway in the 19th century.
3	IECC Compound, York Railway Station	1999	In 1999 an evaluation and watching brief was carried out at the site of a proposed extension to the York IECC building. No archaeological features were encountered during the works and the area appears to have been extensively disturbed through post medieval and modern activity. Residual finds of human bone, Roman pottery and Roman grave furnishings indicate the existence of earlier deposits.
4	Railway cutting 1874	1874	Painted wall plaster, tiles and a 'large fragment' of tessellated pavement were found during work on a railway cutting.
5	Foxton's Garage, Leeman Road	2000	In March/April 2000, MAP excavated two trenches within the interior of Foxton's Garage. Trench 7 uncovered natural deposits at 5.85m AOD. Cut into the uppermost natural deposits were Roman pits at a maximum height of 6.99m AOD. These were sealed by 19th century dump deposits.

Number	Site Name	Date	
6	Former Concrete works, Leeman Road, York	2000	During June 2000 York Archaeological Trust carried out a watching brief on the site of the former concrete works, Leeman Road. Modern levelling deposits were encountered.
7	Bishops Fields Development, Leeman Road, York	2001	A watching brief at Bishop's Fields encountered natural deposits at 13.80m AOD, close to the present ground surface alongside Leeman Road. In the other areas of the site the made ground was too deep for works to reach natural deposits. No archaeological deposits were present.
8	Riverside Apartments, Leeman Road	2001	No information about watching brief recorded in HER or online.
9	Observations during Construction of North East Railway Gasworks	1868	A hoard of Bronze Age flint tools and weapons were found during construction of gas works close to the confluence of Holgate Beck and the River Ouse.
10	Platform 11 footbridge York Station	2004	In 2004 a watching brief was undertaken at the proposed extension of a footbridge to Platform 11 at the Railway Station. No archaeological deposits were present.
11	St. Paul's Green, Holgate	1999	Between April and May 1999 York Archaeological Trust carried out a watching brief on a housing development at St Paul's Green, Holgate. Unusually well preserved peat deposits were uncovered in the southern part of the site, as well as evidence for prehistoric occupation. The finds included a stone axe, pottery dating to late Neolithic/early Bronze Age and pot boilers. The top of these deposits sloped from 11.76m AOD to approximately 10.8m AOD down to the south-west. The peat deposits were further investigated through a programme of borehole interventions. The peat deposits appear to be extensive but irregular with two concentrations, one in the area designated as public open space and the other beneath the Roman levelling deposits. It appears that the peat is threatened by drying out as the result of disturbance by drain trenching.
12	ABB site Poppleton	1995	A watching brief was carried out in August 1995 at

Number	Site Name	Date	
	Road		ABB, Poppleton Road, York. This found dump deposits probably laid to raise the ground level. No archaeological remains were uncovered.
13	York Triangle, York Railway Station	2011	During November 1998 an evaluation of a proposed turntable at York Triangle was undertaken. The trenches revealed natural boulder clay at 10.46-11.11m AOD overlain by modern dumping and made ground deposits. Any archaeological deposits that may have been present appear to have been truncated by 19th-20th century landscaping for the railway.
14	SIEMENS Traincare Facility, Leeman Road	2006	Throughout 2006 a watching brief on works at the new Siemens Traincare Facility revealed build up deposits overlying natural deposits. No archaeological deposits were present.
15	National Railway Museum (New Motive Power Depot), Leeman Road	1998	In June-July 1998 a watching brief was undertaken on groundworks associated with the construction of the new Motive Power Depot and the National Railway Museum. The trenches mainly revealed modern rubble deposits underneath the concrete slab of the original motive power depot. In one trench a deposit of river silt was found at 1m BGL. Within a few of the trenches the modern features were above, or truncated, a thick levelling layer of redeposited clay. The levelling layer was interpreted as landscaping associated with 19th century railway works. Underneath the redeposited clay were laminated sands and gravels and boulder clay; natural glacial deposits. The top of these deposits were at a depth of 2m BGL.
16	Royal York Hotel, York.	1998	An archaeological evaluation was carried out within the grounds of the Royal York Hotel in 1998. Trenches 2 and 3 contained no archaeological features, but a soil deposit in Trench 3 may represent an accumulation of material in this area during the Roman period. In Trench 1 natural boulder clay was present at 12.67m AOD. Above this, at 12.84m AOD, was a deposit that produced 2nd century Roman pottery. Truncating that deposit were features containing Roman pottery, the top of the features were

Number	Site Name	Date	
			12.87m AOD. Above the Roman material were build up layers dating to the medieval or post-medieval period, to a height of 13.94m AOD.
17	Geotechnical investigations: York Central, archaeological monitoring	2006	A watching brief was undertaken on a series of 181 window samples and boreholes by Archaeological Services. The boreholes were undertaken across the York Central development site, which includes the study area and additional areas including the railway station and the NCP car park to the south. The southern and south western side of the area was considered to have a low potential for archaeological deposits. In the far western area laminated alluvial deposits were encountered which have been interpreted as evidence for a palaeochannel, possibly representing a prehistoric meander of the River Ouse. Above this no archaeological deposits were present. The area of high ground on which the present Leeman road is situated was substantially truncated during the construction of the railway. There was evidence for surviving soil deposits closer to the roadway, and in particular within a borehole on the eastern side of the National Railway Museum at 1.6m BGL. This may represent Roman deposits related to the cemetery revealed in the 19th century railway construction. Peat deposits were encountered in eight separate locations of various thicknesses, at depths of between 8.42m AOD and 11.91m AOD. These are more likely to represent peat forming within kettleholes or depressions rather than a continuous layer of peat. Given that similar deposits to the south were associated with Neolithic, Bronze Age and Roman remains (YAT 1999/73), these buried deposits offer considerable archaeological potential.
18	Royal York Hotel Extension	2015	In 2015 an evaluation of land at the Royal York Hotel was undertaken. Within Trench 1 the earliest deposit encountered was subsoil at 12.62m AOD. This contained Roman pottery, CBM and animal bone. Three pits containing Roman pottery, CBM,

Number	Site Name	Date	
			animal bone and oyster shell truncated the subsoil deposit. Trench 2 was excavated to a maximum depth of 13.44m AOD without encountering natural deposits. Above this were two deposits which may have been the same as the subsoil layer in Trench 1. Above this were tipping deposits and mortar deposits possibly associated with the construction of the hotel in the 1870's. These were sealed by soil deposits probably related to earth moving and landscaping in the 19th and 20th century.

7 HISTORIC MAP ANALYSIS

Cartographic evidence shows that the study area was situated on open fields called Bishop's Fields from 1545 to 1736 (Figures 4-7). The earliest cartographic evidence for the study area dates from 1545 and depicts 'The Bisshop Felds' as a large blank area to the west of the city walls (Figure 4). No further information is shown for this area, although it is highly likely that it was mainly undeveloped agricultural land. A large ditch is shown on the external side of the city walls, which is unlikely to be within the York Central Development Area. Speed's map of 1610 only shows a small patch of the eastern part of the development area (Figure 5). Greater detail is shown on this map, with individual buildings illustrated. Outside the city walls close to the River Ouse are a range of three or four buildings in a row and a further building opposite them. The buildings are not labelled so it is unclear whether they are domestic or industrial. No further detail is shown for Bishop's Fields.

Horsley's map of the *City of Yorke* (1697) shows the eastern half of the York Central Development Area (Figure 6). The study area is labelled as 'Bishops Fields' and is comprised of numerous fields situated to the west of the city walls. No great detail is shown for this area, and no structures are depicted within the majority of the area. There are two white rectangles immediately outside the city walls, close to the river, which may represent buildings. No information is given about them.

In Drake's map of 1736 only the eastern part of the study area is present (Figure 7). The area of Bishop's Fields is unlabelled and still undeveloped agricultural fields, with no structures present. The south-western corner of York is still contained within the city walls, with a large area still the open space of Friars Gardens.

The 1853 Ordnance Survey map illustrates the massive impact the railway industry had on this part of York (Figure 8). The development of the previously agricultural Bishop's Fields can be clearly seen, with railway lines and landscaping affecting the area. The York-Scarborough line is shown cutting across Bishop's Fields, with Thief Lane running north west/south east across the study area. A cricket ground and an area of gardens or allotments are situated to the north of Thief Lane. The majority of the study area is still undeveloped agricultural land. The Old

Station is shown within the walls of the city, and the railway lines are visible cutting through the city walls and rampart. A coal depot is indicated outside the city walls with tracks running to the south west to meet the main line.

By the 1892 Ordnance Survey map the expansion of the railway industry is apparent (Figure 9). The present Railway Station has been constructed outside of the city walls; however the Old Station is still visible in the Toft Green area. Expansion westwards into the Bishop's Fields area has progressed, with little undeveloped space left within the York Central Development Area. A coal yard and a Goods Shed are located immediately to the west of the main Station building. The site of the present National Railway Museum building is occupied by an Engine Shed. The southern and western part of the study area is occupied by extensive rail lines. An area of undeveloped land is present in the centre of the study area, with a football pitch located in the centre. At the western end of Leeman Road is located the Phoenix and Albion Iron Works. To the north of the Iron Works are terraced houses built to house the railway workers. Rows of terraced houses have also been constructed to the south, between the Railway Station and Holgate Road. Holgate Beck runs north into the River Ouse and is crossed by Brick Kiln Bridge that may be a reference to previous industry within the area. The Station Hotel has been built along Station Road. Thief Lane has now been developed, with a foot and road tunnel built at the track crossing at Marble Arch, and renamed Leeman Road and follows the line of its present course.

The 1909 edition of the Ordnance Survey map shows the increasing development of the railway industry into the Bishop's Fields area, especially around the Leeman Road area (Figure 10). The North Eastern Railway took over the premises of the former Phoenix and Albion iron foundries in 1905 and adapted them for permanent way and signalling workshops. The York Engineering Works expanded westwards, and the railway lines serving the works were removed. The tracks for the Goods Station were expanded to serve the station and a new concrete depot which was constructed to the south of Leeman Road. Former agricultural land opposite Carlisle Street and Carleton Street was developed to create the North York Stack Yard.

On the 1932 Ordnance Survey map (Figure 11) an engineer’s works is shown to the west of the Iron Works which is now linked by railway lines to the rail network. The area to the west of Carlisle Street and Carleton Street and the northwards angle of Leeman Road has been filled in. An area of allotment gardens is present to the east of the Iron Works. The terraced housing associated with the Iron Works has now expanded to the south.

The result of continued development throughout the 1930s can be seen on the 1941 Ordnance Survey map (Figure 12). Very little undeveloped space remains within the York Central Development Area, with a patch of land around Holgate Beck and another in the centre of the study area being the only open spaces left.

The historic map analysis has demonstrated the rapid growth of the south-west corner of York from the mid-19th century with the development of the railway industry. Prior to this, the York Central Development Area had remained relatively undeveloped agricultural land from at least the mid-16th century.

8 AREAS OF ARCHAEOLOGICAL POTENTIAL

An analysis of the archaeological potential of the York Central Development Area can be seen in Figure 3. The table below sums up the potential and significance, based on previous archaeological discoveries and the level of truncation present.

Table 3 Archaeological potential of the York Central Development Area

Potential	Reasons
High 1	Despite high levels of truncation and made ground recorded during various investigations, there is still the high potential for significant remains of the Roman cemetery to be present in this area. Part of Roman Road 8 was found at Station Road, which may extend into this area.
High 2	The relatively limited amount of development, and therefore potentially little truncation, that has occurred in this area means that there is still high potential for significant Roman remains in this area. The full extent of the Roman cemetery is unknown, and it may continue in this direction. The line of Roman Road 9 is also meant to cross the southern edge of this area.
High 3	This patch of land around Holgate Beck on the western boundary of the study area has been identified as another area of high potential. Little development has occurred in this area, but previous works have found Neolithic-Bronze Age flint hoards of high significance. Prehistoric activity is rare in York, and this higher area of ground to the west of the city may have seen settlement activity in the prehistoric period.
Medium	The central core of the York Central Development Area has been identified as medium potential for significant archaeological deposits. Landscaping and development from the mid-19th century has resulted in most of the area being truncated. Borehole data has indicated that some archaeological deposits do survive despite this, especially in the Leeman Road area.
Low	Most of the low potential area is covered by train tracks. Little of archaeological significance has been found in this area and it is thought to be beyond the western limit of the Roman cemetery.

9 SUMMARY

This baseline assessment has found that there is evidence for archaeological activity from the prehistoric to modern periods within the York Central Development Area.

The study area has been heavily impacted by the 19th century construction of the Railway Station and associated groundwork and industrial activity. Evidence from watching briefs and evaluations suggest that in many areas earlier remains have been disturbed or removed by the levelling and preparation of land for construction. However, pockets of undisturbed ground

are still present and some archaeological deposits may have been protected by large dumps of made ground laid to level the natural topography in the 19th century.

The southwest of the River Ouse was a focus for prehistoric activity, with stray finds including a number of Neolithic to Early Bronze Age flints found near Holgate Beck and St Pauls Green, Holgate. Prehistoric finds from York are rare, and these flints indicate that the areas of higher ground to the south-west of the River Ouse may have been a favourable area for prehistoric activity. Despite modern truncation of the study area, there is still a **high** potential for significant prehistoric remains to be present. The southern part of the study area is known to contain peat deposits that have the potential to provide environmental information as well as prehistoric artefacts.

There is some evidence for the survival of Roman remains within pockets of land that have been minimally disturbed by later activity. This seems most likely in the northeast and southeast parts of the study area. Roman deposits are likely to relate to the large cemetery situated between Leeman Road and Blossom Street and The Mount. There is a **high** probability of significant Roman remains in these areas of land that have been relatively undisturbed by 19th-20th century landscaping.

There is little evidence for any significant archaeological activity in the study area for the Anglo-Scandinavian, medieval and early post-medieval periods. Records indicate that the study area was undeveloped agricultural land throughout this time, known as the Bishop's Fields. There is a **low** potential for archaeological remains from these periods.

During the 19th and 20th centuries the developing railway industry greatly changed the landscape of the study area. There are extensive remains within this area that relate to the early history of the nation's railways, which are of local and national importance. Accordingly there is a **high** potential for significant 19th-20th century archaeological remains.

9 LIST OF SOURCES

https://www.exploreyork.org.uk/

http://mapapps.bgs.ac.uk/geologyofbritain/home.html?

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11 APPENDIX 1 GAZETTEER OF SITES

Table 4 Gazetteer of sites used in study

Number	Site Name	Date	Reference
1	Land off Leeman Road, York	1998	Brinklow, D., 1998. Watching brief on land off Leeman Road, York. YAT Report 1998/3
2	Former Foxton's Garage, Leeman Road	1998	Unpublished document: YAT. 1998. Former Foxton's Garage, Leeman Road
3	IECC Compound, York Railway Station	1999	Unpublished document: FAS. 1999. IECC Compound, York Railway Station.
4	Railway cutting 1874	1874	Monograph: RCHME. 1962. Inventory of the Historical Monuments in the City of York, Volume 1 Eburacum. 63
5	Foxton's Garage, Leeman Road	2000	Unpublished document: MAP. 2000. Foxtons Garage Leeman Road.
6	Former Concrete works, Leeman Road, York	2000	Unpublished document: YAT. 2000/53. Former Concrete Works Leeman Road.
7	Bishops Fields Development, Leeman Road, York	2001	Unpublished document: YAT. 2001/11. Bishop Fields Development Leeman Road York.
8	Riverside Apartments, Leeman Road	2001	Unpublished document: MAP. 2001. Riverside Apartment Leeman Road.
9	Observations during Construction of North East Railway Gasworks	1868	Monograph: RCHME. 1972. RCHME City of York Volume III South-west of the Ouse. ppxxxviixxxix
10	Platform 11 footbridge York Station	2004	Unpublished document: YAT. 2004/38. Platform 11 Footbridge York Station.

Number	Site Name	Date	Reference
11	St. Paul's Green, Holgate	1999	Unpublished document: YAT. 1999/73. St Paul's Square Holgate.
12	ABB site Poppleton Road	1995	Unpublished document: YAT. 1995. ABB site Poppleton Road.
13	York Triangle, York Railway Station	2011	Unpublished document: NAA. 2011. Proposed Turntable site at York Triangle.
14	SIEMENS Traincare Facility	2006	Unpublished document: NAA. 2006. Siemans Traincare facility Leeman Road.
15	National Railway Museum (New Motive Power Depot), Leeman Road	1998	Unpublished document: YAT. 1998. National Railway Museum, Leeman Road.
16	Royal York Hotel, York.	1998	Unpublished document: OSA. 1998EV10. Royal York Hotel, Station Road Evaluation.
17	Geotechnical investigations: York Central, archaeological monitoring	2006	Unpublished document: Archaeological Services University of Durham. 2006. Geotechnical investigations: York Central.
18	Royal York Hotel Extension	2015	Unpublished document: OSA. 2015EV30. Royal York Hotel Extension Report on an Archaeological Evaluation.

Table 5 Gazetteer of Listed Buildings

Number	Name	Designation ID	Grade
19	Former North Eastern Railway Goods Station	DYO1653	II
20	Former Weigh Office	DYO1654	II

Number	Name	Designation ID	Grade
21	Gatepiers and Gates to York Goods Station	DYO1655	II
22	York City Memorial in War Memorial Garden.	DYO907	II*
23	Gates and Gate Piers in War Memorial Garden	DYO908	II

Table 6 Gazetteer of Monuments

Number	Name	Monument ID	Monument date
24	Assemblage of Neolithic flint axes, one greenstone axe, and other flint objects (the "York Hoard")	MYO3890	Neolithic/Bronze Age
25	Roman Road Eburacum to Isurium	MYO2175	Roman
26	Ridge and Furrow York City	MYO3497	Unknown date
27	York Railway Station Roman Cemetery	MYO2010	Roman

12 APPENDIX 2 LISTED BUILDINGS

12.1 RAILWAY STATION, YORK

List Entry Summary

This building is listed under the Planning (Listed Buildings and Conservation Areas) Act 1990 as amended for its special architectural or historic interest.

Name: RAILWAY STATION

List entry Number: 1256554

Location

RAILWAY STATION, STATION ROAD

The building may lie within the boundary of more than one authority.

County:

District: York

District Type: Unitary Authority

Parish:

National Park: Not applicable to this List entry.

Grade: II*

Date first listed: 01-Jul-1968

Date of most recent amendment: Not applicable to this List entry.

Legacy System Information

The contents of this record have been generated from a legacy data system.

Legacy System: LBS

UID: 464767

Asset Groupings

This list entry does not comprise part of an Asset Grouping. Asset Groupings are not part of the official record but are added later for information.

List entry Description

Summary of Building

Legacy Record - This information may be included in the List Entry Details.

Reasons for Designation

Legacy Record - This information may be included in the List Entry Details.

History

Legacy Record - This information may be included in the List Entry Details.

Details

YORK

SE5951NE STATION ROAD 1112-1/15/1000 (West side) 01/07/68 Railway Station

GV II*

Formerly known as: The New Station STATION PLACE. Railway station. 1872-77: original platforms extended to north and south, western platform and Tea Room added, Platform Signal Box and bookshop constructed 1900-09; western platform refurbished and new footbridge built 1938-39; damaged by bomb in 1942, repaired 1947; new Signal Box 1951; all windscreens except one replaced in 1972; major refurbishment in 1977. Original architects were Thomas Prosser, Benjamin Burley and William Peachey. MATERIALS: station and train shed of yellow Scarborough brick in Flemish and English garden-wall bonds with moulded ashlar plinth, plinth band and dressings; roof carried on wrought-iron trusses supported on cast-iron columns. 1930s platform buildings of colour-washed stucco; new Signal Box of orange brick in stretcher bond, header bond on curved corners, with artificial stone dressings: footbridge iron framed with iron railings; Platform signal box and Tea Room of timber. Roofs generally glazed, with some slate, and glazed windscreens; extension platforms covered with corrugated steel sheeting. Stacks are brick, some with moulded stone cornices. PLAN: station consists of aisled train shed with former ticket hall and concourse on eastern side, and portico further east: to west, extension platform with service buildings and new Signal Box built against train shed western wall. EXTERIOR: portico is of 1 storey with clerestory and 9 bays behind cantilevered glazed awning. Arcaded front is of keyed segmental arches on pilaster piers with moulded stone imposts and hoodmoulds. Centre bay is open; flanking bays closed by balustrades of bulbous stone balusters and brick piers, the upper part with glazed timber screens. Moulded eaves cornice surmounted by balustraded parapet. Station clock on S-shaped projecting bracket incorporating the arms of the North Eastern Railway Co. to left of centre. Former ticket hall front within portico: 1 storey and clerestory; 12 bays, 4 centre bays breaking forward. 4 segment-arched openings in centre have pilaster jambs with moulded stone plinth bands and imposts; spandrels at the head are sunk panelled beneath clerestory lights in semicircular keyed brick arches with stone hoodmoulds. Openings on each side, some squat 6-pane sash windows, some altered to C20 doors, have stepped brick panels with segmental heads, some glazed, in clerestory. Train shed elevations: 1 storey and clerestory; blind arcades of round-arched recesses between 3-stage buttresses with moulded stone offsets: clerestory above plain stone band is pierced in each bay by an oculus. Moulded stone eaves cornice, badly decayed in places. At each end are massive square terminal piers with moulded bracket cornices and cross pedimented caps. On western side, New Signal Box is of 3 storeys, 13 bays. The main part is articulated in brick pilasters each with oversize triple keyblock of artificial stone at the head. Windows are metal framed top-opening or pivoting lights. Tea Room Square front: 2 storeys and attic; 6-bay quoined front arranged 2:2:2; centre bays on ground floor project to form 1-storey canted bay window, balustraded at first floor: to left is lower 2-storey 2-bay block. Ground floor openings to main part are arcaded in tall keyed round arches with hoodmoulds between pilaster piers with moulded capitals, those to bay window crocketed. Windows are recessed, of 2 lights, 5 panes high, with blind round heads, over moulded stone sills: centre bay window is altered to makeshift door. All first floor

windows are segment-headed 2-light casements over moulded stone sills and swagged stone aprons, set in cambered arches with garlanded keyblocks. Moulded eaves cornice beneath balustrade of bulbous stone balusters, brick piers and moulded stone coping. Central attic flanked by volutes encloses swagged arms of the NER. Block to left has recessed round-headed sash windows on ground floor, cambered arched sashes on first floor, all 4-paned. Tea Rooms extending through train shed wall on both sides has 2-storey 4-bay spine block between 1-storey parallel ranges. 1-storey fronts have bowed and canted bay windows with square latticed transomed casements incorporating good Art Nouveau glass. Panelled parapet over bracketed eaves string. Bow windows to Square front have domed caps surmounted by tall finials. Original train shed windscreen of tiered arcaded lights survives at end of eastern aisle between Tea Rooms and station hotel. INTERIOR: former ticket hall has roof of 7 hammer beam trusses springing from corbel brackets and stiffened with ornate tie rods. Segment arched opening with garlanded keyblock leads to concourse, between segment-arched doorways with semicircular fanlights. In clerestory over each arch are semicircular panels of brick or stone with stone voussoirs, keyblocks and hoodmoulds. Concourse enclosed on three sides by 2-storey ranges except where bomb damaged. Central opening is segment-arched with pilaster responds and moulded imposts. Canted corner bays have doorways with pilasters jambs with foliate capitals beneath semicircular brick arches set with stone voussoirs, and hoodmoulds with volute keyblocks. Ground floor openings, originally round headed 4-pane sash windows now mostly altered, are round-arched and recessed and tied with moulded impost band. Above moulded cornice, upper floor openings are blind sunk panels in moulded surrounds across main range, 4-pane sashes beneath keyed cambered arches in side ranges.

North of central arch is a ceramic tiled map of the NE Railway network in moulded tile frame. Fourth side of concourse partly blocked by 2-storey Platform Signal Box and bookshop. Bookshop has sliding shop doors on concourse side. First floor glazed with 6-pane horizontal sliding sashes over moulded sunk panels. Moulded bracketed eaves cornice. On concourse side is a clock in pedimented timber surround beneath voluted panel enclosing a roundel. On platform side, massive clock on openwork S-shaped bracket incorporating foliage, white roses and the City of York arms projects over footbridge. Train shed is aisled in arcades of segmental arches springing from Composite columns also supporting transverse segment-arched trusses, the outer ends of which are carried on pilasters attached to outer walls: arch spandrels filled with heraldry set in foliage trails incorporating the Yorkshire rose. Inner side of walls arcaded as outside. Brackets projecting from two columns and incorporating foliated NER monogram now support television screens. North and south extensions are roofed with braced trusses on twin colonnades of slim Corinthian columns: canopies are valanced. (Bartholomew City Guides: Hutchinson J and Palliser DM: York: Edinburgh: 1980-: 246-7).

Listing NGR: SE5959751712

Selected Sources

Books and journals

Hutchinson, J, Palliser, D M, 'Bartholomew City Guides' in York, (1980), 246-247

National Grid Reference: SE 59597 51712

12.2 FORMER NORTH EASTERN RAILWAY GOODS STATION

List Entry Summary

This building is listed under the Planning (Listed Buildings and Conservation Areas) Act 1990 as amended for its special architectural or historic interest.

Name: FORMER NORTH EASTERN RAILWAY GOODS STATION

List entry Number: 1407453

Location

Leeman Road (South East, Off)

The building may lie within the boundary of more than one authority.

County:

District: York

District Type: Unitary Authority

Parish: Non Civil Parish

National Park: Not applicable to this List entry.

Grade: II

Date first listed: 08-Apr-2003

Date of most recent amendment: Not applicable to this List entry.

Asset Groupings

This list entry does not comprise part of an Asset Grouping. Asset Groupings are not part of the official record but are added later for information.

List entry Description

Summary of Building

Legacy Record - This information may be included in the List Entry Details.

Reasons for Designation

Legacy Record - This information may be included in the List Entry Details.

History

Legacy Record - This information may be included in the List Entry Details.

Details

Former Goods Station, now railway museum. 1875-77 with minor late C20 alterations. Designed by Benjamin Burleigh for the Great Northern Railway Co. 2-storey office block with single-storey goods sheds behind. Red brick with white brick and ashlar dressings. Slate roofs to office block and steel sheeting to sheds. Office block has blue and white brick impost band, projecting first-floor cill band and deeply moulded brick cornice. Main north-east facade has 9 windows with a 2-storey, 2-window, central entrance projection. Central round-headed

doorway with deeply moulded brick doorcase and double doors with octagonal panels and a tall, 2-light, fanlight. This entrance is approached up a double flight of steps with an ornate iron balustrade. Above are 2 segmental-headed sash windows. Either side are 4 round-headed windows with keystones, those to left with margin-light windows and those to right with sashes; above are 4 smaller segmental-headed sashes each with a moulded lower panel. Side facades have 4 windows each, with similar fenestration. Goods sheds have giant brick pilasters and deeply moulded brick cornice. Either side of the office block is a single wide segmental arch with ashlar impost blocks, keystones and hood mould. Sides have 11 bays defined by pilasters with two symmetrically placed entrance arches at bays 4 and 8. Rear facade has 4 main gables with various large and small segmental entrance arches, small central single projection with slate roof and irregular fenestration.

Selected Sources

None.

National Grid Reference: SE5935951842

12.3 FORMER WEIGH OFFICE, LEEMAN ROAD

List Entry Summary

This building is listed under the Planning (Listed Buildings and Conservation Areas) Act 1990 as amended for its special architectural or historic interest.

Name: FORMER WEIGH OFFICE

List entry Number: 1407456

Location

Former Weigh Office, Leeman Road

The building may lie within the boundary of more than one authority.

County:

District: York

District Type: Unitary Authority

Parish: Non Civil Parish

National Park: Not applicable to this List entry.

Grade: II

Date first listed: 08-Apr-2003

Date of most recent amendment: Not applicable to this List entry.

Asset Groupings

This list entry does not comprise part of an Asset Grouping. Asset Groupings are not part of the official record but are added later for information.

List entry Description

Summary of Building

Legacy Record - This information may be included in the List Entry Details.

Reasons for Designation

Legacy Record - This information may be included in the List Entry Details.

History

Legacy Record - This information may be included in the List Entry Details.

Details

Former Weigh Office, now office. 1875, with minor C20 alterations. Red brick with ashlar dressings. Asphalt and slate roofs. Brick plinth. Ashlar cill band and linked ashlar lintels. Moulded ashlar eaves cornice. Single storey. North-west entrance front has central doorway with 4-panel door and clock above. Either side are single narrow sash windows. South-west front has an early C20 single 7-light casement window with sliding sashes overlooking the metal weighing machine buried below ground. North-east front has two plate-glass sash windows. The rear has a small pitched-roofed addition with plate glass sash windows and a single 4-panel door.

Selected Sources

None.

National Grid Reference: SE5944051856

12.4 GATEPIERS AND GATES TO YORK GOODS STATION, LEEMAN ROAD

List Entry Summary

This building is listed under the Planning (Listed Buildings and Conservation Areas) Act 1990 as amended for its special architectural or historic interest.

Name: GATEPIERS AND GATES TO YORK GOODS STATION

List entry Number: 1407468

Location

Gatepiers and Gates to York Goods Station, Leeman Road

The building may lie within the boundary of more than one authority.

County:

District: York

District Type: Unitary Authority

Parish: Non Civil Parish

National Park: Not applicable to this List entry.

Grade: II

Date first listed: 08-Apr-2003

Date of most recent amendment: Not applicable to this List entry.

Asset Groupings

This list entry does not comprise part of an Asset Grouping. Asset Groupings are not part of the official record but are added later for information.

List entry Description

Summary of Building

Legacy Record - This information may be included in the List Entry Details.

Reasons for Designation

Legacy Record - This information may be included in the List Entry Details.

History

Legacy Record - This information may be included in the List Entry Details.

Details

Gatepiers and gates. 1875. Designed by Benjamin Burleigh - architect to the North Eastern Railway Co. Painted and rendered brick and stone. Two tall octagonal gatepiers with chamfered bases and moulded pyramidal tops. Each pier has a battered and curved curbing stone on the front corner. These piers retain their hinges though the iron gates have been removed. Two outer piers define pedestrian entrances on either side. Shorter than the main piers, they are also octagonal with chamfered bases and pyramidal caps. The surviving iron gates have major and minor spears. These gates originally formed the main entrance to the York Goods Station.

Selected Sources

None.

National Grid Reference: SE5947051866

12.5 YORK CITY WAR MEMORIAL IN THE WAR MEMORIAL GARDEN, LEEMAN ROAD

List Entry Summary

This building is listed under the Planning (Listed Buildings and Conservation Areas) Act 1990 as amended for its special architectural or historic interest.

Name: York City War Memorial in the War Memorial Garden

List entry Number: 1257512

Location

Leeman Road, York, YO1 6FZ

The building may lie within the boundary of more than one authority.

County:

District: York

District Type: Unitary Authority

Parish: Non Civil Parish

National Park: Not applicable to this List entry.

Grade: II*

Date first listed: 10-Sep-1970

Date of most recent amendment: 28-Oct-2015

Legacy System Information

The contents of this record have been generated from a legacy data system.

Legacy System: LBS

UID: 463792

Asset Groupings

This list entry does not comprise part of an Asset Grouping. Asset Groupings are not part of the official record but are added later for information.

List entry Description

Summary of Building

First World War memorial by Sir Edwin Landseer Lutyens, 1925, with later inscriptions.

Reasons for Designation

York City War Memorial, situated in the War Memorial Garden on Leeman Road, is listed at Grade II* for the following principal reasons: * Historic interest: as an eloquent witness to the tragic impacts of world events on this community, and the sacrifices it made in the conflicts of the C20; * Architect: by the nationally renowned architect Sir Edwin Landseer Lutyens (1869-1944), who designed 58 war memorials at home and abroad including the Cenotaph in Whitehall; * Design quality: a simple yet elegant cross; * Group value: with gate piers and gates (together listed Grade II) that enclose the war memorial garden also designed by Lutyens, and within sight of the North Eastern Railway Company War Memorial (Grade II*) similarly by Lutyens.

History

The great wave of memorial building after the First World War resulted in thousands of commemorative monuments being raised both at home and on the battlefield. Lutyens was the most outstanding designer to work in this field. This is one of 15 War Crosses designed by Lutyens, sharing a broadly similar design. The earliest to be erected was at Miserden, Gloucestershire, in 1920; York was the latest. The memorial, commemorating 1,162 servicemen from York who died fighting during the First World War, had a controversial history that meant that six years elapsed between the opening of a memorial fund in August 1919 and the unveiling of the memorial on 25 June 1925. Various ideas such as a new City Hall and a nursing home had been considered before a public meeting on 14 January 1920 decided that there should be a permanent memorial rather than a building with a community use.

After a plan for a memorial garden with an archway and cenotaph had been prepared by the City Engineer it was agreed to appoint Lutyens, who had recently been appointed to design a memorial in the city for the North Eastern Railway Company (NER). He was given a budget of

£2,000 and visited York on 12 August 1920 to review nine potential sites, accompanied by the Lord Mayor and City Engineer.

The architect's preferred site was a former cholera burial ground outside the city walls but the committee chose his alternative – in the moat inside the City Wall near Lendal Bridge. His submitted scheme was for a Stone of Remembrance (which he had designed for the Imperial (now Commonwealth) War Graves Commission) raised upon a high platform. It was approved by the War Memorial Committee on 24 June 1920 and at a public meeting on 25 November.

Despite such endorsement the memorial became enveloped in the controversy surrounding the North Eastern Railway Company Memorial which was also close to the city walls and within sight of the intended City Memorial location. There was also a feeling that the former (which had a budget of £20,000) would overshadow the latter. The opposition was led by the York Archaeological Society (YAS) and the Yorkshire Architectural and York Archaeological Society (YAYAS).

The proximity to the city walls meant that the construction of both memorials required the consent of the Ancient Monuments Board, which was duly given following a meeting at the NER offices on 8 July 1922. However, there was growing local disquiet about the location of the City Memorial and, aware that YAYAS had called a public meeting about the matter on 3 May 1923, the War Memorial Committee announced that it was prepared to reconsider the matter. Lutyens' assistant, AJ Thomas, visited York on 3 August to look at an alternative site called Walkers Paddock on Leeman Road, which had originally been suggested by a member of the public in 1921 and which, in a twist of fate, was owned by the NER.

The site was duly approved and donated to the city by the railway company. Lutyens prepared a revised scheme for a cross and Stone of Remembrance but the lowest tender cost of £2,446 11s 8d was considerably in excess of the £1,100 in the Memorial Fund. It was therefore decided to omit the Stone and for the Council to undertake the work using its own staff. The memorial was unveiled by the Duke of York, and dedicated by the Archbishop of York, on 25 June 1925 at a ceremony attended by great crowds. Earlier that day the Duchess of York had unveiled the Five Sisters Window in York Minster, as a memorial to 1,450 women "of the Empire" who had died during the First World War.

Despite the concerns over costs there was £400 remaining in the Fund following the memorial's completion and Lutyens was commissioned to design pillars and entrance gates for the Memorial Garden within which the City memorial stands. An inscription to commemorate the fallen of the Second World War was added at a later date.

Sir Edwin Lutyens OM RA (1869-1944) was the leading English architect of his generation. Before the First World War his reputation rested on his country houses and his work at New Delhi, but during and after the war he became the pre-eminent architect for war memorials in England, France and the British Empire. While the Cenotaph in Whitehall (London) had the most influence on other war memorials, the Thiepval Arch was the most influential on other forms of architecture. He designed the Stone of Remembrance which was placed in all

Imperial War Graves Commission cemeteries and some cemeteries in England, including some with which he was not otherwise associated.

Details

MATERIALS: Portland stone.

DESCRIPTION: the memorial stands in the War Memorial Gardens, overlooking the River Ouse and St Mary's Abbey to the north. It comprises the War Cross design by Sir Edwin Lutyens, a slender tapering cross c10m tall. The lozenge-sectioned shaft and short cross arms are linked to the base by stop chamfers and torus moulding. The base consists of four stepped rectangular blocks of unequal heights standing upon a square, undercut platform which, in turn, stands upon two further square blocks and two square, shallow steps.

The dedicatory inscription is carved into the south face of the largest block of the base, reading TO/ THE CITIZENS/ OF/ YORK/ 1914 – 1918/ 1939 – 1945. On the opposite face is carved THEIR NAME/ LIVETH/ FOR EVERMORE.

This List entry has been amended to add the source for War Memorials Online. This source was not used in the compilation of this List entry but is added here as a guide for further reading, 1 February 2017.

Selected Sources

Books and Journals

Skelton, T, Gliddon, G, Lutyens and the Great War, (2008), 59-63
Websites
War Memorials Online, accessed 1 February 2017

From https://www.warmemorialsonline.org.uk/memorial/93395
War Memorials Register, accessed 01/09/2015

from http://www.iwm.org.uk/memorials/item/memorial/30915
Other
"Royal Visit to York", Yorkshire Post and Leeds Intelligencer, 24 June 1925, p8.

National Grid Reference: SE5983751919

12.6 GATES AND GATE PIERS TO WAR MEMORIAL GARDEN, LEEMAN ROAD

List Entry Summary

This building is listed under the Planning (Listed Buildings and Conservation Areas) Act 1990 as amended for its special architectural or historic interest.

Name: GATES AND GATE PIERS TO WAR MEMORIAL GARDEN

List entry Number: 1257514

Location

GATES AND GATE PIERS TO WAR MEMORIAL GARDEN, LEEMAN ROAD

The building may lie within the boundary of more than one authority.

County:

District: York

District Type: Unitary Authority

Parish:

National Park: Not applicable to this List entry.

Grade: II

Date first listed: 24-Jun-1983

Date of most recent amendment: Not applicable to this List entry.

Legacy System Information

The contents of this record have been generated from a legacy data system.

Legacy System: LBS

UID: 463794

Asset Groupings

This list entry does not comprise part of an Asset Grouping. Asset Groupings are not part of the official record but are added later for information.

List entry Description

Summary of Building

Legacy Record - This information may be included in the List Entry Details.

Reasons for Designation

Legacy Record - This information may be included in the List Entry Details.

History

Legacy Record - This information may be included in the List Entry Details.

Details

This list entry was subject to a Minor Amendment on 11/02/2016

SE5951NE 1112-1/15/543

YORK, LEEMAN ROAD (North side), Gates and gate piers to War Memorial Garden

24/06/83

GV II

Gates and pair of gate piers. c1924 in a C18 style. Designed by Sir Edwin Lutyens. Limestone and wrought-iron. Piers of square plan with cornices and ball finials. Ironwork painted with black and gold paint. To each side of the gates there are ironwork panels with finials, linked by an overthrow with the City shield of arms placed centrally. The gates are placed on an axis with and facing the City War Memorial (qv). (Murray H: Heraldry and the Buildings of York: York: 1985: 12-13).

Listing NGR: SE5983051887

Selected Sources

Books and Journals

Murray, H , Heraldry and the Buildings of York, (1985), 12-13

National Grid Reference: SE 59830 51887

13 APPENDIX 3 FIGURES

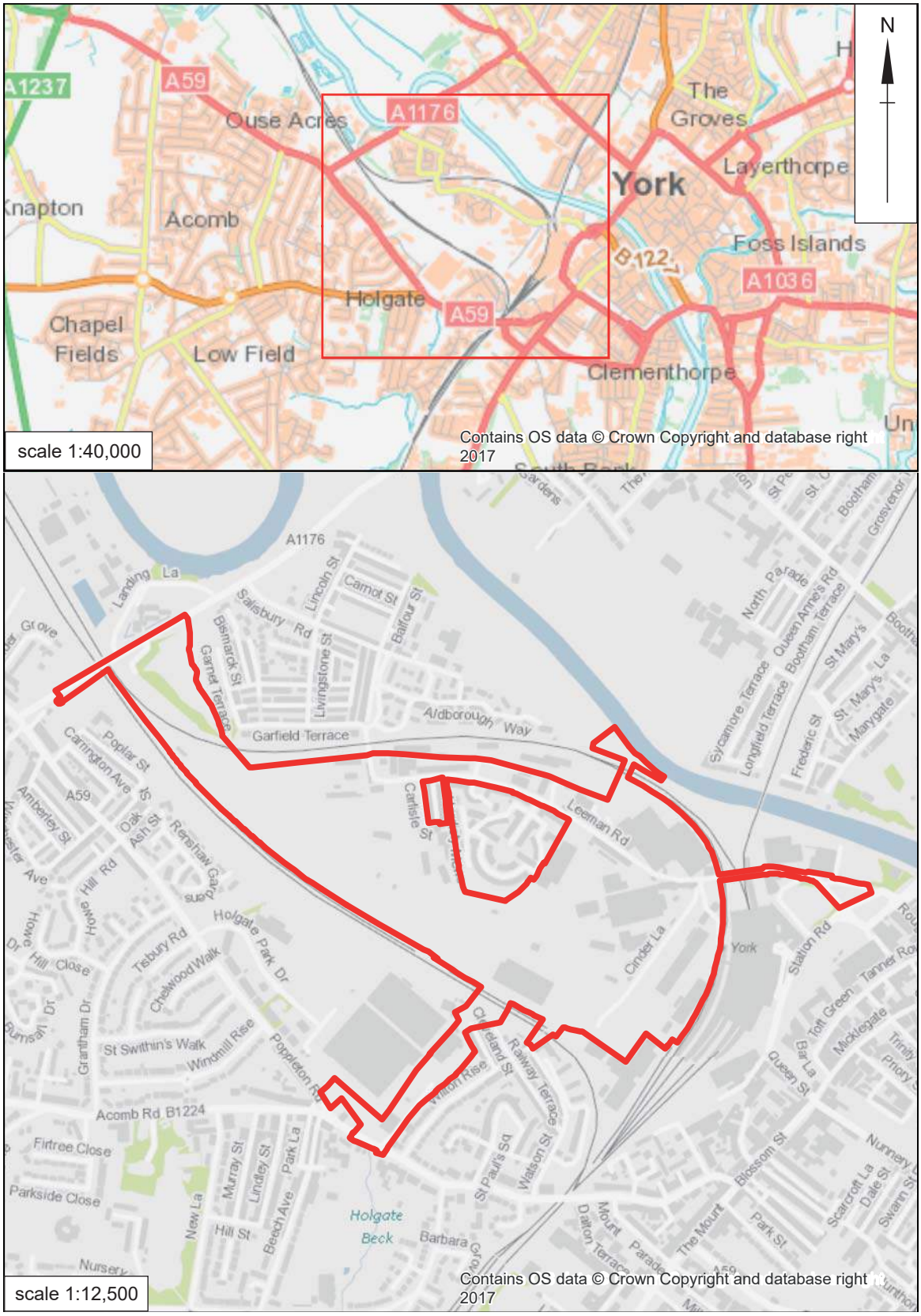


Figure 1 Study area location

Legend

- Event point
- Listed building point
- Monument point
- Roman Road
- Study area 900m radius
- Monument polygon
- Event polygon
- Site Outline

Figure 2 Location of sites, listed buildings and monuments from gazetteer

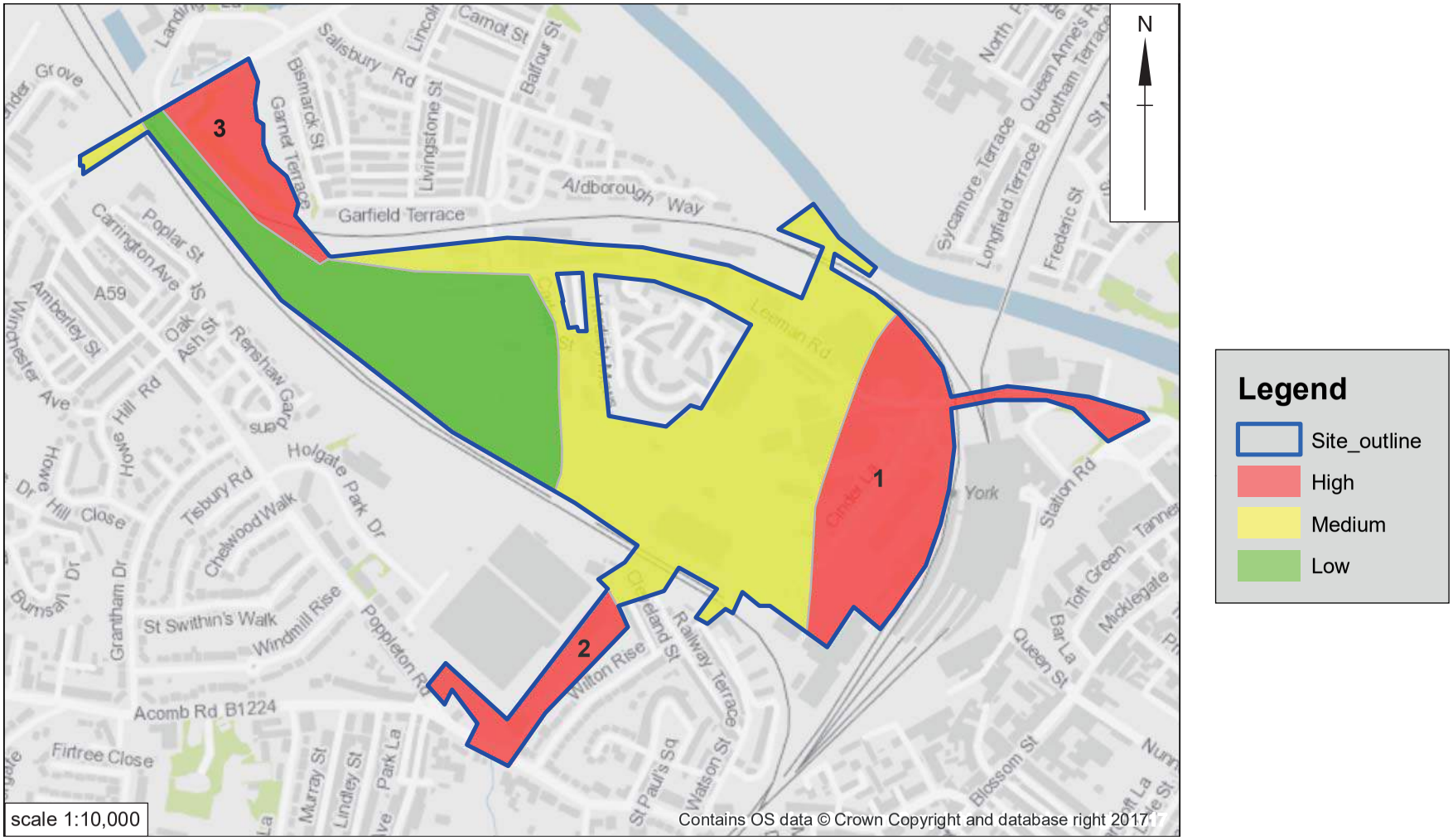


Figure 3 Archaeological potential of the York Central Development Area

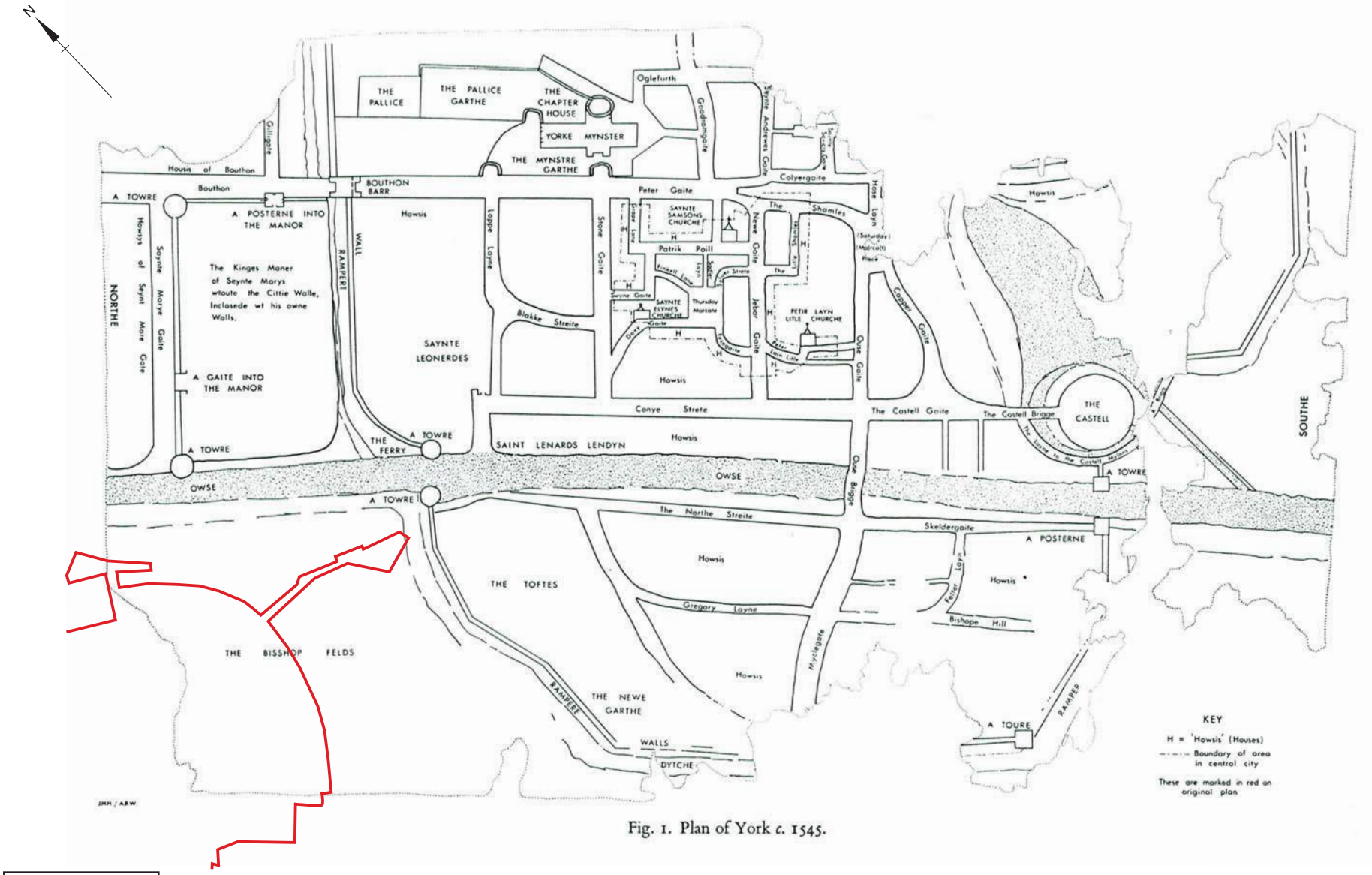
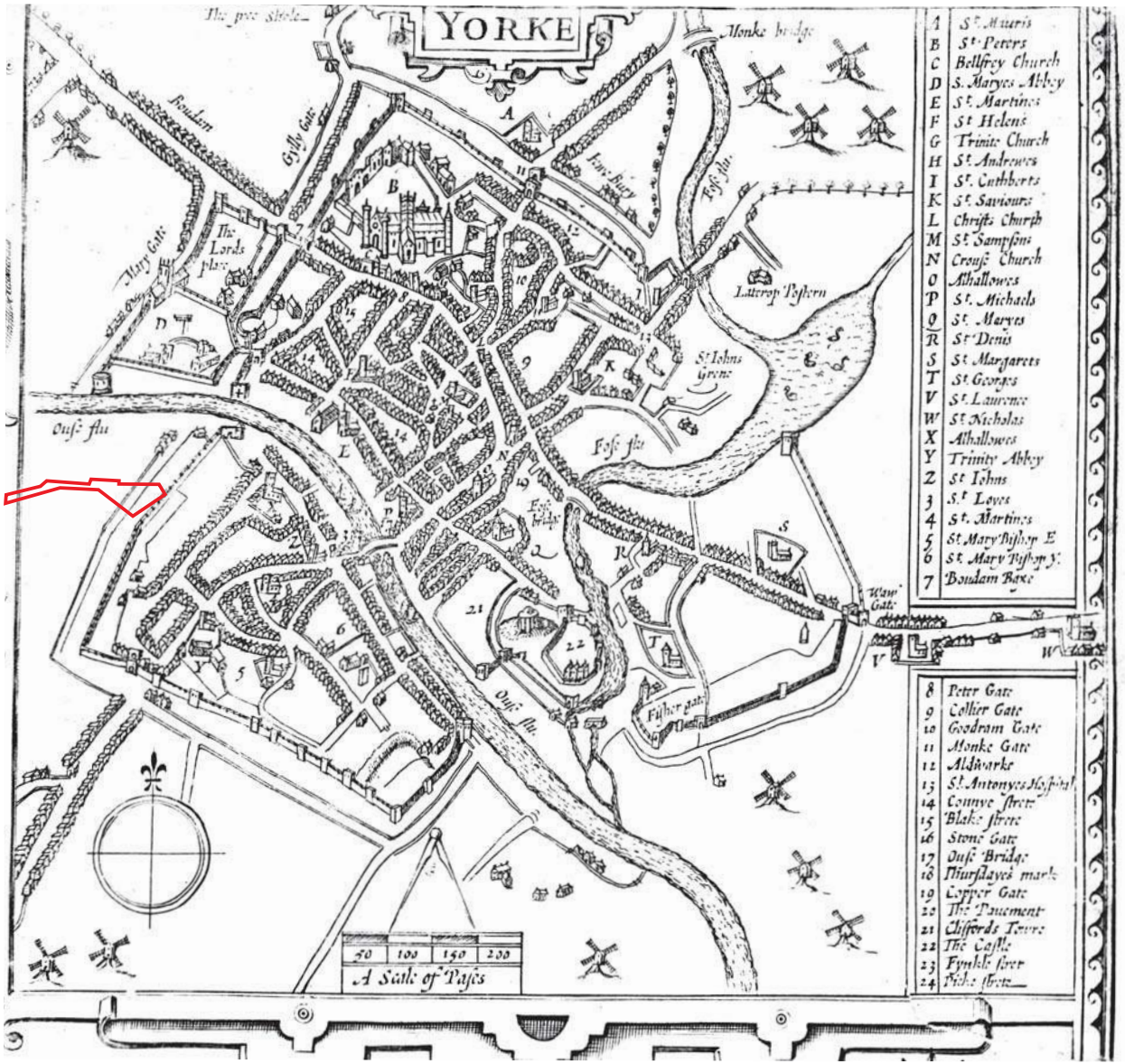


Fig. 1. Plan of York *c.* 1545.

Key
Study area

Figure 4 1545 Plan of York



Key
Study area

Figure 5 Speed's 1610 Map

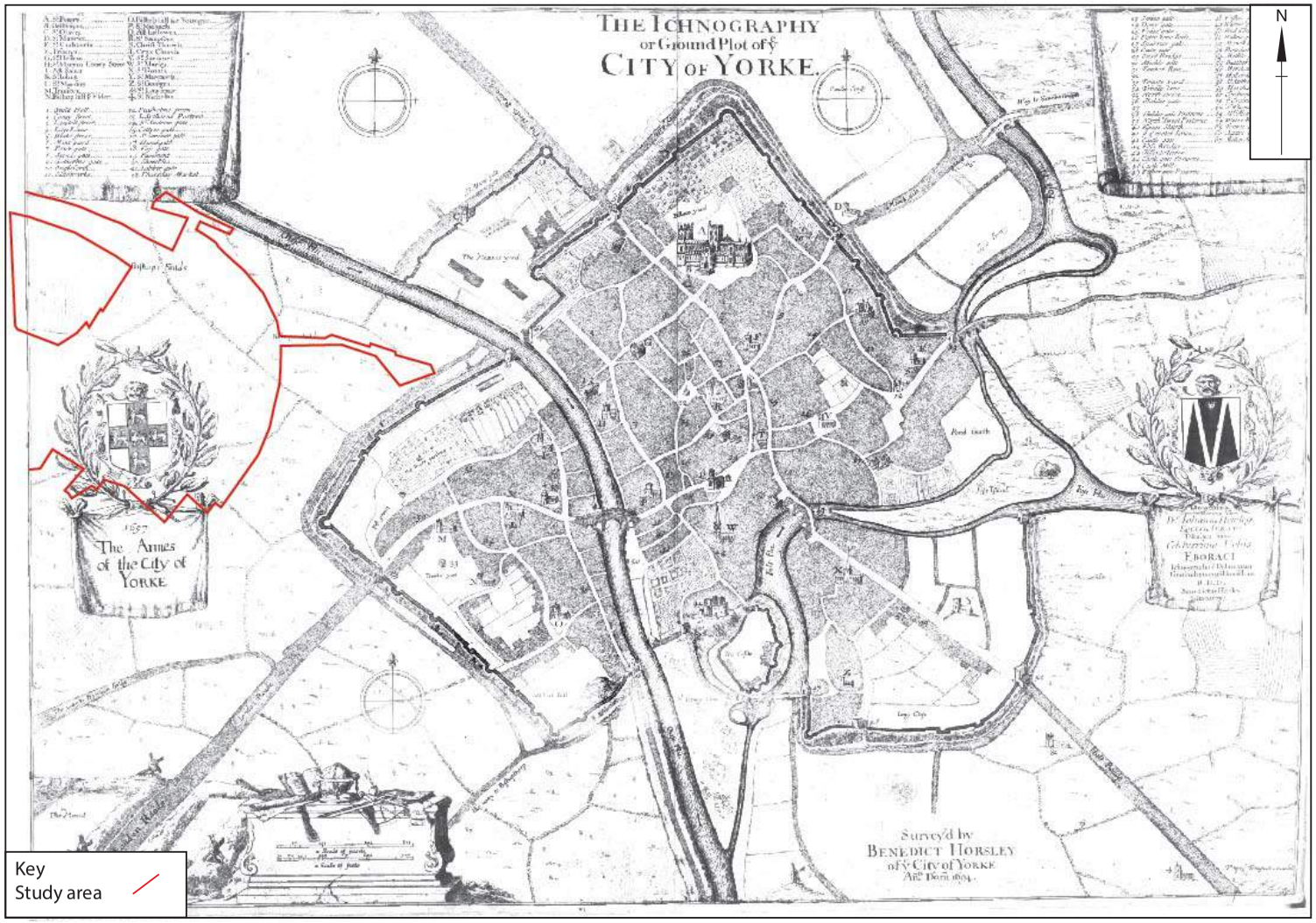


Figure 6 Horsley 1697 map

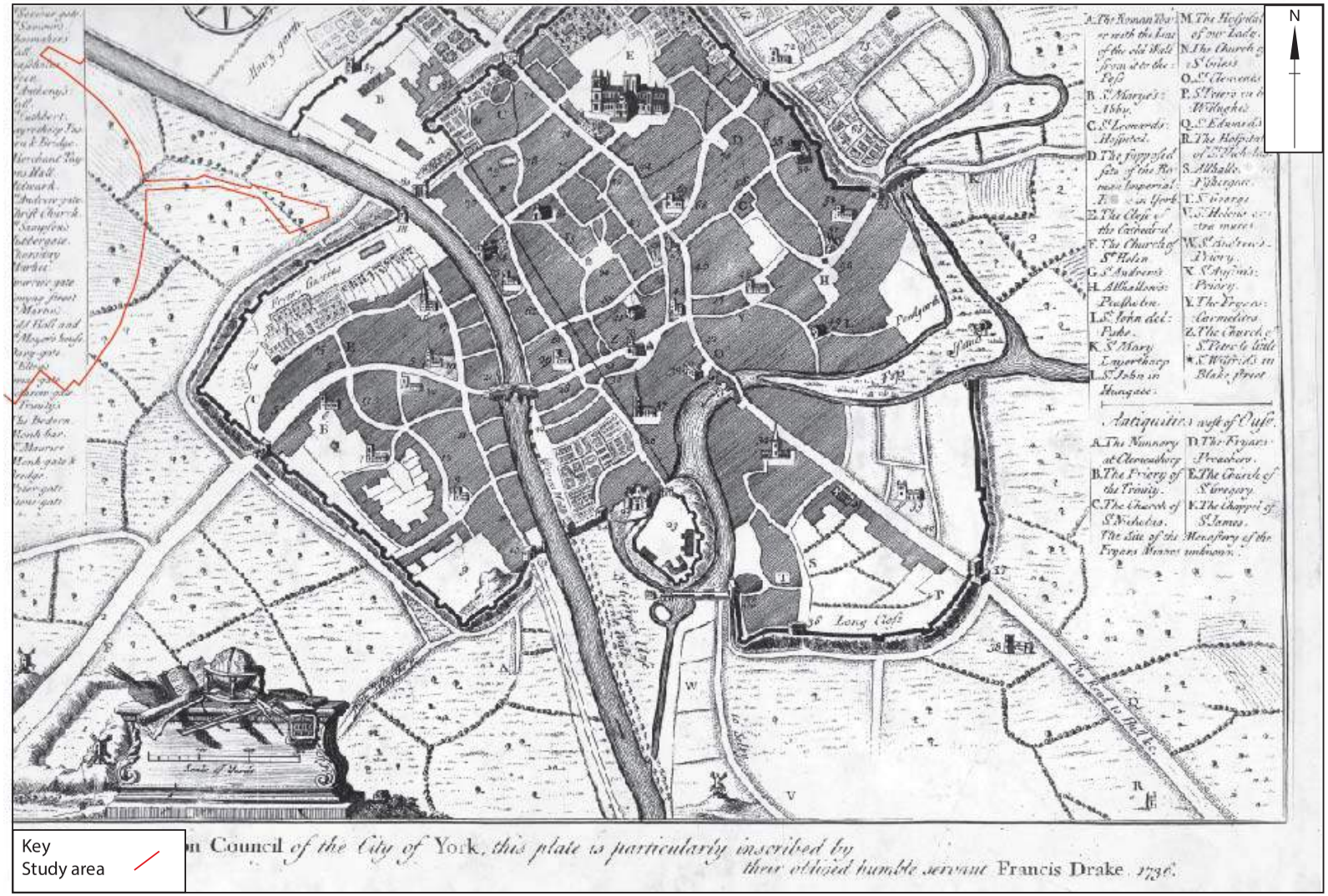


Figure 7 Drake's 1736 map

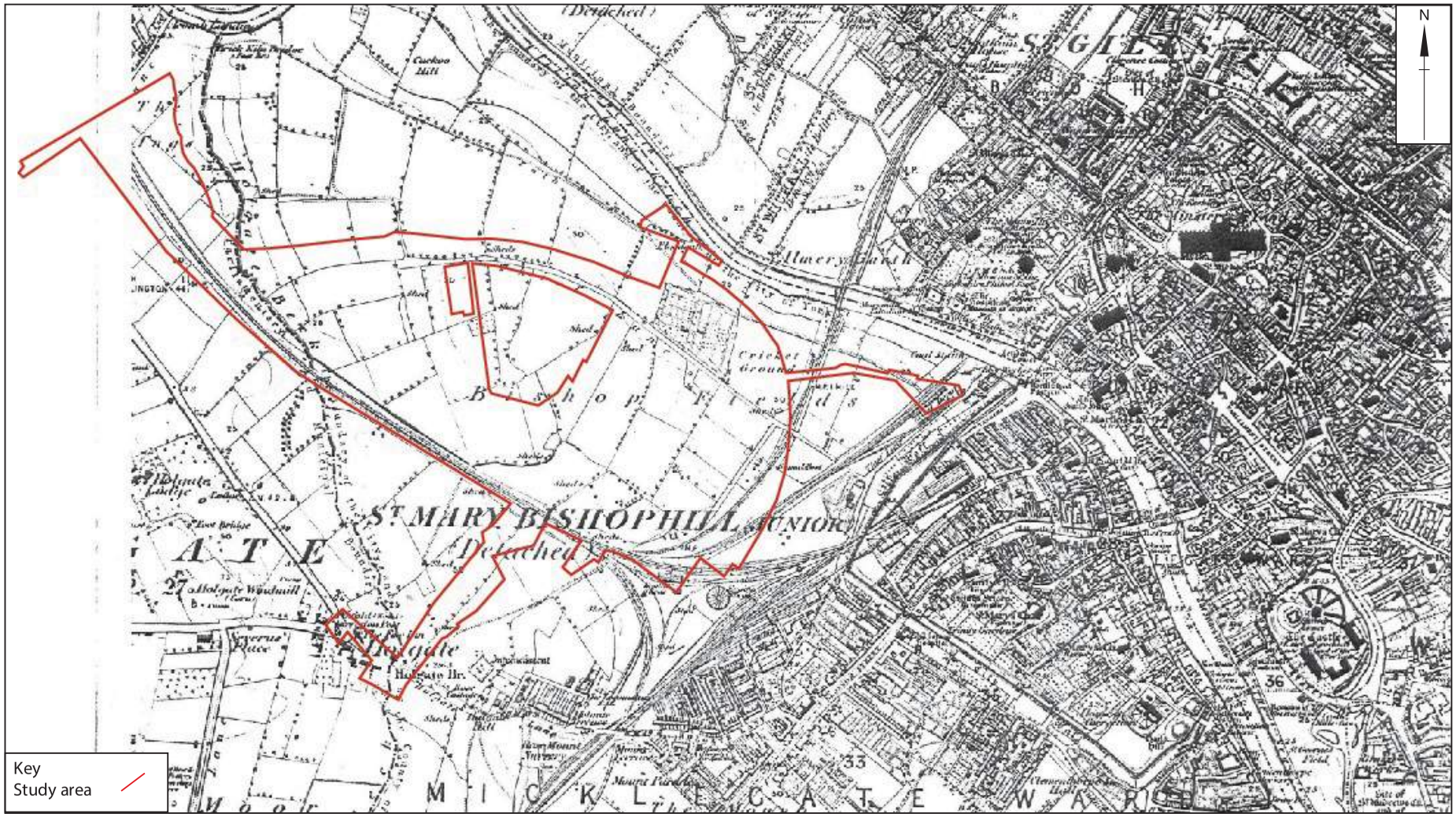


Figure 8 1853 OS map

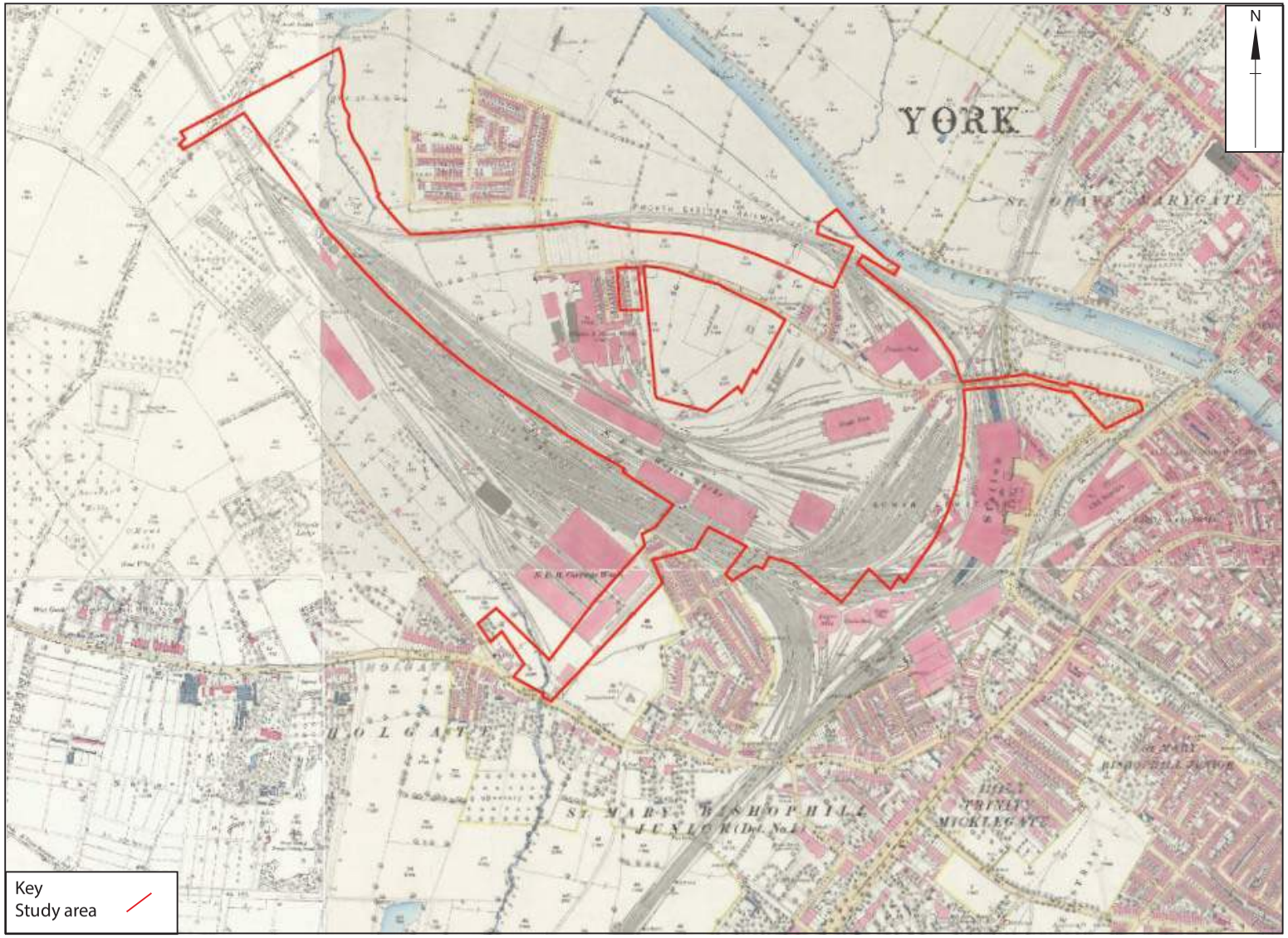


Figure 9 1892 OS map

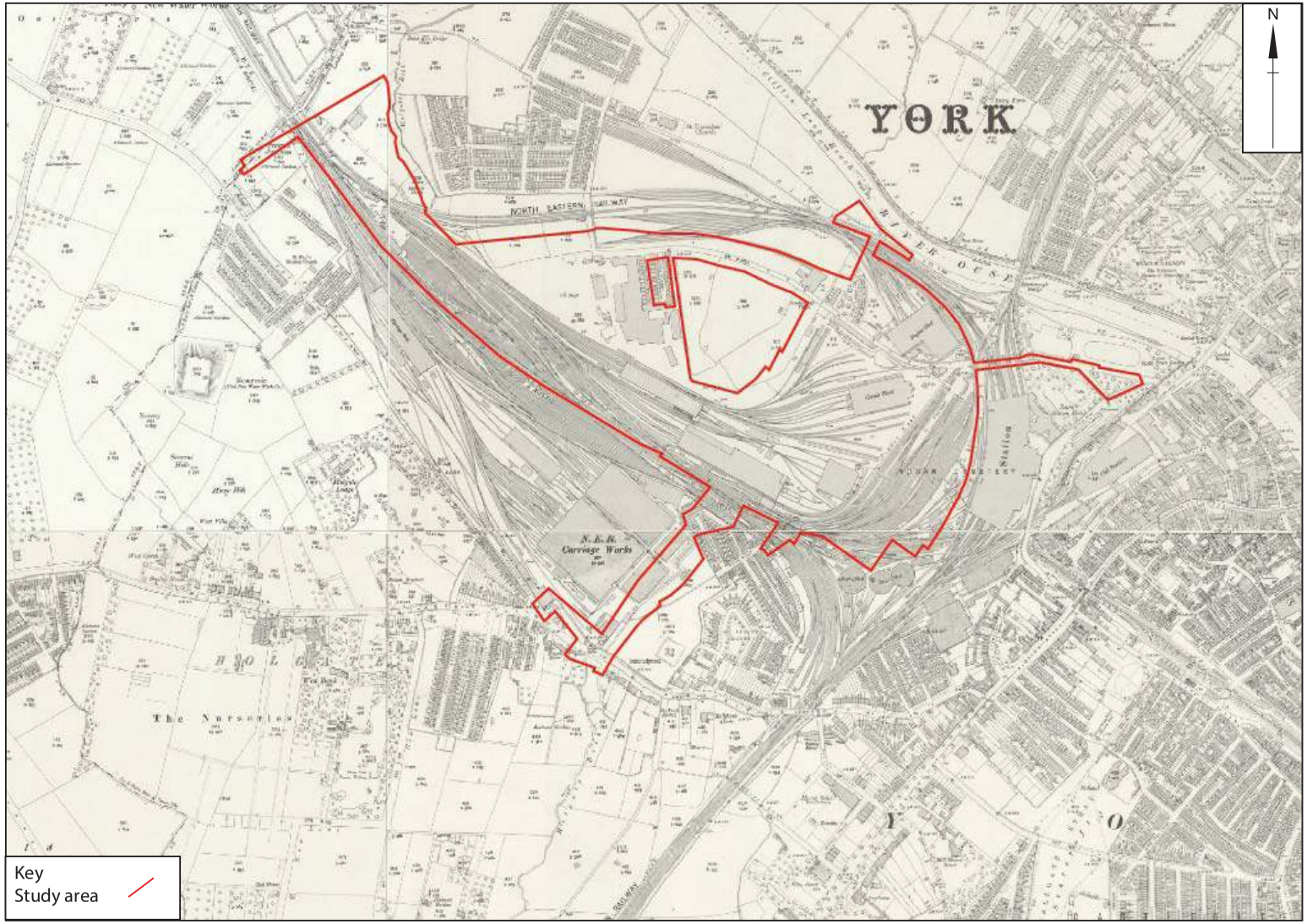


Figure 10 1909 OS map

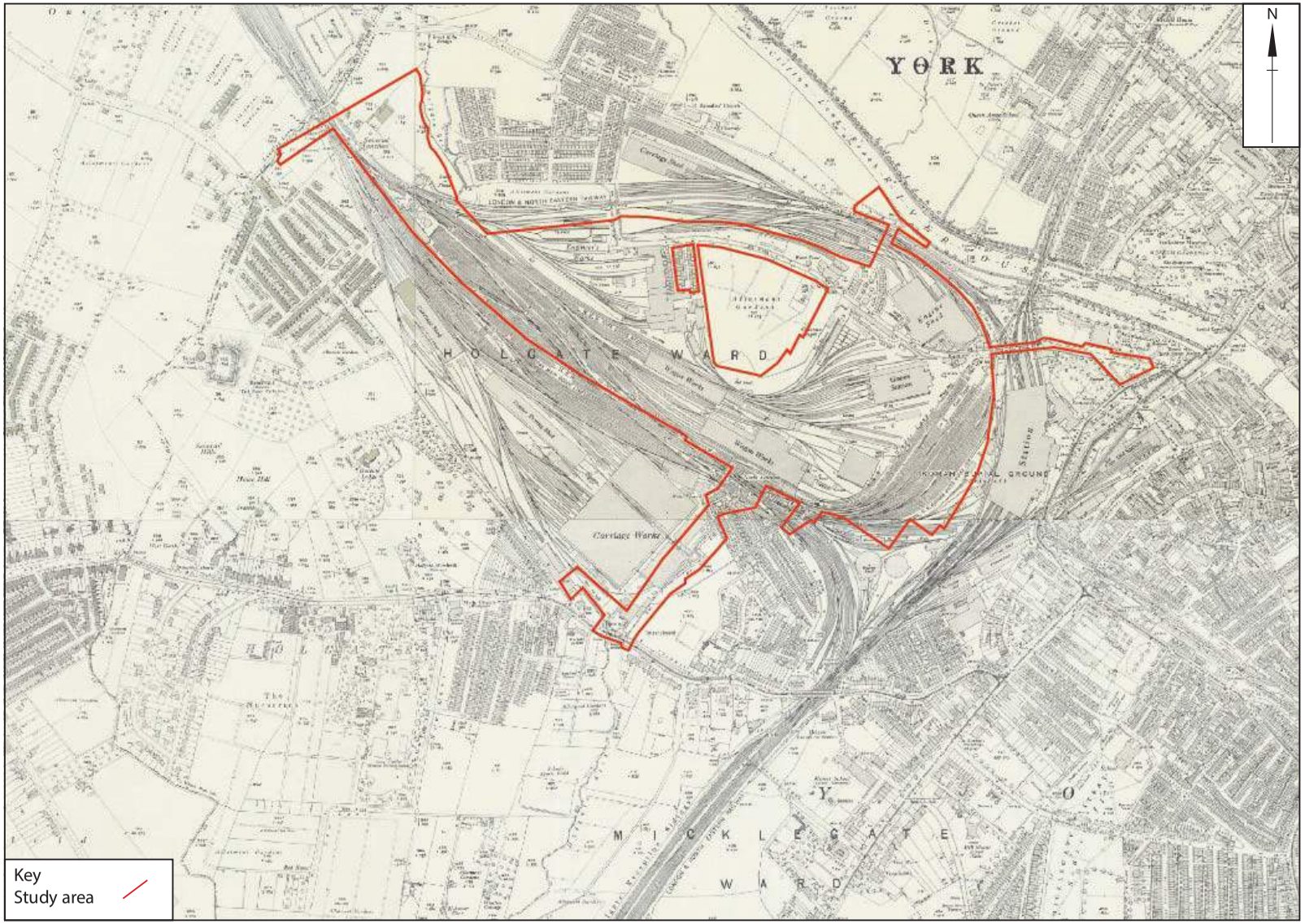


Figure 11 1932 OS map

Figure 12 1941 OS map

YORK ARCHAEOLOGICAL TRUST

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Appendix 9A
TVIA Assessment Method

Contents

Tables

9A.1 Assessment Method

9A.1.1 Study Area

A study area of 500 m from the boundary of the Site is considered to be appropriate for the assessment of the local townscape. Whilst glimpsed views towards the Site from some locations within the wider townscape of York would be possible, it is not expected that the proposed Development would significantly alter the setting of the townscape character beyond the immediate character areas.

A study area extending 1.5 km from the boundary of the Site has been adopted for the visual assessment to include significant views towards York Minster.

9A.1.2 Impact Assessment and Significance Criteria

The TVIA identifies and evaluates the likely significant effects which may arise from the construction and operation of the proposed Development. The methodology for the landscape/townscape and visual impact assessment has been informed by current best practice and guidance as listed in Section 9.2.3 Chapter 9: Townscape and Visual within ES Volume I: Main Report.

The TVIA has been carried out using professional judgement with reference to the above guidelines and takes into account both the adverse and beneficial contribution that the proposed Development can make upon the surrounding townscape and visual amenity. The assessment considers the magnitude of change arising from the proposed Development alongside the sensitivity of the landscape and visual receptors to determine the level of effect (minor, moderate, major beneficial or adverse, or negligible). Both moderate and major categories are considered to constitute a significant effect.

The TVIA has been undertaken for the peak construction years 2020/21 (Phase 1) and 2028 (Phase 2, 3 and 4 constructed concurrently) and for the operational phase at the year of completion of the proposed Development (2033) to ensure that the worst-case scenario is assessed. It is not anticipated that maturing planting within or along the boundary of the proposed Development would considerably change the level of effect. Therefore, an assessment of a future operational year has not been undertaken. At the peak construction year it is expected the Site would be fully set up with construction plant, welfare facilities, materials stockpiles, hoardings and peak construction traffic movements.

9A.1.3 Baseline Methodology

The existing townscape and visual baseline has been informed by an initial desktop study, including a review of relevant publications, Ordnance Survey (OS) data and aerial mapping. The findings of the preliminary desktop study were verified in the field in September 2017.

Townscape Baseline

The townscape baseline has been established through desk-based research and field surveys to identify and assess the existing surrounding townscape character as of 2018. The desktop and field survey data sources are outlined below.

The assessment area has been determined by the maximum extent of townscape character areas that lie partially or entirely within the Zone of Theoretical Visibility (ZTV) (except in those locations where the proposed Development would be either barely perceptible or would be obscured by a feature not present within the ZTV). The methodology for producing the ZTV is described below.

For the purpose of this assessment the term townscape refers to the urban landscape to describe the character of the study area. It has been used throughout the assessment to describe urban areas and green open spaces.

The townscape baseline within the study area considered the following:

- The existing situation - including a description of the existing townscape and its condition (topography, built form, patterns, scale, transport routes);
- The existing townscape character - initially through desktop study informed by existing published character assessments followed by verification in the field; and
- The value and susceptibility of the existing townscape - including reference to relevant statutory and non-statutory designations and an assessment of the sensitivity of the townscape to change.

Townscape character areas are largely homogenous areas regarding their intrinsic elements and physical condition. They form the receptors for the townscape assessment. Text and plans are used to describe the following physical characteristics:

- Land use;
- Heritage assets and the presence of historic components;
- Vegetation patterns and extents;
- Characteristic building materials; and
- Open space distribution and type.

These townscape baseline elements have been used to define townscape character areas, which display common features and characteristics within the assessment area.

Description of Landscape Character Areas

The character of the townscape character areas has been described taking account of:

- Designated areas;

- Components such as listed buildings, listed structures and vegetation that make a substantial contribution to the character area; and
- Key characteristics of and the setting of the character areas.

The sensitivity of each character area has been determined with reference to susceptibility and value, which are described below.

Townscape Sensitivity

An assessment is made of the sensitivity of the existing townscape including the elements and features which make up the townscape in the vicinity of the development. Townscape sensitivity is derived from consideration of the townscape value attached to townscape receptors and the susceptibility to the type of change or development proposed.

Townscape value

The townscape value attached to townscape receptors is a relative value or importance attributed to the townscape as well as individual townscape elements. This is based in part on designation (international, national or local) as well as professional judgement or value at community level. Townscape value is also founded on condition, special qualities (including perceptual aspects), cultural associations or other issues including representativeness and/or rarity of the townscape.

Based on this, factors that influence townscape value are described in Table 9A.1.

Table 9A.1: Criteria for the townscape value

Scale of townscape value	**Typical description** **The townscape character area is:**
International	• Located within a World Heritage Site • Considered an internationally important component of character, and may be experienced by substantial numbers of international tourists
National	• Located within an Area of Outstanding Natural Beauty • A nationally significant historic or cultural resource • Considered a distinctive component of national landscape character, and may be experienced by significant numbers of tourists from around the country
Regional	• Located within green belt or a regional scale park • Considered a distinctive component of York's character, experienced by a large proportion of the city's population
Borough	• Designated open space within the local authority local plan areas • Designated as a conservation area • Experienced by a large proportion of the borough's population
Local	• A public, semi-public or private open space that serves the local community or residents • A residential area, likely to be valued by the local community

Townscape susceptibility

The townscape susceptibility to the type of change or development proposed is the ability of townscape receptors to accommodate change without compromising the current baseline situation of the townscape or the realisation of relevant landscape/townscape planning policies or strategies. The ability will vary according to the specific type and nature of change being proposed.

Determining townscape sensitivity

With reference to susceptibility and value, the sensitivity of each townscape character area to change is determined. The determination of sensitivity requires the application of professional judgement using criteria developed from guidance in GLVIA3. The presence of any combination of attributes may be considered when determining the sensitivity of a character area. This allows professional judgement to be used when determining the relative importance of different attributes, which varies for each character area and for specific change scenarios. Attributes which contribute to the sensitivity of the townscape are described in Table 9A.2. The occurrence of any one attribute may be sufficient to determine the sensitivity rating.

Table 9A.2: Townscape sensitivity

Sensitivity	**Typical description** **The townscape character area:**
High	• Is valued at the borough scale or higher • Is a designated landscape at international, national, regional or borough level, such as World Heritage Sites or Areas of Outstanding Natural Beauty • Is predominantly characterised by landscape components that are rare and distinctive and/or listed • Is designated as a conservation area, registered park and garden or public open space • Has a character that is rare within the assessment area • High importance and rarity, or containing rare elements, or a high level of intactness • Highly susceptible to change • No or limited scope for substitution or positive enhancement
Medium	• Is locally valued • Has some components that are rare and/or distinctive • Has a character which is common within the assessment area • Moderate importance and rarity with some degraded elements/condition • Some scope for substitution or positive enhancement
Low	• Has limited townscape value • Has few or no distinctive components, or components that detract from the overall character of the Site • Has a character that is very common within the assessment area • Low importance and rarity with few, if any valued features. May be eroded/fragmented • Considerable scope for substitution or positive enhancement

Sensitivity	Typical description The townscape character area:
	• Low susceptibility to change

9A.1.4 Visual baseline

The visual baseline has been established through a combination of desk based research and field surveys to establish the existing visual context as of 2018. The desktop and field survey data sources are outlined below.

The assessment area has been determined by the maximum extent of the ZTV, except in those locations where the proposed Development would be either barely perceptible or would be obscured by a feature not present within the ZTV. All visual assessment viewpoints are located within the ZTV.

The York Central Historic Core Conservation Area Appraisal[1] has also been reviewed to inform the selection of viewpoints and determination of their sensitivity.

The following field surveys have also been undertaken:

- Site visit to establish the locations of visual receptors and to take baseline photography; and
- Verifiable photography: professional photography from each of the viewpoints for which wirelines have been prepared, including surveying of the camera location.

The visual baseline has been described with reference to viewpoints that are representative of views towards the proposed Development from visual receptors (people). All viewpoints are located within the ZTV.

ZTV Preparation Methodology

ZTV plans have been prepared for the visual assessment area to identify the area within which the proposed Development would potentially be visible (see Figure 9.2 within Volume II of the ES). The ZTV was used to inform the selection of viewpoints within the assessment area.

The ZTV has been created by digitally modelling the landform within the assessment area using a digital terrain model (ground profile) combined with building height information from a digital surface model.

Building height information was extracted to the Ordnance Survey OpenMap Local buildings layer. Woodland inventory areas were extracted for the area and generalised heights were assigned to these areas of 10 m for young trees/ shrubs and 15 m for all others. The building and woodland features were then incorporated into the digital terrain model and the analysis run on this.

The ZTV has been run for the maximum proposed building parameters (see Figure 2.11 within Volume II of the ES).

[1] York City Council (2011) Central Historic Core Conservation Area Appraisal

An offset of 1.6 m above ground level has been used to represent the eye level view of an average height person. The model has then highlighted areas from which the proposed Development would be theoretically visible.

The results have been presented on a plan showing the ZTV, thereby highlighting the extent of visibility of the proposed Development which would be experienced by people standing at ground level.

The validity of the ZTVs has been checked on Site, using professional judgement to ensure the output is a fair representation of the likely visibility of the proposed Development. Where necessary, the extent of the assessment area has then been reduced to reflect the likely visibility of the proposed Development.

Identifying visual receptors

Viewpoints have been selected to represent groups of receptors within the ZTV. Before viewpoints were selected, the different visual receptors within the assessment area were mapped based on desktop research and Site visits. The area around each broad viewpoint location was explored to find the most suitable (i.e. unscreened and representative) and safely accessible location for the view to be taken from. Viewpoints were then selected to represent groups of visual receptors which have the same or a similar view towards the Site, based on the following attributes:

- Theoretical visibility of the proposed Development;
- Protected views, identified in the York Historic Core Conservation Area Appraisal;
- Consultation and feedback from the LPA;
- The receptor type; and
- The extent of screening or filtering of the view (e.g. by buildings or vegetation).

The location of each viewpoint has been confirmed in consultation with the LPA landscape officer. These viewpoints have formed the basis for the visual assessment.

Description of Visual Baseline from Each Viewpoint

For each viewpoint, text and photos have been used to describe the baseline visual characteristics. In each case, the following has been described:

- The composition of the view, including skyline, foreground, middle ground and background characteristics and how these are distinctive, aesthetically or culturally important, or detract from the view;
- The nature of the view of the Site, including what, if anything, filters or screens the view and whether a view is a wide panorama, framed, glimpsed or part of a sequential (or kinetic) view; and

- The conditions within the view that may affect the assessment, including atmospheric conditions, distance, seasonal change or building works that may block or harm views on a temporary basis.

Panoramas have been included for all viewpoints, to illustrate the baseline view. These have been created using a series of single frame images taken in portrait orientation which overlap by at least 30 per cent. These images have been stitched together using the automated cylindrical photomerge process within Adobe Photoshop CS6. It should be acknowledged that this introduces some distortion into the view and these stitched panoramas should not be relied on to provide an exact representation of the view from each viewpoint.

Where a wireline has been prepared from a viewpoint, the professionally captured verifiable photo of the baseline has been provided as either a single frame image or a wide panorama, matching what is visible to the human eye. These panoramas have been professionally created, providing accurate representations of the views from these locations.

All viewpoints have been selected to represent the view of the proposed Development from visual receptors (people) in publicly accessible locations. For most views, the most sensitive receptors are recreational and residential.

Visual Sensitivity

The sensitivity of the potential visual receptors has been identified. Visual sensitivity is derived from consideration of cultural significance or value of the viewpoint and the susceptibility of the different visual receptors to the changes in the view and visual amenity.

View Value

The cultural significance or value of the viewpoint is based on the appearance in guidebooks, maps, literature and art, the view's popularity, the provision of facilities for the enjoyment of the view, its relationship to areas of landscape value/designations and cultural and/or historical association.

Visual Susceptibility

The susceptibility of the different visual receptors to the changes in view and visual amenity considers the occupation or activity of people, their expectation of the view and the extent to which their attention or interest may be focused on the view and the visual amenity at a particular location.

As identified within GLVIA3, the most sensitive receptors include residential receptors and users of recreational facilities, where interest is focused on their surroundings. Less sensitive receptors are people engaged in outdoor sports, people travelling through the area (with the exception of scenic routes) and people at work (with the exception of where visual setting affects quality of work life), whose attention is likely to be focused on their activity rather than their surrounding visual environment.

Determining Sensitivity of Visual Receptors

The sensitivity of visual receptors is determined taking into account a visual receptor's susceptibility to change in views and the value attached to particular views.

The susceptibility of visual receptors to visual changes is mainly a function of their level of interaction with the landscape, for example the occupation or activity of visual receptors experiencing the view and the extent to which their attention or interest is focussed on views.

The criteria which have been used to inform the assessment of visual sensitivity are outlined in Table 9A.3.

Table 9A.3: Visual sensitivity

Sensitivity	Typical description
High	Receptors with key interest in the view such as residential properties, and receptors undertaking recreation including tourists where the view is a key reason for the activity and attention is focused on the surrounding landscape e.g. users of Public Rights of Way and Open Access Land.
Medium	Receptors with moderate interest in their environment e.g. outdoor workers, pedestrian users of major movement corridors, users of minor roads and people taking part in outdoor sports.
Low	Receptors with passing or momentary interest in their environment e.g. motorists on major roads and office or shop workers. Their attention is generally focused on the activity rather than on the wider landscape.

Where viewpoints are located in areas that may represent multiple receptor types, the most sensitive receptor has been selected, acknowledging the presence of other sensitive receptors.

The sensitivity of a visual receptor remains the same in both summer and winter, and during daytime and night time.

Chapter 19: Cumulative Impact Assessment within ES Volume I: Main Report summarises the other developments within the assessment area that have been considered as part of the cumulative assessment.

9A.1.5 Methodology for Assessment of Effects

This section sets out the methodology for assessing the effects of the proposed Development during the construction and operational phase on the townscape and visual receptors.

Construction effects are temporary and relate to the plant and activity required to be present during the construction of the proposed Development. Operational effects are considered to be long-term and relate to the constructed built form, areas of hardstanding and landscaping within the Site.

The findings of the construction phase assessment have been used to identify appropriate mitigation (see Section 9.7 Chapter 9: Townscape and Visual within ES Volume I: Main Report), whilst the findings of the operation phase assessment

have been iteratively fed back into the design process to minimise adverse effects wherever possible.

Townscape Effects

Magnitude of Change

The likely nature and magnitude of changes to individual landscape elements and characteristics have been described together with the consequential effect on townscape character.

The magnitude of potential townscape change (either adverse or beneficial) has been described by reference to the:

- Size or scale of change: based on the extent to which the removal or addition of townscape features, the proportion that this represents, and the contribution that element makes to the townscape character as well as the degree to which aesthetic or perceptual aspects of the townscape may be altered. It will also be considered if the effect of the change will alter key characteristics of the townscape;
- Geographical extent of change: extent of the area over which the effect is evident, i.e. the Site itself, the character area in which the development is situated or several character areas;
- Duration and reversibility of the effect: short (0-5 years)/medium (5-10 years)/long-term (>10 years), permanent or temporary and reversible; and
- Effectiveness of any mitigation proposed.

Factors that have been considered in assessing the magnitude of change to each townscape character area are described in Table 9A.4 based on guidance from GLVIA3.

Table 9A.4: Townscape change magnitude criteria

Impact magnitude	Definition
High	• Total loss of or major alteration to key characteristics or components of the townscape character area • Addition of new features or townscape components that would substantially change the existing character of the townscape character area • Loss or addition of features that would substantially alter the immediate setting of the majority of the townscape character area
Medium	• Partial loss of or alteration to one or more key characteristics or components of the townscape character area • Addition of new features or townscape components that may be prominent, but are largely in character with the townscape character area • Loss or addition of features that represent change to part of the immediate setting of a townscape character area
Low	• Fairly small loss or alterations to one or more characteristics or components of the townscape character area

Impact magnitude	Definition
	• Addition of new features or components that are in character with the existing townscape character area • Localised loss or addition of features in the wider setting of the townscape character area
Negligible	• Very limited loss or alteration of characteristics or townscape components of the townscape character area or setting of surrounding character areas • Addition of new features or townscape components that are relatively inconspicuous and largely in character with the existing townscape character area or setting of surrounding character areas

Significance of Effects

Determination of the level of an effect requires the application of professional judgement to weigh the findings of receptor sensitivity and the magnitude of change. This approach is recommended by GLVIA3 as opposed to using an assessment matrix only. The presence of any combination of factors may be considered when assessing the level of effect. This allows professional judgement to be used when determining the relative importance of different factors, which varies on a site-specific basis. Effects may be adverse or beneficial. The broad criteria that influence the level of significance and which are guided by and adapted from GLVIA3 guidance are shown in Table 9A.5. Both the major and moderate categories are considered to constitute a significant effect. Any one aspect described may result in a categorisation within that level of effect.

Table 9A.5: Significance criteria for assessment of townscape effects

Sensitivity	Typical description
Major adverse	• At considerable variance with the existing townscape character, degrading its integrity • Permanently degrade, diminish or destroy the integrity of valued characteristic features, elements and /or their setting • Adverse at a national or regional level • Comprehensively conflicts with regional or local environmental policies for protection and enhancement of the environment • Effects a large proportion of the character area or its setting
Moderate adverse	• At variance with existing townscape character • Cannot be fully mitigated and may cumulatively amount to a moderate adverse effect • Adverse at a local level • Not be wholly compatible with local environmental policies for the protection and enhancement of the environment • Affects a part of the character area or its setting
Minor adverse	• Slightly at variance with the existing townscape character • Largely mitigated with only small residual adverse effect • Affects only a small proportion of the character area or its setting
Negligible	• Compatible with the existing townscape character • Affects only a small proportion of the wider setting of a character area

Sensitivity	Typical description
Minor beneficial	• Improves and enhances existing townscape character • Restores valued characteristic features partially lost through other land uses • Enhances a small proportion of the character area or its setting
Moderate beneficial	• Markedly improves and enhances existing townscape character • Restores valued characteristic features substantially lost through other land uses • Enhances a part of the character area or its setting
Major beneficial	• Considerably and distinctly improves and enhances the existing townscape character • Restores valued characteristic features substantially or entirely lost through other land uses • Enhances a large proportion of the character area or its setting

Visual Effects

Wireline Production Methodology

A verifiable wireline is a wireline based on a replicable, transparent and structured process, so that the accuracy of the representation can be verified by an independent party.

The methodology followed for the assessment is based on current best practice and follow recommendations from the Advice Note 01/11 Photography and Photomontages in Landscape and Visual Impact Assessment[4].

Verifiable Photography

The verifiable wirelines have been based on accurately captured and surveyed verifiable photography. Photography was captured during December 2017 to May 2018. The horizontal field of view was determined with reference to the York. All images have a vertical field of view of 50 degrees.

The specification for the verifiable photography was as follows:

- Image resolution:
    - Panoramic images were supplied at a minimum of 15,000 pixels wide at 300 dpi;
- Image quality:
    - Processed tagged image file formats[2] (TIFF files) containing corrections for lens distortions[3], vignetting[4] and chromatic aberrations[5];
    - Any necessary sharpening was applied uniformly across images; and

[2] A type of file particularly suited to high resolution images.
[3] Displacement or errors in the images caused by irregularities in camera lens.
[4] Reduction in an image's brightness or saturation at the periphery when compared to the centre of the image.
[5] Colour distortion in an image caused by the inability of the camera lens to bring the various colours of light to focus at a single point.

    - All panoramic images were free of parallax errors[6];
- Data (marked on each file in a separate layer):
    - Focal length (to three decimal places where applicable);
    - The lens axis;
    - The details of height over survey point (between 1.55m and 1.70m high);
    - Field of view;
    - Image dimensions;
    - Film gate size;
    - Date and time; and
- Accuracy:
    - Generally each individual observation set-up achieved an accuracy of + or – 45mm to Ordnance Survey grid/datum.

Verifiable Surveying

Each camera location has been surveyed together with a series of clearly defined detail points within the image (e.g. corners of road markings, features on road signs, corners of building features etc.). Each image has a minimum of 10-12 clearly defined detail points taken across the width of the image at near, mid and far distance (i.e. a balance of points across the photograph).

The surveyors delivered:

- Points for the camera locations and each detail point was given a unique number that related to the viewpoint number;
- A CAD file containing the camera position and detail points as vertical lines;
- A spreadsheet of the camera locations and detail points including annotated descriptions; and
- An image of the photo showing the detail points marked on.

Production of 3D Model

The 3D model of the project was created collaboratively with the design team, in order to illustrate the proposed Development parameters.

All elements of the 3D model were resolved from all angles to ensure it was a complete model and therefore fully robust when creating wirelines from specific angles and locations.

Within Autodesk 3DS Max, all surfaces created as part of the 3D model were checked to ensure no co-planar faces existed anywhere in the model, with all faces appropriately sub-divided.

[6] Apparent change in the direction of an object caused by changes in the camera location.

All elements within the 3DS Max model files were named appropriately. There were no generic names within the model files (e.g. circle, cylinder etc.) to ensure all objects can be selected and all users have full control of the 3DS Max scene.

A 3DS Max model file for each viewpoint was assembled before rendering.

Camera Matching

The process of camera matching creates a virtual camera in the same location and height, and pointing in the same direction as the physical camera used on-Site to capture the image.

The process involves accurately positioning the three-dimensional model of the proposed Development within each existing view. This was achieved through a process of matching the surveyed points in the digitised image with those recorded by the survey team on the existing photographs. The central horizon line in each of the existing views was then calculated and imported into 3DS Max as a backdrop to the 3D model. The survey points and specifications of the lens type relating to each view were also entered into 3DS Max.

The survey points of the camera position and each clearly defined detail point (relating to specified objects in the view) were then highlighted on the digitised image. A further check of the accuracy of the survey points in each digitised view was carried out by overlaying the central horizon line of each view with the digitised survey points prepared in 3DS Max. This additional check ensured that the survey points matched precisely. This process was undertaken independently by two different designers, with the results cross referenced to provide a further check on accuracy.

Once the process of camera matching was completed, the 3D model of the Project was accurately positioned to match each of the views captured. This was achieved by rendering the camera matched 3D model of the Project within 3DS Max at the same size as the digitised existing view.

Recommended Viewing Distances

It is recommended that the panoramic verified images are viewed at an optimum viewing distance in relation to the size of printed photomontage, to give a correct sense of scale[4,5].

In order for the viewer at the camera location to use the images, they must be printed large enough to hold at a comfortable 400-500mm viewing distance which, for the whole panorama is often impractical because of the size. The images are provided within an A3 format for practicality, and do not lend themselves to direct comparison out in the field.

For viewing in the field, it is more practical to use a set of 40 degree sections from the panorama, printed on A3 landscape sheets (with the image filling the full height of the paper). These can then be held up at the correct distance from the eye (as noted above) and at the height photographed from, and this would then match what is being seen in the field. It is crucial that the viewer is standing in the precise location of where the photograph was captured from.

If the panoramas are to be used in the field, they should be viewed by curving them either with the use of a cylindrical object or simply by hand with a radius of 450mm. With a standard vertical field of view, panoramas should be printed at the following sizes for true representation:

- 80 degrees – 630 mm x 300 mm;
- 120 degrees – 950 mm x 300 mm; and
- 160 degrees – 1200 mm x 300 mm.

Magnitude of Change

The likely nature and magnitude of changes to viewpoints have been described together with the consequential effect on the visual receptor.

The magnitude of potential visual change (either adverse or beneficial) to the visual amenity of the identified receptors has been described by reference to the:

- Size or scale of change: with respect to the loss or addition of features and changes in its composition, including the proportion of the view occupied by the proposed Development, the degree of contrast or integration of any new features or changes in the landscape in terms of form, scale, mass, line, height, colour and texture, the nature of the view of the proposed Development in respect of the time over which it will be experienced as well as if it is a full, partial or glimpsed view;
- Geographical extent of change: considering the angle of the view in relation to the main activity of the receptor, the distance from the proposed Development and the extent over which the changes will be visible;
- Duration and reversibility of the effect: short (0-5 years)/medium (5-10 years)/long-term (>10 years), permanent or temporary and reversible; and
- Effectiveness of any mitigation proposed.

This assessment of magnitude was also informed by:

- The type of view i.e. wide panorama, framed, glimpsed or sequential view; and
- The extent of screening or filtering of the view (e.g. by buildings/ vegetation).

Factors that have been considered in assessing the magnitude of change to each viewpoint are described in Table 9A.6 below, based on guidance from GLVIA3.

Table 9A.6: Visual change magnitude criteria

Impact magnitude	Definition
High	• Total loss of or major alteration to key characteristics of the view from a receptor • Addition of new features or components which would be continuously highly visible and markedly different in character to the existing composition of the view

Impact magnitude	Definition
	• Substantial changes in close proximity to the visual receptor, within the direct frame of view
Medium	• Partial loss of or alteration to one or more key characteristics of the view from a receptor • Addition of new features or landscape components that may be continuously highly visible, but are largely characteristic of the existing view from a receptor • Changes a relatively short distance from a receptor, but viewed as one of a series of components in the middle ground of the view • Substantial change partially filtered by intervening vegetation and/or built form, or viewed obliquely from the visual receptor
Low	• Fairly small loss of, or alterations to, one or more characteristics of the view from a receptor • Addition of new features or components that may be continuously or intermittently visible, but are largely characteristic of the existing view from a receptor • Changes within the background of the view, viewed as one of a series of components in the wider panoramic view from a receptor • Change largely filtered by intervening vegetation and/or built form, or viewed obliquely from the visual receptor
Negligible	• Very limited loss or alteration of inconspicuous characteristics of the view from a receptor • Addition of new features or components that are largely inconspicuous and characteristic of the existing Site when viewed from a receptor • Changes within the background of the view, viewed as an inconspicuous element within the wider panoramic view from a receptor • Change almost entirely obscured by intervening vegetation and/or built form

Significance of Effects

Determination of the level of an effect requires the application of professional judgement to weigh the findings of receptor sensitivity and the magnitude of change. This approach is recommended by GLVIA3 as opposed to using an assessment matrix. The presence of any combination of factors may be considered when assessing the level of effect. This allows professional judgement to be used when determining the relative importance of different factors, which varies on a site-specific basis. Effects may be adverse or beneficial. The broad criteria that influence the level of significance and which are guided by and adapted from GLVIA3 guidance are shown in Table 9A.7 below. Both the major and moderate categories are considered to constitute a significant effect. Any one aspect described may result in a categorisation within that level of effect.

Table 9A.7: Significance criteria for assessment of visual effects

Sensitivity	Typical description
Major adverse	A marked deterioration in the existing view
Moderate adverse	A noticeable deterioration in the existing view
Minor adverse	A discernible deterioration in the existing view

Sensitivity	Typical description
Negligible	No perceptible deterioration or improvement in the existing view
Minor beneficial	A discernible improvement in the existing view
Moderate beneficial	A noticeable improvement in the existing view
Major beneficial	A marked improvement in the existing view

Appendix 10A
Acoustics Terminology

Contents

10A.1 Glossary of acoustic terminology

10A.1.1 Decibel (dB)

The ratio of sound pressures which we can hear is a ratio of 106:1 (one million:one). For convenience, therefore, a logarithmic measurement scale is used. The resulting parameter is called the 'sound pressure level' (Lp) and the associated measurement unit is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.

10A.1.2 dB(A)

The unit used to define a weighted sound pressure level, which correlates well with the subjective response to sound. The 'A' weighting follows the frequency response of the human ear, which is less sensitive to low and very high frequencies than it is to those in the range 500Hz to 4kHz.

In some statistical descriptors the 'A' weighting forms part of a subscript, such as LA10, LA90, and LAeq for the 'A' weighted equivalent continuous noise level.

10A.1.3 Equivalent continuous sound level

An index for assessment for overall noise exposure is the equivalent continuous sound level, Leq. This is a notional steady level which would, over a given period of time, deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating levels can be described in terms of a single figure level.

10A.1.4 Frequency

Frequency is the rate of repetition of a sound wave. The subjective equivalent in music is pitch. The unit of frequency is the hertz (Hz), which is identical to cycles per second. A 1000Hz is often denoted as 1kHz, eg 2kHz = 2000Hz. Human hearing ranges approximately from 20Hz to 20kHz. For design purposes the octave bands between 63Hz to 8kHz are generally used. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. For more detailed analysis, each octave band may be split into three one-third octave bands or in some cases, narrow frequency bands.

10A.1.5 Maximum noise level

The maximum noise level identified during a measurement period. Experimental data has shown that the human ear does not generally register the full loudness of transient sound events of less than 125ms duration and fast time weighting (F) has an exponential time constant of 125ms which reflects the ear's response. Slow time weighting (S) has an exponential time constant of 1s and is used to allow more accurate estimation of the average sound level on a visual display.

The maximum level measured with fast time weighting is denoted as LAmax, F. The maximum level measured with slow time weighting is denoted LAmax, S.

10A.1.6 Sound power level

The sound power level (Lw) of a source is a measure of the total acoustic power radiated by a source. The sound power level is an intrinsic characteristic of a source (analogous to its volume or mass), which is not affected by the environment within which the source is located.

10A.1.7 Sound pressure level

The sound power emitted by a source results in pressure fluctuations in the air, which are heard as sound.

The sound pressure level (Lp) is ten times the logarithm of the ratio of the measured sound pressure (detected by a microphone) to the reference level of 2 x 10-5Pa (the threshold of hearing).

Thus Lp (dB) = 10 log (P1/Pref)2 where Pref, the lowest pressure detectable by the ear, is 0.00002 pascals (ie 2x10-5 Pa).

The threshold of hearing is 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dBLA and a change of 3dB is only just detectable. A change of 10dB is subjectively twice, or half, as loud.

10A.1.8 Statistical noise levels

For levels of noise that vary widely with time, for example road traffic noise, it is necessary to employ an index which allows for this variation. The L10, the level exceeded for 10% of the time period under consideration, and can be used for the assessment of road traffic noise (note that LAeq is used in BS 8233 for assessing traffic noise). The L90, the level exceeded for 90% of the time, has been adopted to represent the background noise level. The L1, the level exceeded for 1% of the time, is representative of the maximum levels recorded during the sample period. A weighted statistical noise levels are denoted LA10, dBLA90 etc. The reference time period (T) is normally included, e.g. dBLA10, 5min or dBLA90, 8hr.

10A.1.9 Typical levels

Some typical dB(A) noise levels are given below:

Noise Level, dB(A)	Example
130	Threshold of pain
120	Jet aircraft take-off at 100m
110	Chain saw at 1m
100	Inside disco
90	Heavy lorries at 5m
80	Kerbside of busy street
70	Loud radio (in typical domestic room)
60	Office or restaurant
50	Domestic fan heater at 1m
40	Living room
30	Theatre
20	Remote countryside on still night
10	Sound insulated test chamber

10A.1.10 Vibration

Vibration may be expressed in terms of displacement, velocity and acceleration. Velocity and acceleration are most commonly used when assessing human comfort or structureborne noise issues.

Vibration magnitude may be quantified as a peak value, or as a root mean squared (rms) value. The rms value is of benefit because it takes into account both time history variation and energy content. The rms value is equal to 0.707 times the peak value.

The peak value, expressed as the peak particle velocity (PPV) is commonly used for construction vibration and is the parameter best correlated with building damage. PPV can also be related to the perceptible to people of vibration.

Generally humans are more sensitive to changes in vibration amplitude than they are to changes in the duration of the exposure to vibration.

10A.1.11 Vibration dose value (VDV)

This is a complex metric that has been identified as being the best objective measure of human disturbance from intermittent/transient vibration. The VDV is the fourth root of the time integral of the fourth power of the weighted acceleration. VDV are measured in units of m/s1.75. The frequency weightings are defined in BS 6472-1: 2008 and in BS 6841: 1987.

The VDV doubles in magnitude with a doubling of vibration amplitude. However, a 16-fold increase in the duration of exposure to the vibration is required to double the VDV (without any change in amplitude).

Appendix 10B
Survey Results

Contents

10B.4 Tables and Figures

Figures

Tables

10B.1 Introduction

An environmental noise and vibration survey has been undertaken to determine the existing conditions in and around the proposed Development. Measurements have been undertaken in accordance with national and international industry good practice guidance.

10B.1.1 Site description

As shown in Figure 10B.1, the proposed site is located immediately adjacent to York Railway Station, between the River Ouse and the A59 (Boroughbridge Road). The surrounding areas consist of both residential and commercial uses.

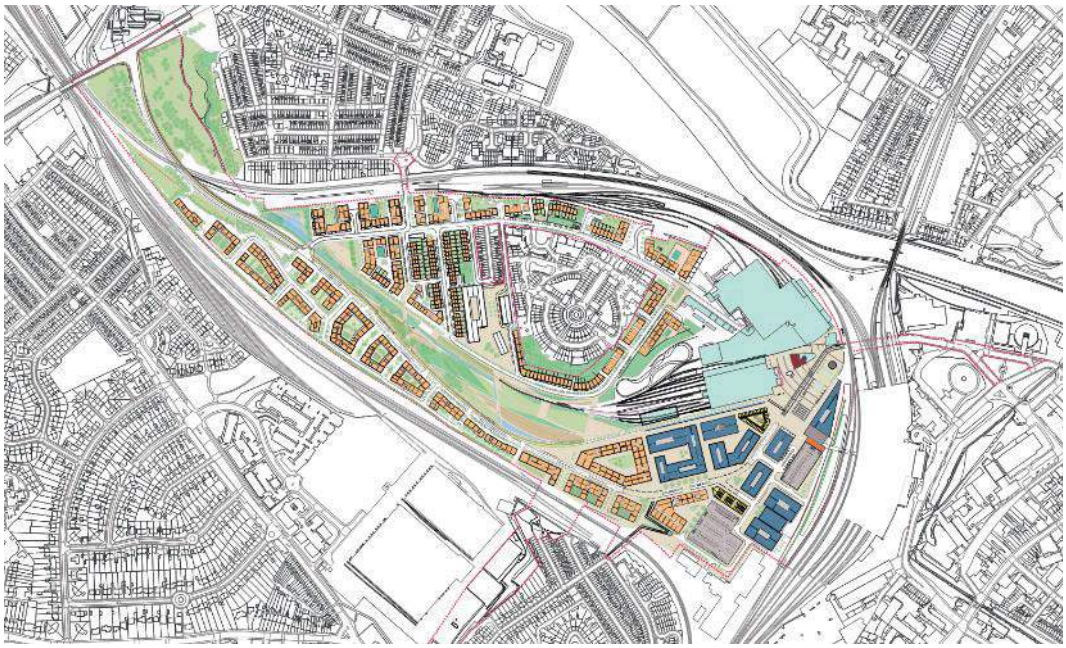


Figure 10B.1: Proposed Development, with boundary and surrounding area

Where appropriate, in relation to noise and vibration measurements, the direction of trains will be described in terms of "up" (towards the south) or "down" (towards the north). For the purposes of this assessment, the following track names will be used, as shown in **Error! Reference source not found.**:

- East Coast main line (ECML)
- Freight avoiding line (FAL)
- Station avoiding line (SAL)
- National Railway Museum line (NRML)

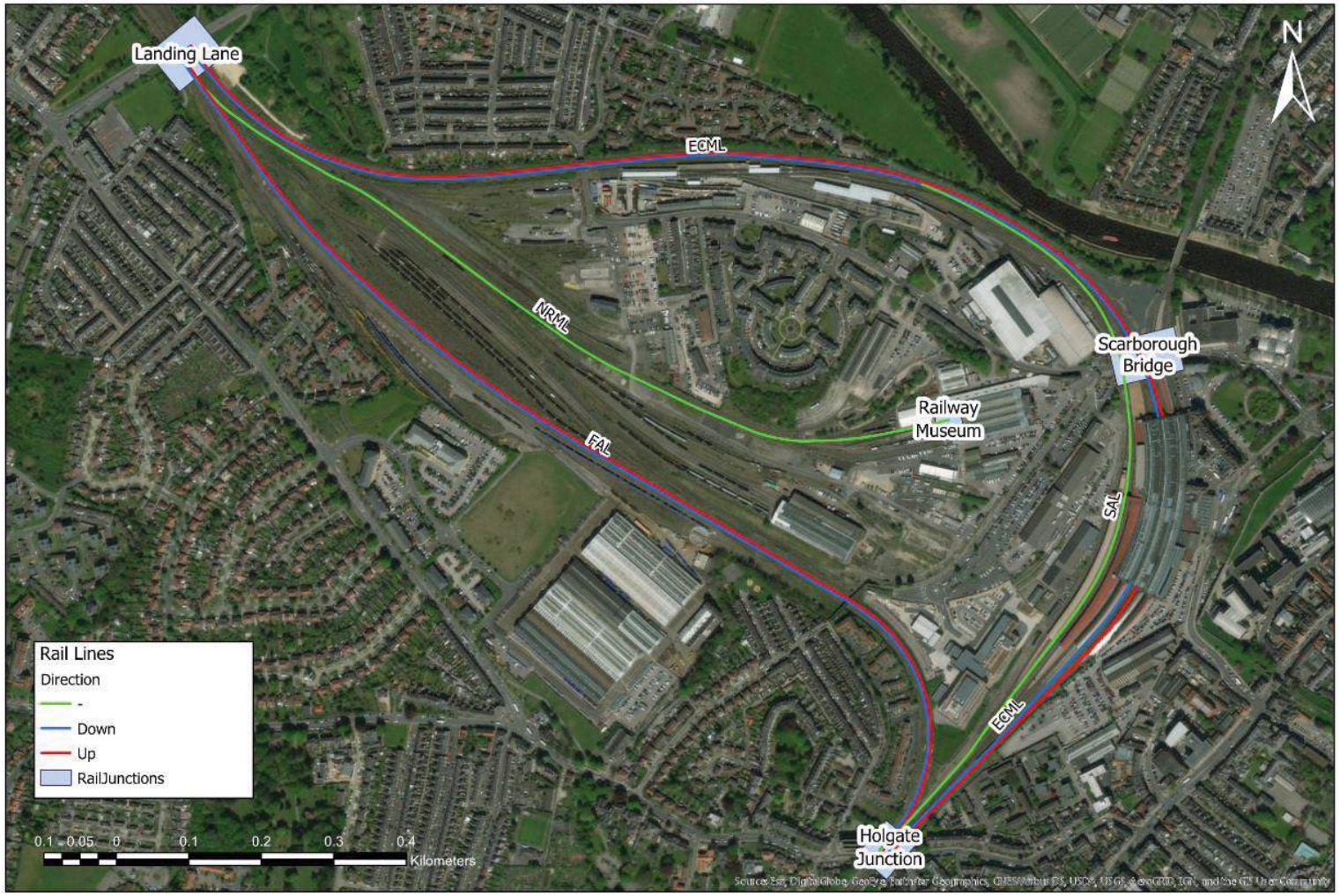


Figure 10B.2: Attended and unattended noise measurement locations

10B.1.2 Dates, personnel and weather conditions

The noise and vibration surveys were conducted by the following Arup staff:

- 17th - 19th April 2018: Henry Cook and Holly Cowperthwaite
- 18th - 20th June 2018: and by Joy Stevens and Naomi Tansey
- 27th June 2018: Holly Cowperthwaite

Attended measurements were undertaken during dry conditions where wind speeds did not exceed 5m/s.

Unattended measurements were conducted between 17th - 30th April and 18th June – 5th July 2018.

10B.1.3 Noise and vibration measurement equipment

The sound level meters and microphones are Type 1 conforming to BS EN 61672-1:2013. The calibration of the sound level meters and microphones were checked before and after use to confirm that there was no significant drift in meter response. This verification indicated that there was less than 0.5dB variation between checks.

The accelerometers are calibrated in accordance with ISO16063-21 and ISO16063-22. The data recorders are checked annually against the manufacturer's specification to confirm device linearity.

The monitoring equipment used is described in **Error! Reference source not f ound.**.

Table 10B.1: Instrumentation used for attended and unattended noise and vibration measurements

Equipment	Manufacturer	Model Number	Serial Number
Attended noise measurements			
Precision integrating sound level meter (Kit B/D/E)	Norsonic	140	1403431/ 1405203/ 1405202
Sound level meter microphone (Kit B/D/E)	PCB/ Norsonic/ Norsonic	N/A/ 1225/ 1225	163499/ 151246/ 151245
Sound level meter preamp (Kit B/D/E)	Norsonic	1209	12579/ 15390/ 15264
Type I sound pressure level calibrator (Kit B/D/E)	Norsonic	1251	33845/ 33555/ 33554
Sound level meter windshield (Kit B/D/E)	Norsonic	N/A	N/A
Unattended noise measurements			
Precision integrating sound level meter (Kit A/B/D/E/F)	RION	NL-32	00451285/ 00661738/ 00282490/ 00493035/ 00493038
Sound level meter microphone (Kit A/B/D/E/F)	RION	UC-53A	308532/ 312914/ 313776/ 315940/ 315944
Sound level meter preamp (Kit A/B/D/E/F)	RION	NH-21	15278/ 26688/ 26689/ 29977/ 29980
Type I sound pressure level calibrator (Kit A/B/D/E/F)	RION	NC-74	34773051/ 34662222/ 35173547/ 34104514/ 35173566
Attended and unattended vibration measurements			
4 channel data recorder (Kit A/B)	RION	DA20	460341/ 460342
Accelerometer (Kit D/F)	PCB	B12	24194/ 24195/ 31453/ 51174/ 51175/ 51176

10B.1.4 Measurement methodology

Noise

All noise measurements were captured as follows (as shown in **Error! Reference s ource not found.**):

- at locations considered to be representative of the nearest existing noise sensitive receptors (dwellings) and
- at locations considered to represent the existing noise climate affecting the proposed Development

At each location $L_{Aeq,T}$, L_{A10}, L_{A90} and L_{Amax} values were measured and Octave band spectra recorded. For some locations where train noise was dominant, L_{AE} values were also measured.

The sound level meter was mounted on a tripod with the microphone set approximately at 1.2m-1.5m above local ground level. All measurements were undertaken under acoustically free-field conditions (i.e. at least 3.5m from any reflective surface other than the ground), except where otherwise stated. A windshield was fitted to the microphone in order to minimise the effects of wind-induced noise across the microphone diagram.

Error! Reference source not found. provides details of where attended and u nattended noise measurements were undertaken and **Error! Reference source not found.** shows the corresponding locations.

Attended

Attended noise measurements were undertaken at the following times:

- Day time measurements between 9:30 and 17:30
- Evening measurements between 19:30 and 22:30
- Night-time measurements between 01:00 and 04:30

Attended measurements were 15 minutes in duration during daytime and evening hours and 5 minutes during the night-time.

Unattended

Unattended measurements were logged continuously for 5 minute periods during daytime, evening and night-time.

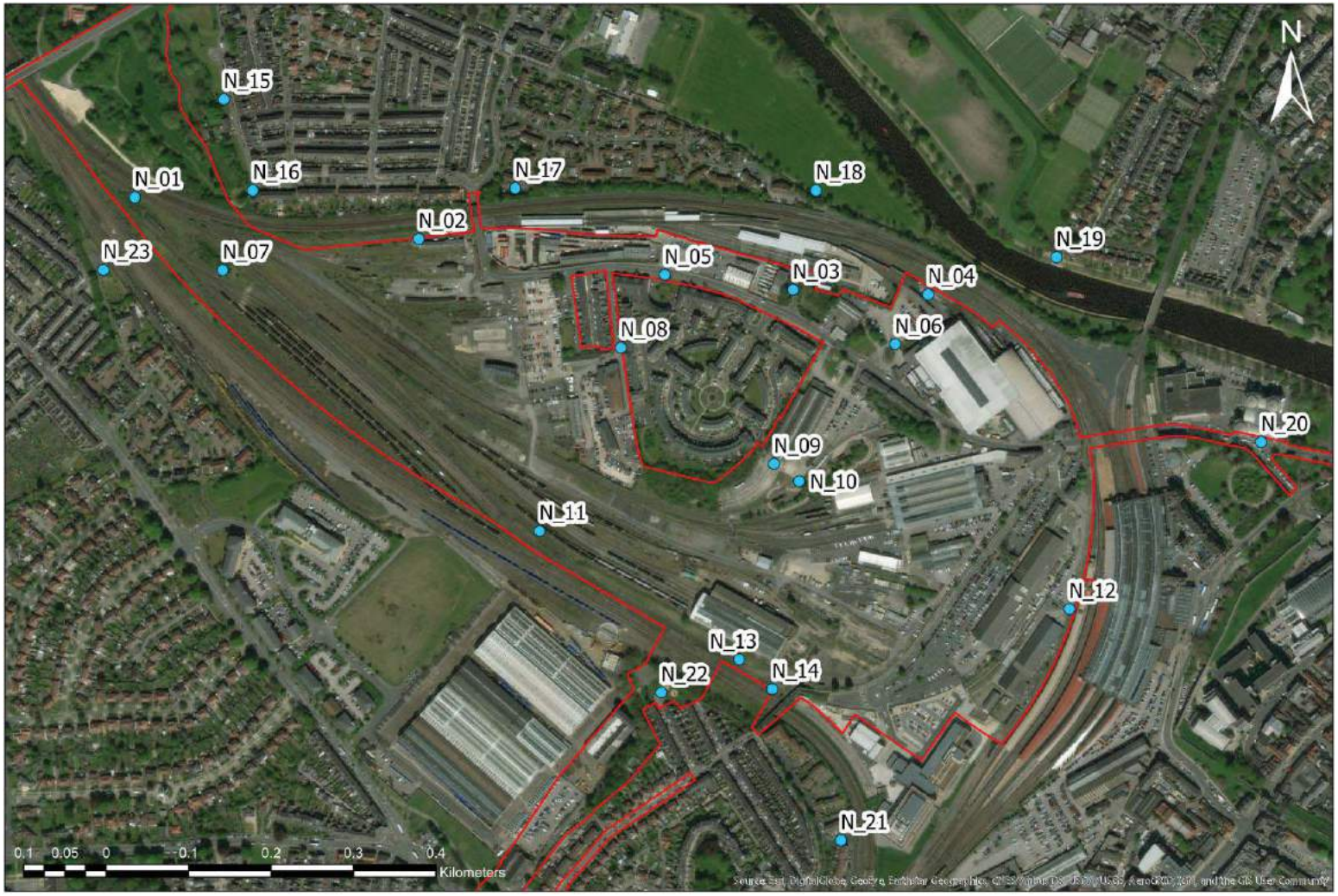


Figure 10B.3: Attended and unattended noise measurement locations

Table 10B.2: Summary of completed noise measurements

Name (see Figure B3)	Description	Noise Measurement			
		Attended, Day	Attended, Evening	Attended, Night	Logger
N_01	ECML - North	X			
N_02	ECML - Leeman Road	X			
N_03	Siemens depot	X	X	X	
N_04	NRM North carpark				X
N_05	Leeman Road / Martins Court	X	X	X	
N_06	NRM entrance	X	X	X	
N_07	Midway between ECML and FAL				X
N_08	Carleton Street East	X			
N_09	NRM South carpark	X			
N_10	NRM Miniature railway				X
N_11	FAL midway				X
N_12	York Railway Station	X			
N_13	FAL South	X			
N_14	FAL South				X
N_15	Garnet Terrace	X			
N_16	Garfield Terrace	X		X	
N_17	Aldborough Way West	X			
N_18	Aldborough Way East	X			
N_19	Almery Terrace south	X			
N_20	Leeman Road / Station Rise	X			
N_21	St Pauls Mews	X		X	
N_22	Upper St Paul's play area	X		X	
N_23	Siddings Gardens	X			

Vibration

All vibration measurements were captured (as shown in **Error! Reference source not found.**) at locations considered to represent the existing vibration levels affecting the proposed Development.

At each location a WAV file was recorded using a Rion DA20. These have been post-processed to calculate VDVs for daytime and night-time.

The measurements were taken using a PCB B18 accelerometer, which features three separate orthogonal accelerometers. The accelerometer channel numbers 1, 2 and 3 refer to the X (perpendicular to the rail line), Y (parallel to the rail line) and Z (vertical) axes respectively. Mounting of the accelerometer was dependent on the ground conditions and other constraints. The mounting options used were as follows:

- V_01 – epoxy glue to mount the baseplate to a dis-used rail sleeper
- V_02 – plaster of Paris on the ground
- V_03 – aluminium ground spike in the ground

Meteorological conditions during all measurements were conducive to environmental vibration measurements.

Error! Reference source not found. provides details of where attended and u nattended vibration measurements were undertaken and **Error! Reference source not found.** shows the corresponding locations.

Table 10B.3: Summary of completed vibration measurements

Name (see Error! R eference source not found.**)**	**Description**	**Vibration Measurements**	
		Attended, Day	**Logger**
V_01	ECML - North	X	X
V_02	ECML - Leeman Road	X	-
V_03	Siemens depot	-	X

Attended

Attended vibration measurements were undertaken between 11:30 and 17:10hrs.

A continuous WAV signal file was measured with the frequency range set to 1000Hz.

Unattended

A continuous WAV signal file was measured with the frequency range set to 500Hz.

Figure 10B.4: Attended and unattended vibration measurement locations

10B.2 Noise Survey

10B.2.1 Attended measurement locations

N_01

The acoustic environment was generally quiet when trains were not present, with occasional strong gusts of wind. The SLM was positioned facing the track, around ~6m from the closest track (where the idling freight train was) and ~9m from the East Coast Mainline. Occasional freight trains moved slowly on the line behind the SLM. Most of the train passes included horn noises.

Figure 10B.5: N_01 Location

Figure 10B.6: N_01 Location

Table 10B.4: Measured noise levels at location "N_01"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{AE}	dBL_{AFmax}	Comment	No. of carriages	Operator	Line	Direction
Day – 18/06/2018								
15:11	00:14	81.2	77.1	horn	3	TPEX	ECML	Up
15:17	00:18	84.6	82.0	horn	3	TPEX	ECML	Up
15:18	00:30	94.4	88.5	ringing rails, slower, horn	4	Northern	ECML	Down
15:21	00:14	86.2	81.9	siren in background, horn	3	TPEX	ECML	Down
15:25	04:58	97.5	86.6	horn, idling freight	4	NR Maintenance	NRML	Up / Down
15:32	00:13	80.1	76.3	horn	4	XC	ECML	Up
15:34	01:29	76.0	68.0	southern line	21	Freight	FAL	Up / Down
15:36	00:14	84.9	79.4	horn	4	XC	ECML	Down
15:37	00:26	80.9	72.0		8	XC	ECML	Up
15:39	00:18	88.5	82.2	idling freight in background, horn	11	Virgin	ECML	Down
15:42	00:25	83.4	77.0	horn	3	TPEX	ECML	Down
15:48	00:10	76.8	72.1	batteries failed mid-recording	3	TPEX	ECML	Up
Average		*90*	*68 - 89*					

N_02

The acoustic environment was generally quiet, with the dominant noise being distant road traffic from Leeman Road as well as occasional train pass-bys and vehicle movement through the exit of the National Rail compound. The railway was ~22m from the measurement point, with the track raised above ground level.

Figure 10B.7: N_02 Location

Figure 10B.2: N_02 Location

Table 10B.5: Measured noise levels at location "N_02"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{AE}	dBL_{AFmax}	Comment	No. of carriages	Operator	Line	Direction
Day – 19/06/2018								
15:59	00:47	86.7	79.9		11	Virgin	ECML	Down
16:01	00:34	76.2	66.6		4	XC	ECML	Up
16:05	00:33	80.8	74.6		3	TPEX	ECML	Up
16:12	00:24	88.4	84.1		3	Northern	ECML	Down
16:13	01:11	86.9	72.8		Long	Freight	ECML	Up
16:18	00:14	76.8	71.4		3	TPEX	ECML	Up
16:21	00:21	85.2	80.4		3	TEPX	ECML	Down
16:32	00:29	83.0	75.5		4	XC	ECML	Down
16:34	00:56	89.8	82.9	Slowing down	11	Virgin	ECML	Up
16:37	00:36	81.7	74.6		11	Virgin	ECML	Down
16:39	00:32	76.3	67.6		4	XC	ECML	Up
16:41	00:22	82.9	77.7		3	TPEX	ECML	Down
16:47	00:24	82.9	76.1		4	XC	ECML	Down
16:48	00:19	80.2	73.8		6	TPEX	ECML	Up
16:51	00:30	76.0	67.7	Slowing down	4	Northern	ECML	Up
16:56	00:50	89.6	82.8	Two trains at same time	5 / 11	TPEX / Virgin	ECML	Up / Down
17:02	00:20	64.1	57.6	Missed 1st half of train	Long	Freight	FAL	Up
17:03	00:27	84.4	79.7		11	Virgin	ECML	Up
17:07	00:18	86.6	81.7		3	TPEX	ECML	Down
17:12	00:36	89.8	83.2	Two trains at same time	4 / 3	Northern / TPEX	ECML	Down / Up
Average		*85*	*58 - 84*					

N_03

The acoustic environment was fairly quiet during the day, with traffic from Leeman Road being dominant. At night time, noise from the staff in the depot and the car park gate were dominant. ~25m from Leeman Road and 80m from closest railway.

Figure 10B.9: N_03 Location

Figure 10B.10: N_03 Location

Table 10B.6: Measured noise levels at location "N_03"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{ASmax}	dBL_{AFMax}	Comments
Day – 18/04/18							
14:08	15:00	47.1	57.3	61.0	71.6	75.7	workmen in distance, nearby road traffic, jetwash
15:14	15:00	48.0	58.0	61.3	72.3	74.6	pickup truck, van turned around
16:15	15:00	49.2	57.7	61.6	70.0	73.8	train coming into depot, person with suitcase
Average		*48*	*58*	*61*	*66 - 68*	*74 - 76*	
Evening 18/04/18							
19:54	15:00	44.5	56.0	60.3	67.6	69.7	Electric gate in car park
20:54	15:00	45.2	55.4	59.8	66.4	74.2	

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{ASmax}	dBL_{AFMax}	Comments
21:54	15:00	44.2	54.4	58.2	67.8	70.4	
Average		*45*	*55*	*59*	*66 - 68*	*70 - 74*	
Night 18/04/18							
01:35	05:00	40.6	45.0	45.1	55.8	**	people walking, train horn
01:45	05:00	40.3	41.4	41.7	47.8	**	
01:50	05:00	41.3	49.4	53.6	62.5	**	
02:37	05:00	40.1	41.1	42.1	47.3	**	
02:42	05:00	39.9	40.8	41.5	49.3	**	
02:47	05:00	39.8	44.5	41.4	61.8	**	
03:41	05:00	41.3	49.0	51.7	61.2	**	
03:46	05:00	46.8	52.3	57.6	62.0	**	
03:51	05:00	46.1	50.2	50.4	64.4	**	
Average		*42*	*48*	*47*	*61 - 64*		

N_05

The acoustic environment consisted of traffic on Leeman Road and passing pedestrians. ~2m from Leeman Road and 85m from closest railway.

Figure 10B.11: N_05 Location

Figure B12: N_05 Location

Table 10B.7: Measured noise levels at location "N_05"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{ASmax}	dBL_{AFMax}	Comments
Day – 18/04/18							
14:28	15:00	48.9	67.0	71.4	77.5	79.3	
15:33	15:00	51.3	68.2	72.5	78.8	80.4	
16:37	15:00	50.9	67.6	72.2	77.7	79.8	
Average		*50*	*68*	*72*	*77 - 79*	*79 - 80*	
Evening 18/04/18							
20:14	15:00	41.2	64.5	68.7	83.2	86.6	Motorbike pass-bys, sirens, and a group of pedestrians shouting
21:14	15:00	44.5	65.3	69.3	83.2	86.0	
22:14	15:00	41.3	66.3	69.1	87.8	90.1	
Average		*42*	*65*	*69*	*83 - 88*	*86 - 90*	
Night 18/04/18							
01:59	05:00	38.8	40.7	42.2	43.8	**	
02:04	05:00	38.4	39.6	40.6	42.5	**	

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{ASmax}	dBL_{AFMax}	Comments
02:09	05:00	38.7	51.7	43.7	70.7	**	
02:58	05:00	31.0	54.9	52.0	74.1	**	train
03:03	05:00	33.6	58.9	57.8	76.4	**	
03:08	05:00	31.2	40.1	43.4	51.3	**	
04:00	05:00	32.8	50.8	40.2	69.9	**	
04:05	05:00	33.4	50.2	38.6	69.4	**	
04:10	05:00	34.0	54.5	53.7	73.4	**	
Average		*35*	*53*	*46*	*43 - 76*		

** no recorded value

N_06

The acoustic environment is dominated by road traffic on Leeman Road and the nearby car-park. The measurement location is around 40m from Leeman Road and 90m from the closest railway.

Figure 10B.13: N_06 Location

Figure B14: N_06 Location

Table 10B.8: Measured noise levels at location "N_06"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{ASmax}	dBL_{AFMax}	Comments
Day – 18/04/18							
14:24	15:00	50.5	63.7	64.2	84.6	**	plane, van idling
15:51	15:00	48.0	62.2	63.5	84.1	**	moped
17:27	15:00	49.8	61.5	63.8	80.0	84.2	van idling, talking, car doors slamming, loading van
Average		*49*	*63*	*64*	*80 - 85*	*84*	
Evening 18/04/18							
19:35	15:00	44.0	59.3	63.4	69.7	71.8	locking car park
20:35	15:00	44.5	58.6	62.9	69.5	72.5	man with suitcase, talking
21:35	15:00	41.7	57.3	62.0	72.9	76.3	man popping bubble wrap, moped
Average		*43*	*58*	*63*	*70 - 73*	*72 - 76*	
Night 18/04/18							

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{ASmax}	dBL_{AFMax}	Comments
01:14	05:00	33.8	34.9	35.8	41.2	**	people, car moving from car park, train horn, 1 freight train & 1 passenger train
01:19	05:00	38.4*	62.7*	53.8*	85.1*	**	
01:24	05:00	36.4	47.8	52.2	58.4	**	
02:20	05:00	33.2	34.8	35.2	46.4	**	birdsong
02:25	05:00	33.0	42.3	36.5	58.6	**	
02:30	05:00	32.8	43.4	37.9	60.4	**	
03:23	05:00	47.0*	55.3*	60.3*	67.3*	**	van in car park, loud lorry pass, car over metal levers, 1 passenger train & 1 freight train
03:28	05:00	38.9*	56.8*	53.2*	79.3*	**	
03:33	05:00	36.0*	52.5*	56.5*	66.3*	**	
Average		*41*	*55*	*57*	*66 - 79*		
Average excluding car park activity		*34*	*43*	*40*	*41 - 60*		

* includes car park activity
** no recorded value

N_08

The acoustic environment was quiet with occasional cars and vans passing by from the nearby car hire company and traffic audible from Leeman Road. ~100m from Leeman Road and 160m from closest railway.

Figure 10B.15: N_08 Location

Figure B16: N_08 Location

Table 10B.1: Measured noise levels at location "N_08"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{AFMax}	Comments
Day – 18/04/18						
14:51	15:00	35.8	56.2	54.8	80.5	people talking, music playing, lorry
15:52	15:00	38.4	54.0	55.6	75.5	car doors slamming, talking, car horn
16:57	15:00	38.4	59.0	58.7	86.5	car on trailer
Average		*38*	*57*	*56*	*76 - 87*	

N_09

The acoustic environment consisted of noise from children visiting the railway museum, cars in the visitor car park, coach engines running, and distant announcements from York station. The measurement location was ~30m from the ride-along train route and 60m from the East Coast Mainline.

Figure 10B.3: N_09 Location

Figure 10B.4: N_09 Location

Table 10B.2: Measured noise levels at location "N_09"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{ASmax}	dBL_{AFMax}	Comments
Day – 18/04/18							
14:05	15:00	41.4	47.3	47.4	64.0	**	horn from ride-along train
15:32	15:00	39.1	42.7	43.5	58.9	**	no train
16:41	15:00	42.6	49.1	50.3	69.5	**	horn from ride-along train
Average		*41*	*47*	*47*	*59 - 70*		
Day – 28/06/18							
11:38	14:51	42.2	49.4	50.7	-	74.5	mini train, coach
11:53	2:32	45.3	49.6	53.2	-	59.5	SEL of steam train pass-by / idling on tracks
12:02	9:23	39.2	47.7	51.5	-	62.0	good mini train
Average		*42*	*48*	*52*	-	*60 - 75*	

N_12

The acoustic environment was dominated by heavy foot traffic from staff entering the National Rail buildings, with some noise from train passengers on the platform opposite. Around 25m from closest railway and 50m from station.

Figure 10B.5: N_12 Location

Figure 10B.6: N_12 Location

Table 10B.3: Measured noise levels at location "N_12"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{ASmax}	dBL_{AFMax}	Comments
Day – 18/04/18							
15:08	15:00	45.3	69.6	75.0	83.3	**	heavy foot traffic, pedestrian gate
16:13	15:00	48.0	71.1	75.3	81.2	**	
17:18	15:00	43.8	70.6	77.8	82.0	**	
Average		*46*	*70*	*76*	*81 - 83*		

** no recorded value

N_13

The acoustic environment was quiet with no train activity on the nearest line throughout the duration of the measurement. There were distant sounds of children playing, lawn mowers and sirens. There was a gentle breeze but no strong gusts of wind.

Figure 10B.7: N_13 Location

Table 10B.4: Measured noise levels at location "N_13"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{AFMax}	Comments
Day – 18/06/2018						
14:33	15:00	42.3	46.9	49.5	63.6	No train activity, relatively quiet

N_15

The acoustic environment was dominated by traffic from Water End off the A59, which was ~145m away. There were sounds of children playing in the distance and wind rustling leaves, as well as occasional train and car pass-bys. The railway was ~135m from the measurement location. The measurement location is representative of the receptors along Garnet Terrace.

Figure 10B.8: N_15 Location

Figure 10B.9: N_15 Location

Table 10B.5: Measured noise levels at location "N_15"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{AFMax}	Comments
Day – 19/06/2018						
10:25	15:00	48.7	52.7	54.7	64.9	distant train horn, aircraft
11:30	15:00	46.9	52.7	55.8	63.6	car door slam, talking
12:40	15:00	48.0	53.7	57.0	65.3	pedestrian walking, distant hedge cutter, distant children playing
Average		*48*	*53*	*56*	*64 - 65*	

N_16

The acoustic environment was generally quiet, consisting of distant road traffic from Water End, rustling of leaves and children playing in the distance with occasional train and car passes. During night-time, the dominant noise source was distant traffic from Water End and the A59, which was ~260m away. The railway was ~36m from the SLM and at a raised level. This measurement location is representative of the receptors along Garfield Terrace.

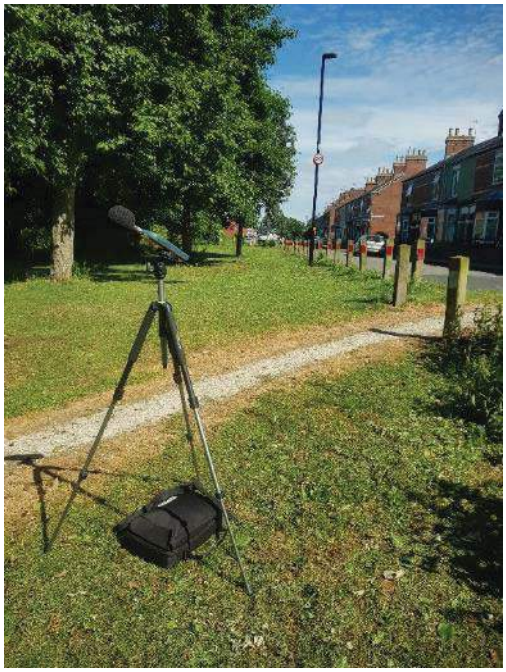


Figure 10B.10: N_16 Location

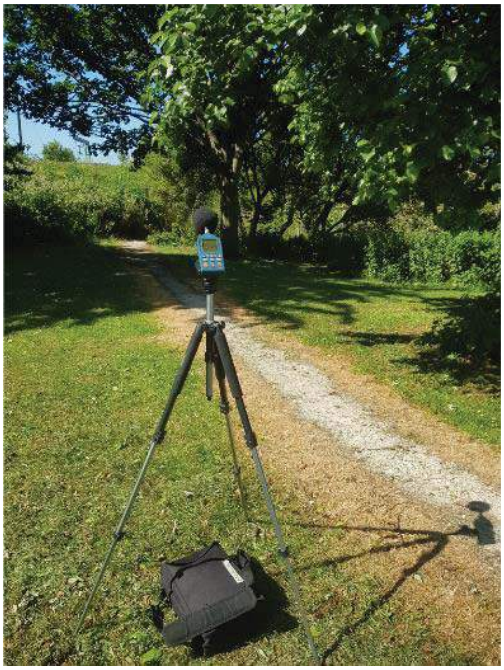


Figure 10B.11: N_16 Location

Table 10B.6: Measured noise levels at "N_16"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL$_{A90}$	dBL$_{Aeq}$	dBL$_{A10}$	dBL$_{AFMax}$	Comments
Day – 19/06/2018						
10:05	15:00	45.7	56.3	54.2	75.7	distant hedge trimmer, pedestrians chatting
11:10	15:00	43.2	58.0	55.7	75.0	people talking
12:20	15:00	41.4	55.2	52.7	76.8	cuckoo, car idling
Average		*43*	*57*	*54*	*75 - 77*	
Night– 20/06/2018						
01:43	05:00	30.7	39.7	41.2	54.7	distant train
01:48	05:00	29.4	36.3	39.3	53.7	
01:53	05:00	28.9	34.4	38.0	46.0	
03:00	05:00	29.5	32.9	33.8	57.3	distant train
03:05	05:00	31.4	33.2	34.8	44.7	distant trains
03:10	05:00	33.0	39.1	42.9	52.0	loud bird

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{AFMax}	Comments
04:13	05:00	37.2	42.2	43.3	58.9	birdsong, paused out train pass
04:18	05:00	38.1	41.7	44.1	51.1	
04:24	05:00	39.1	42.0	43.9	52.1	
Average		*33*	*39*	*40*	*45 - 59*	

N_17

The acoustic environment during the day consisted mainly of road traffic from Kingsland Terrace and Garfield Terrace (~30m away) and the rustling of leaves, as well as occasional train pass-bys. The measurement location was 17m from the railway and 6m from the nearest house. This measurement location is representative of the receptors along Aldborough Way the cul-de-sacs off it.

Figure 10B.12: N_17 Location

Figure 10B.13: N_17 Location

Table 10B.7: Measured noise levels at "N_17"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{AFMax}	Comments
Day – 19/06/2018						
09:40	15:00	47.7	56.6	59.0	73.0	alarm, train horn, HGV
10:50	15:00	45.0	57.9	60.7	73.2	people talking, train horn, distant air craft, car door slamming
11:55	15:00	44.4	56.0	58.1	73.2	HGVs, metal clangs from rail direction
Average		*46*	*57*	*59*	*73*	

N_18

The acoustic environment consisted of pedestrians and cyclists using the nearby footpath. The measurement location was 30m from the railway and 435m from Scarborough rail bridge. This measurement location is representative of the receptors on Aldborough Way.

Figure 10B.14: N_18 Location

Figure 10B.15: N_18 Location

Table 10B.8: Measured noise levels at location "N_18"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{ASmax}	dBL_{AFMax}	Comments
Day – 19/04/18							
13:25	15:00	40.0	52.4	56	68.5	**	train horn, strimmer
14:38	15:00	37.9	48.3	51.9	85.2	68.1	steam train over bridge near foot bridge, train horn, people talking.
15:39	15:00	40.2	52.0	52.6	71.6	**	people talking
Average		*39*	*51*	*54*	*69 - 85*	*68*	

** no recorded value

N_19

The acoustic environment consisted of pedestrians and cyclists, with boats passing on the river. The measurement location was 80m from the railway and 130m from Scarborough rail bridge. This measurement location is representative of receptors on Almery Terrace.

Figure 10B.16: N_19 Location

Figure 10B.17: N_19 Locations

Table 10B.9: Measured noise levels at location "N_19"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{ASmax}	dBL_{AFMax}	Comments
Day – 19/04/18							
12:53	15:00	43.4	63.7	56.4	90.7	**	boat tour, train horn, loud train horn.
14:18	15:00	44.7	55.6	59.6	67.1	**	people talking nearby
15:20	15:00	44.8	56.2	58.7	72.3	73.4	people talking and walking past
Average		*44*	*60*	*58*	*67 – 91*	*73*	
Average excluding train horn		*45*	*56*	*59*	*67 - 72*		

N_20

The acoustic environment was dominated by traffic on Leeman Road, with a constant source of background noise from sightseeing buses in the nearby lay-by. ~6m from the BAS Remaps premises and 140m from the closest rail line.

Figure 10B.18: N_20 Location

Figure 10B.19: N_20 Location

Table 10B.10: Measured noise levels at location "N_20"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{ASmax}	dBL_{AFMax}	Comments
Day – 19/04/18							
12:26	15:00	53.6	65.2	68.9	77.9	**	road train passes, baby crying
13:52	15:00	56.4	69.7	70.2	93.7	**	cars, motorbike passbys, road train, people talking
14:52	15:00	55.3	66.1	68.7	82.6	**	
Average		*55*	*67*	*69*	*78 - 94*		

** no recorded value

N_21

The acoustic environment during the day was generally quiet, with the dominant noise sources being bird song and a hum, with occasional train and car pass-bys. At night-time, the noise environment was dominated by the generator/building services noise. Distant road traffic from the A59 was also audible. The railway was 31m away behind a brick wall barrier ~2m high. The measurement location is representative of all receptors along St Paul's Mews.

Figure 10B.20: N_21 Location

Figure 10B.21: N_21 Location

Table 10B.11: Measured noise levels at "N_21"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{AFMax}	Comments
Day – 19/06/2018						
10:34	15:00	41.8	50.8	54.2	69.5	distant siren, plane, train horn, metal scraping sounds
11:46	15:00	39.9	50.1	53.2	69.3	house alarm, siren, people, plane pass directly overhead
12:57	15:00	40.4	49.1	52.1	65.8	train lingers in front of SLM), kids playing in park
Average		*41*	*50*	*53*	*66 - 70*	
Night– 20/06/2018						
01:17:25	05:00	37.5	39.3	41.3	47.3	distant train with clangs
01:22:28	05:00	37.8	39.1	40.4	46.2	idling car engine, voices

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{AFMax}	Comments
01:27:30	05:00	37.5	38.5	39.3	48.6	idling car engine, voices
02:30:03	05:00	37.6	38.6	39.4	56.2	seagulls, train horn, voices
02:35:15	05:00	37.9	40.5	40.8	52.6	train, voices
02:40:18	05:00	37.9	40.7	41.4	56.1	voices, motorbike pass-by, singing
03:47:49	05:00	39.3	46.5	47.8	62.1	birdsong, train pass-by
03:52:51	05:00	38.4	44.5	48.3	60.8	car horn
03:57:54	05:00	38.6	54.0	60.2	63.0	freight pass-by
Average		*38*	*46*	*44*	*46 - 63*	

N_22

The acoustic environment contained light birdsong during the day and industrial sounds from York Station (100m away). Distant road traffic was audible and there were intermittent loud clangs emanating from the Network Rail depot (~70m). The night-time environment contained no industrial noise or birdsong, but very distant road traffic from the A59, occasional seagulls and wind blowing through trees. The railway was ~45m away from the measurement position. This measurement location is representative of the receptors along Cleveland Street and Upper St Paul's Terrace.

Figure 10B.22: N_22 Location

Figure 10B.23: N_22 Location

Table 10B.12: Measured noise levels at "N_22"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{AFMax}	Comments
Day – 19/06/2018						
10:10	15:00	42.3	47.9	50.2	68.4	vehicle reversing alarm, hammering from houses on Upper St Pauls Terrace, people in park
11:23	15:00	42.0	45.5	47.2	63.2	train horn
12:36	15:00	39.6	44.7	47.7	59.2	train horn
Average		*41*	*46*	*48*	*59 - 68*	
Night– 20/06/2018						
00:53	05:00	32.1	37.2	40.6	52.1	seagulls, very distant train

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{AFMax}	Comments
00:58	05:00	32.4	38.6	42.2	56.3	very distant train
01:03	05:00	31.5	35.9	38.2	41.8	very distant train
02:08	05:00	31.6	36.3	39.5	56.2	distant freight train on railway south of station
02:13	05:00	30.3	35.0	40.0	43.5	Birds, leaves rustling, very distant road traffic
02:18	05:00	29.2	31.6	33.3	39.0	As previous
03:26	05:00	32.0	37.2	39.8	56.3	As previous
03:31	05:00	36.4	46.0	46.3	61.7	distant motorbike, train horn, distant train, freight train pass-by
03:36	05:00	34.9	45.9	43.8	59.8	Freight train pass-by
Average		*32*	*41*	*40*	*39 - 62*	

N_23

The acoustic environment during the day was mainly birdsong with distant traffic on 'Water End' off the A59, ~250m away. There were occasional train passes and gusts of wind. The measurement location was 13m from the closest freight line and 30m from the mainline. The measurement location is representative of the receptors at Poplar Street, Renshaw Gardens and cul-de-sacs.

Figure 10B.24: N_23 Location

Figure 10B.25: N_23 Location

Table 10B.13: Measured noise levels at "N_23"

Start time (hh:mm)	Elapsed time (mm:ss)	dBL_{A90}	dBL_{Aeq}	dBL_{A10}	dBL_{AFMax}	dBL_{AE}	Comments
Day – 19/06/2018							
09:40	15:00	41.0	52.5	57.1	74.8		freight train stopped in front of SLM
10:59	15:00	39.4	50.4	53.9	71.1		people in park, banging of slide, barking dog in park, train horn
12:11	15:00	38.0	48.6	50.4	73.5		people in park, talking, slide sounds
Average		*39*	*51*	*54*	*71 - 75*		
09:58	01:20	61.9	71.4	76.3	80.1	89.3	long freight train

10B.2.2 Unattended measurement locations

N_14

The acoustic environment was generally quiet, with the occasional train passes causing a large rise is noise level. Traffic from Leeman Road was barely audible. Some noise from the car park nearby could be heard. The measurement location was 25m form the nearest freight line and ~150m from two station/National Rail car parks.

Figure 10B.26: N_14 Location

Figure B27: N_14 Location

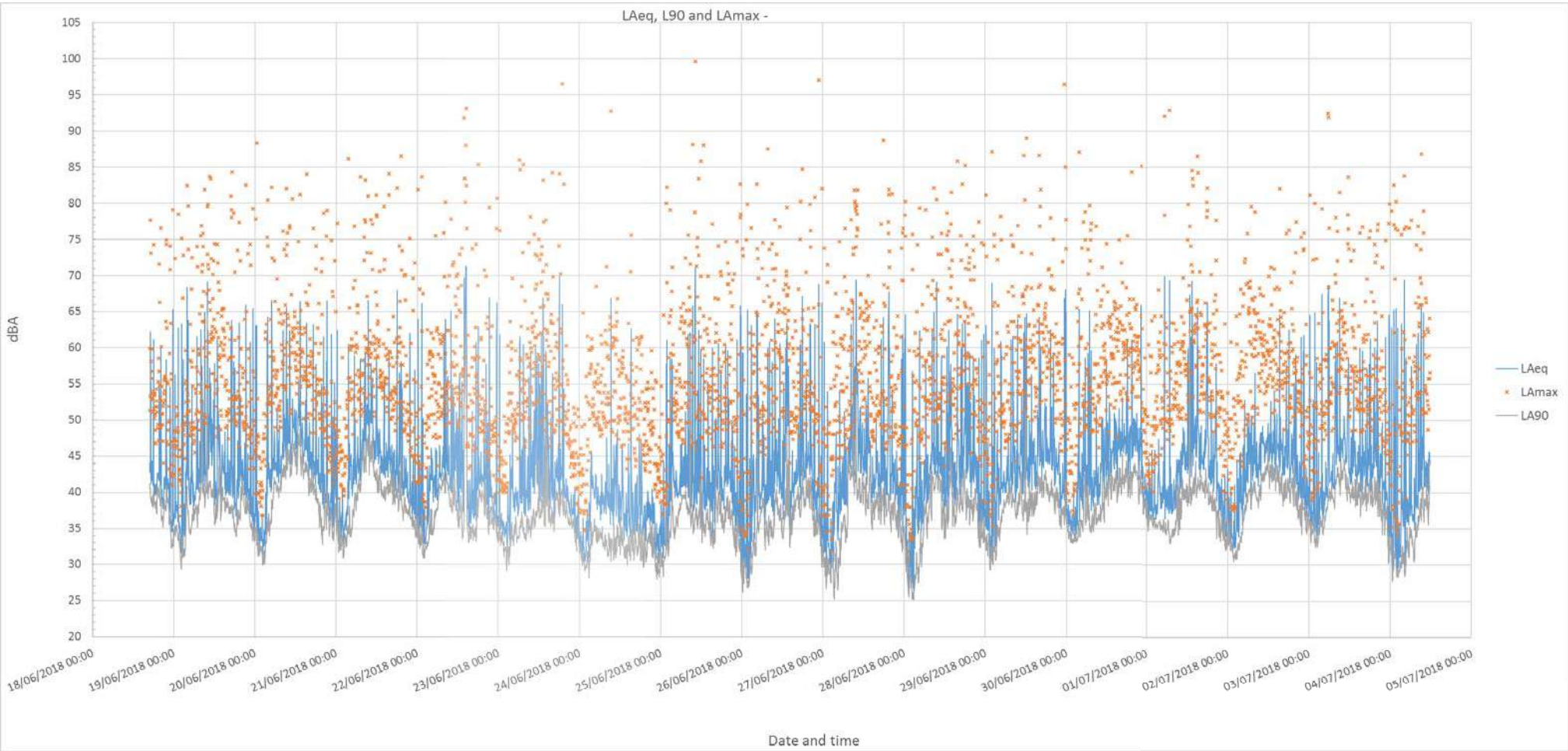


Figure 10B.28: Location N_14 data

N_11

The acoustic environment was generally quiet with occasional train pass-bys. There were maintenance workers moving freight trains slowly on the lines 15-30m away. The logger was recording between 18/06/2018 16:37 and 30/06/2018 00:52

Figure 10B.29: N_11 Location

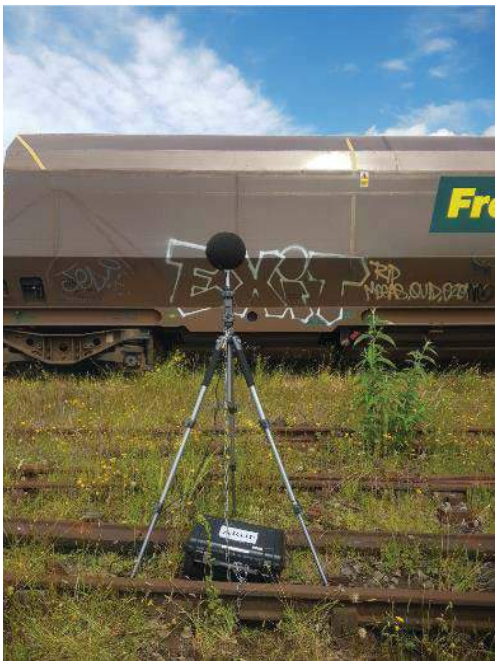


Figure 10B.30: N_11 Location

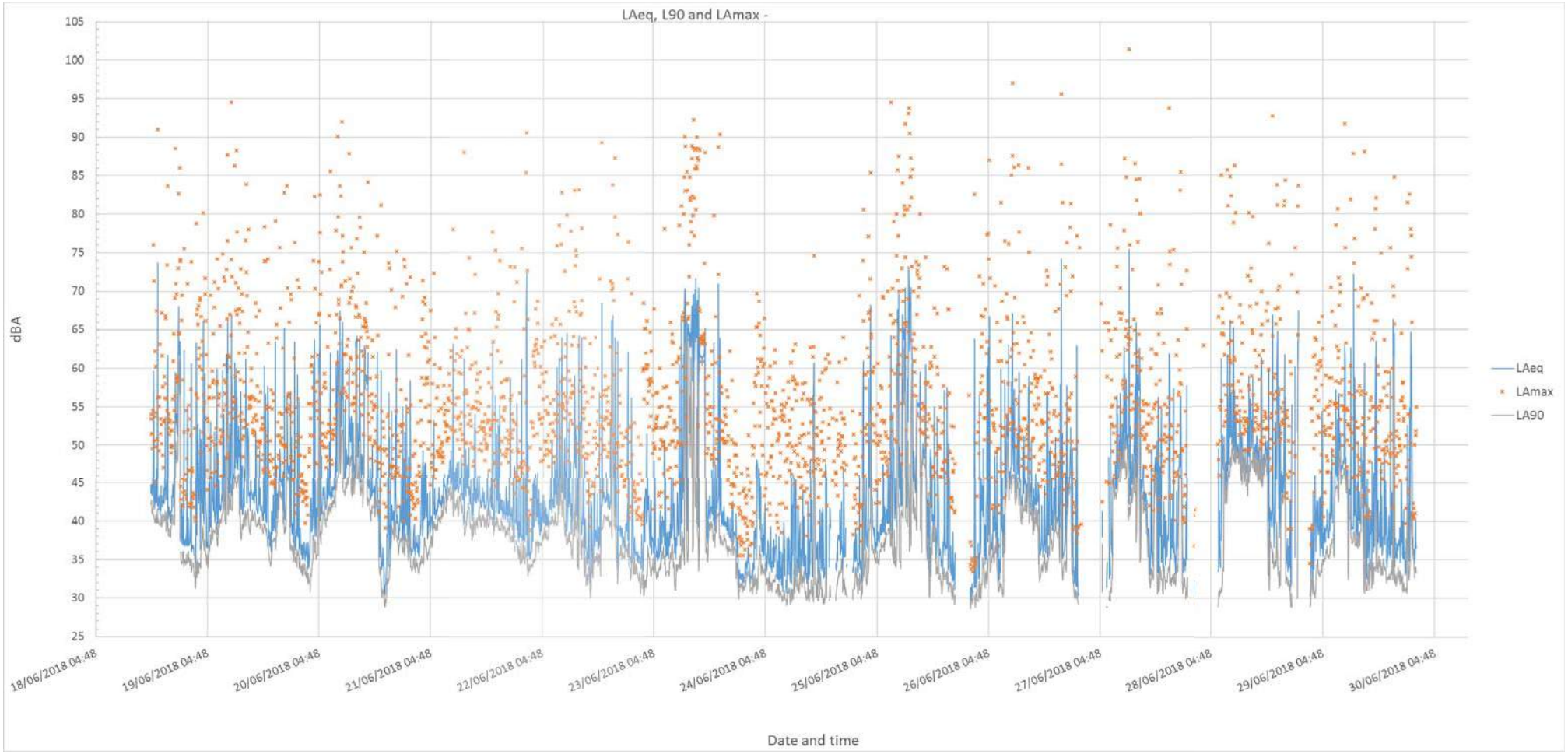


Figure 10B.31: Location N_11 data

N_07

The acoustic environment was generally quiet, with occasional train pass-bys. There were maintenance men moving freight trains slowly (normally 1-2 carriages) on the rail line 10m away from the measurement location. The East Coast mainline was ~63m away, with additional freight lines in-between. The logger was recording between 18/06/2018 16:23 and 03/07/2018 01:23

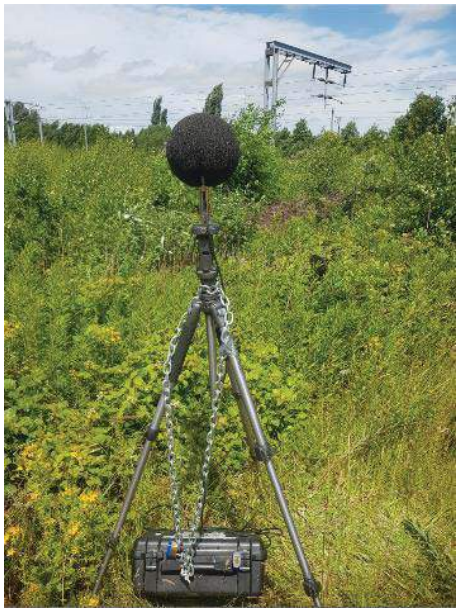


Figure 10B.32: N_07 Location

Figure 10B.33: N_07 Location

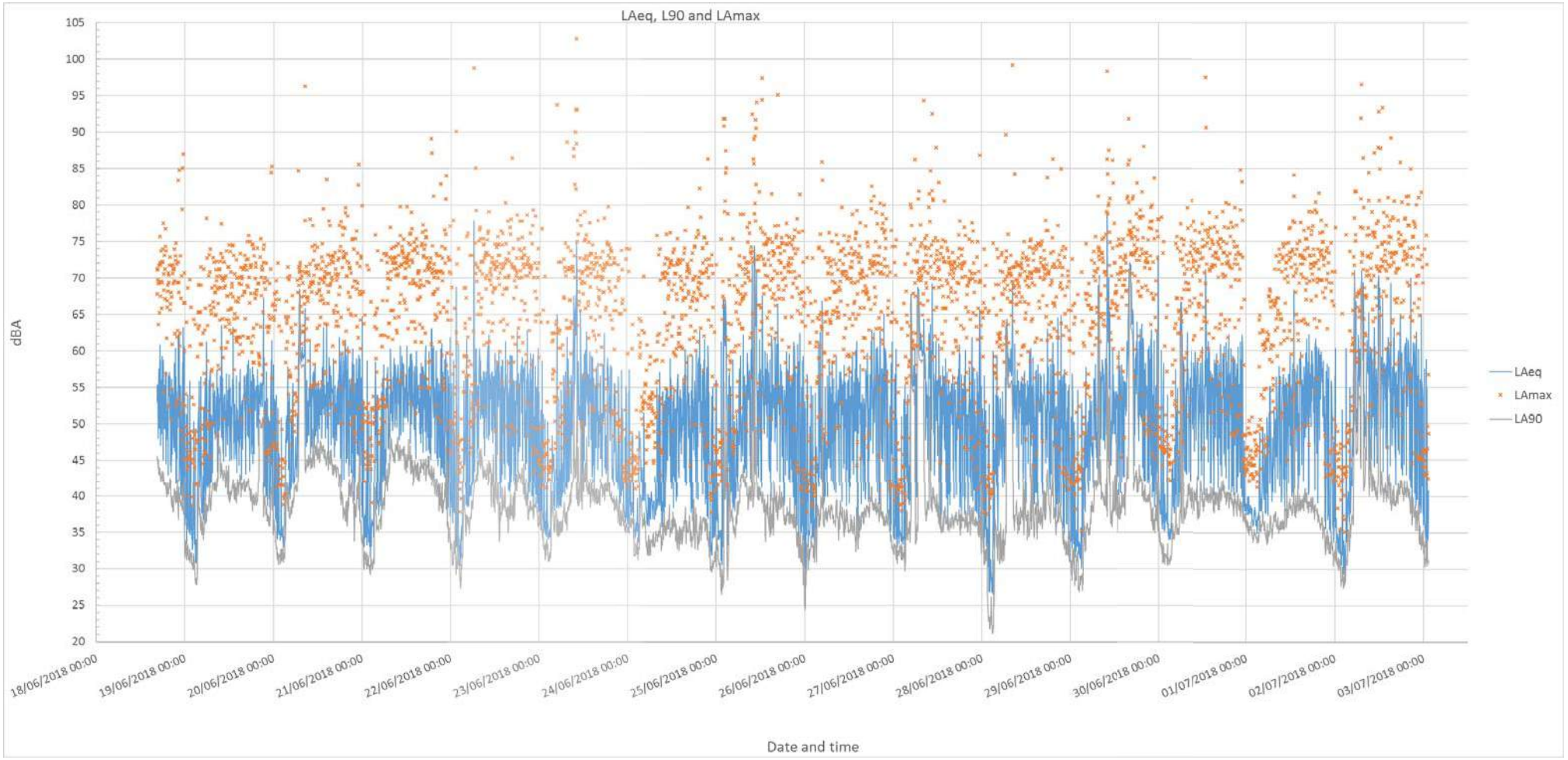


Figure 10B.34: Location N_07 data

N_04

The acoustic environment when setting up the logger was generally quiet, with some road traffic noise from Leeman Road ~100m away and occasional trains on the line ~33m away. There were also movements within the car-park along with people talking.

The logger was recording between 20/06/2018 15:43 and 28/06/2018 14:28.

Figure 10B.35: N_04 Location

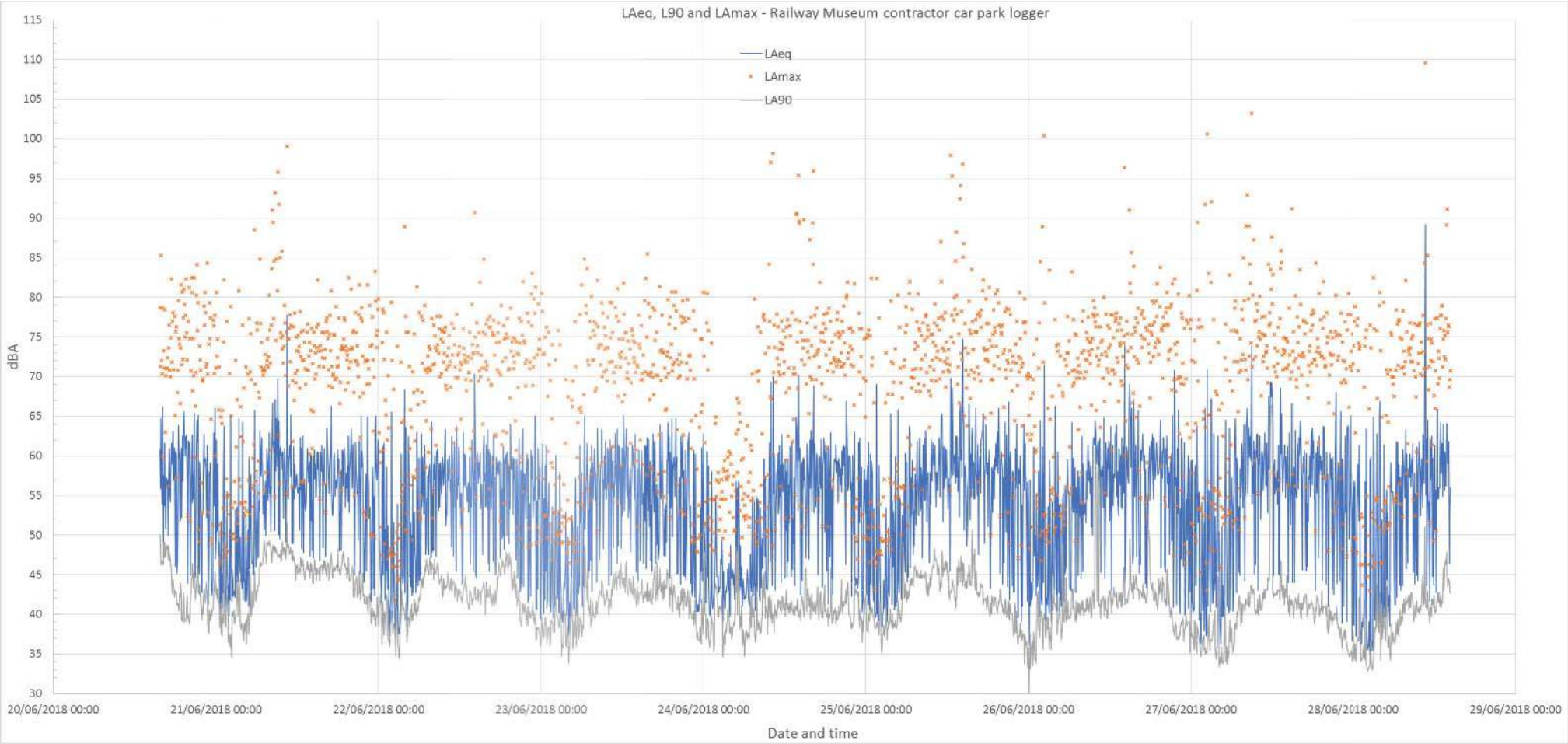


Figure 10B.36: Location N_04 data

N_10

The acoustic environment was dominated by sounds from the railway museum and trains coming into York station. There was some background noise from nearby Leeman Road.

The logger was recording between 17/04/2018 16:01 and 30/04/2018 13:36.

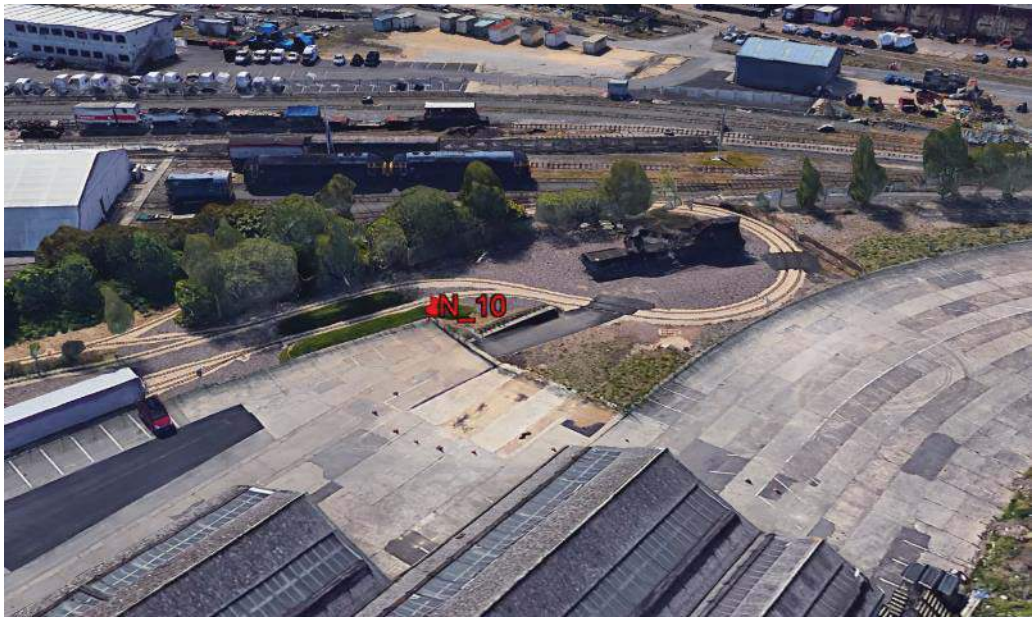


Figure 10B.37: N_10 Location *Copyright Google Earth Pro*

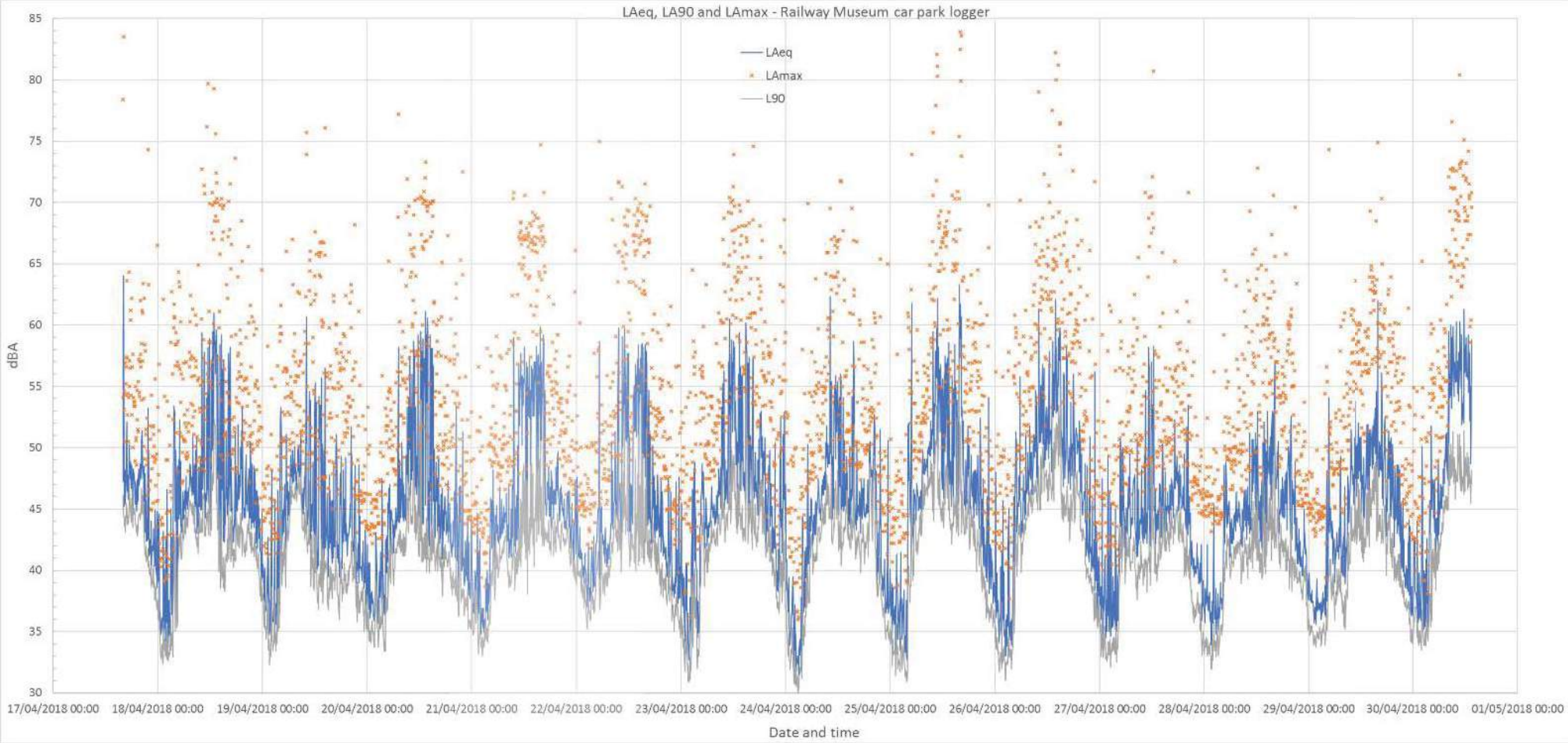


Figure 10B.38: Location N_10 data

10B.3 Vibration Survey

10B.3.1 Attended measurement locations

V_02

The vibration environment consisted of occasional movements along the Network Rail compound exit route (63m away) towards Leeman Road, and the rail line 17m away.

Figure 10B.39: V_02 Location

Figure 10B.40: V_02 Location

Start time (hh:mm:ss)	Elapsed time (mm:ss)	$VDV_{,Wd}$ X	$VDV_{,Wd}$ Y	$VDV_{,Wb}$ Z	Comment	No. of carriages	Operator	Line	Direction
Day – 19/06/2018									
16:06:38	00:11	0.0057	0.0055	0.0557		3	TPEX	ECML	Up
16:12:37	00:10	0.0037	0.0033	0.0382		3	Northern	ECML	Down
16:13:07	01:08	0.0097	0.0073	0.0821		long	Freight	ECML	up
16:18:09	00:10	0.0041	0.0033	0.0346		3	TPEX	ECML	Up
16:21:39	00:11	0.0056	0.0053	0.0559		3	TPEX	ECML	Down
16:32:41	00:12	0.0046	0.0030	0.0463		4	XC	ECML	Down
16:34:38	00:13	0.0021	0.0015	0.0161	Slowing down	11	Virgin	ECML	Up
16:37:22	00:26	0.0044	0.0038	0.0502		11	Virgin	ECML	Down
16:39:56	00:13	0.0031	0.0023	0.0305		4	XC	ECML	Down
16:41:08	00:12	0.0047	0.0040	0.0522		3	TPEX	ECML	Down
16:47:47	00:12	0.0049	0.0034	0.0520		4	XC	ECML	Down
16:48:18	00:13	0.0059	0.0045	0.0490		6	TPEX	ECML	Up
16:51:45	00:01	0.0022	0.0018	0.0241	Slow	4	Northern	ECML	Up
16:56:42	00:27	0.0068	0.0059	0.0738	2 trains in 1 recording	5/11	TPEX/Virgin	ECML	Up/Down
17:03:39	00:19	0.0063	0.0053	0.0606		11	Virgin	ECML	Up
17:07:47	00:11	0.0052	0.0047	0.0555		3	TPEX	ECML	Down
17:12:17	00:11	0.0046	0.0042	0.0455		4	Northern	ECML	Down
17:12:37	00:08	0.0022	0.0018	0.0200		3	TPEX	ECML	Up
16 Hour VDV (day)	*16 hours*	*0.0166*	*0.0138*	*0.1644*					
8 Hour VDV (night)	*8 Hours*	*0.0096*	*0.0080*	*0.0952*					

Table B14: Attended vibration levels at V_02

10B.3.2 Unattended measurement locations

V_01

The vibration environment consisted of occasional trains along the ECML (18m away), FAL in the *+x* and *-x* direction (40m away). The logger was recording between 18/06/2018 15:31 and 21/06/2018 17:10

Figure 10B.41: V_01 Location

Figure 10B.42: V_01 Location

Start time (hh:mm:ss)	Elapsed time (mm:ss)	$VDV_{,wd}$ X	$VDV_{,wd}$ Y	$VDV_{,wb}$ Z	No. of carriages	Operator	Line	Direction
Day – 18/06/2018								
11:38:55	00:03	0.0005	0.0005	0.0033	3	XC	ECML	Up
11:39:55	00:13	0.0006	0.0020	0.0205	4	XC	ECML	Up
11:40:41	00:20	0.0012	0.0040	0.0315	11	Virgin	ECML	Down
11:45:56	00:12	0.0010	0.0021	0.0217	4	Northern	ECML	Up
11:49:05	00:13	0.0014	0.0023	0.0258	4	XC	ECML	Down
11:51:20	00:12	0.0009	0.0027	0.0254	3	TPEX	ECML	Down
11:56:52	00:20	0.0015	0.0039	0.0318	11	Virgin	ECML	Up
11:57:27	00:22	0.0014	0.0035	0.0337	11	Virgin	ECML	Down
12:02:23	00:13	0.0010	0.0020	0.0225	3	TPEX	ECML	Up
12:05:47	00:13	0.0009	0.0015	0.0202	3	TPEX	ECML	Down
12:13:52	00:12	0.0008	0.0018	0.0177	3	TPEX	ECML	Down
12:15:44	00:11	0.0012	0.0013	0.0162	3	Northern	ECML	Down
12:17:08	00:13	0.0011	0.0017	0.0215	3	TPEX	ECML	Up
12:18:49	00:15	0.0013	0.0034	0.0298	5	XC	ECML	Down
12:25:54	00:12	0.0010	0.0029	0.0280	5	TPEX	ECML	Down
12:28:01	00:21	0.0013	0.0034	0.0325	11	Virgin	ECML	Up
12:31:45	00:14	0.0014	0.0040	0.0322	5	XC	ECML	Up
12:37:27	00:22	0.0016	0.0042	0.0332	11	Virgin	ECML	Down
12:40:10	00:13	0.0011	0.0028	0.0256	3	TPEX	ECML	Down
12:43:13	00:13	0.0008	0.0014	0.0121	2	Northern	ECML	Up
12:44:16	00:18	0.0014	0.0033	0.0284	5	XC	ECML	Up
12:45:18	00:16	0.0006	0.0006	0.0051	2	Volker Rail Freight	Southern freight line	Up
12:48:38	00:15	0.0010	0.0013	0.0173	3	TPEX	ECML	Up
12:57:35	00:27	0.0017	0.0037	0.0324	11	Virgin	ECML	Down

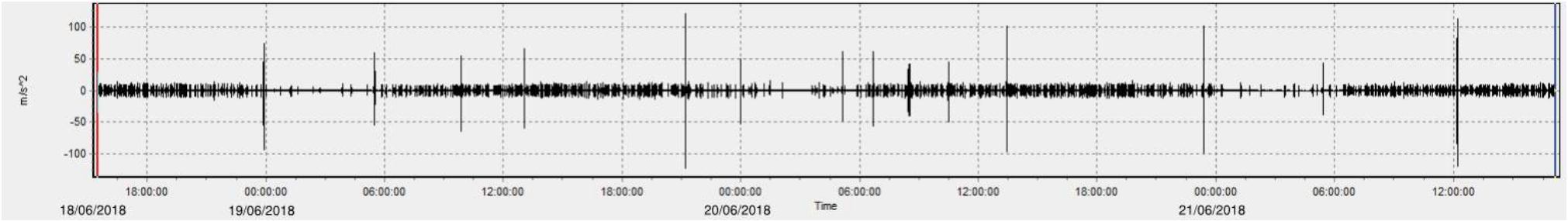
13:00:31	00:20	0.0019	0.0043	0.0346	11	Virgin	ECML	Up
13:08:06	00:11	0.0016	0.0031	0.0277	3	TPEX	ECML	Down
13:10:24	00:11	0.0007	0.0017	0.0233	3	TPEX	ECML	Up
13:14:04	00:12	0.0012	0.0021	0.0237	5	XC	ECML	Down
15:03:26	01:05	0.0015	0.0016	0.0169	long	Freight	ECML	Up

Table 10B.23: Attended vibration levels at V_01

Table 10B.15: Unattended vibration levels at V_01

Date	Period	X $VDV_{,wd}$	Y $VDV_{,wd}$	Z $VDV_{,wb}$
19/06/2018	16-hour day	0.0234	0.0137	0.1740
20/06/2018	16-hour day	0.0142	0.0163	0.2262
18-19/06/2018	8-hour night	0.0096	0.0075	0.0739
19-20/06/2018	8-hour night	0.0054	0.0129	0.1664
20-21/06/2018	8-hour night	0.0036	0.0084	0.0767
Average	*16-hour day*	*0.0188*	*0.0150*	*0.2001*
Average	*8-hour night*	*0.0062*	*0.0096*	*0.1057*

Figure 10B.43: Unattended vibration levels at V_01



V_03

The vibration environment consisted of trains idling on the maintenance depot 11m away and the East Coast Mainline 70m away. The traffic along Leeman Road, 40m away, also contributed to the measurements. The logger was recording between 20/06/2018 16:43 and 23/06/2018 18:45

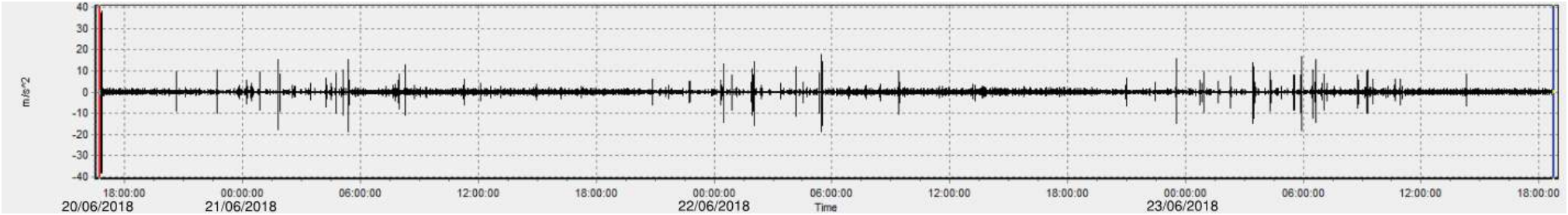
Figure 10B.44: V_03 Location

Figure 10B.45: V_02 Location

Table 10B.16: Unattended vibration levels at V_03

Date	Period	X $VDV_{,Wd}$	Y $VDV_{,Wd}$	Z $VDV_{,Wb}$
21/06/2018	16-hour day	0.0028	0.0026	0.0225
22/06/2018	16-hour day	0.0027	0.0024	0.0233
20-21/06/2018	8-hour night	0.0039	0.0030	0.0158
21-22/06/2018	8-hour night	0.0039	0.0029	0.0193
22-23/06/2018	8-hour night	0.0038	0.0031	0.0176
Average	*16-hour day*	*0.0028*	*0.0025*	*0.0229*
Average	*8-hour night*	*0.0039*	*0.0030*	*0.0176*

Figure 10B.46: Unattended vibration levels at V_03



Appendix 10C
Construction noise and vibration assumptions

Contents

Figures

Tables

10C.1 Construction Assumptions

10C.1.1 Noise

This section provides the construction activity assumptions which form the basis for the prediction of construction noise in accordance with *British Standard 5228-1:2009+A1:2014 - Code of practice for noise and vibration on construction and open sites - Part 1: Noise*. At this stage in the proposed Development exact demolition and construction equipment is unknown, therefore the following processes have been assumed from past experience of similar sized schemes.

- Activity 1 – Demolition – dump trucks, hand held breakers, vibratory rollers, mounted breakers, tracked excavators, tracked crusher.
- Activity 2 – Site enabling works – tracked excavators, movements of tipper trucks removing material, vibratory roller, dump trucks, tracked crusher, road sweeper.
- Activity 3 – Construction:
    - Piling – rotary bored and cast in situ.
    - Concrete pours – foundation and basement works for buildings, including any piling activities using truck mixers and lorry mounted concrete pumps.
    - Construction to roof level- fabrication of steel structures, potentially some concrete pours, craning of materials and wall sections, bricklaying.

To calculate noise levels off-site, the assumptions set out in Table 10C.1 have been made for plant, operating locations and typical durations of time for which plant would be operating during a working day.

No noise barrier mitigation has been accounted for in the calculations, with the exception of screening provided by existing buildings, walls or fences.

Notably construction works would be managed in accordance with the principles of best practicable means (BPM) as required by the Control of Pollution Act (CoPA). Therefore additional screening may be provided for noisy activities, which has not been accounted for in the calculations.

The equipment activity levels presented represent the worst-case for a single phase of the proposed Development. It is assumed that activities within a phase occur sequentially rather than simultaneously. It is also assumed that the phases are developed sequentially rather than simultaneously. Whilst some temporal overlap might be expected between different phases, this is only expected to occur for relatively short periods of time and has therefore not been accounted for.

A worst case has been assumed, using the shortest distance between each receptor group and the edge of the construction works. There would be some variability in noise level during the day and for different locations, depending on variations in distance and the amount of screening present.

Table 10C.1 Construction plant assumptions

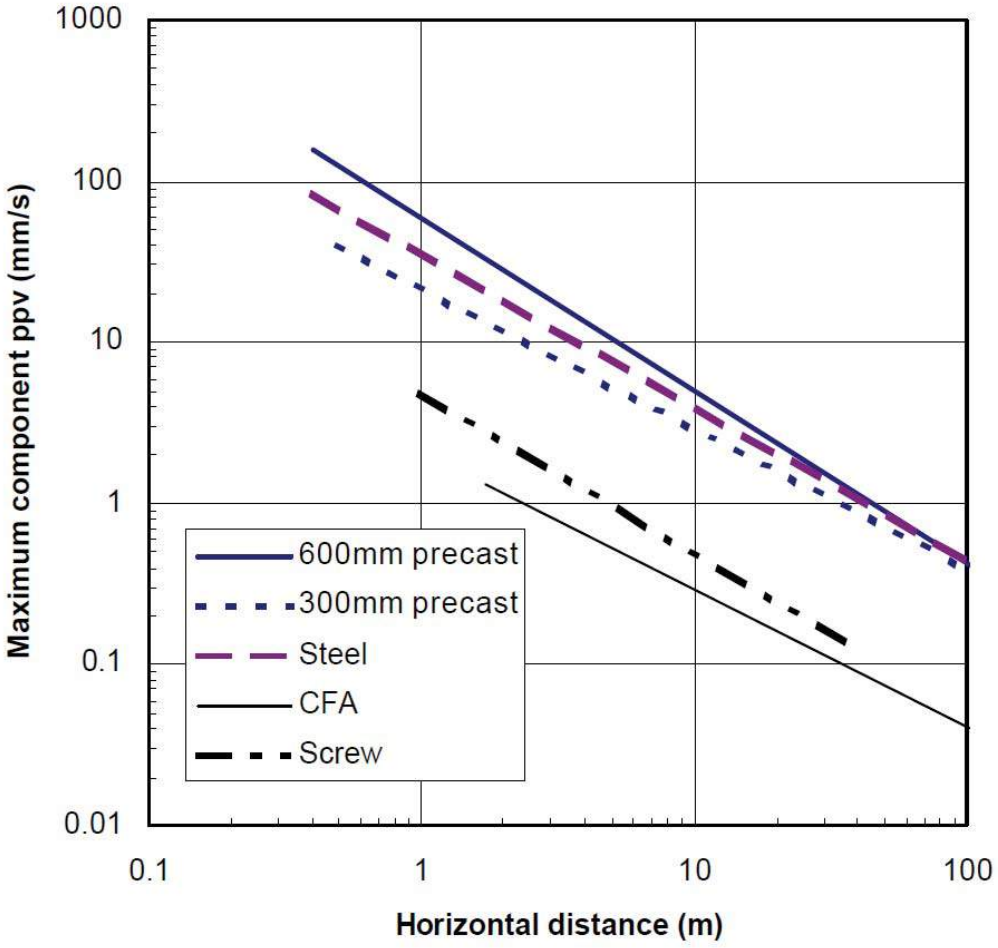
Activity		Equipment	Quantity	% on-time	Lw dB(A)	Source
Demolition	Demolition	Dump Truck (Tipping Fill)	1	50	107	BS5228 Table C 2-30
		Dump Truck (Empty)	1	50	115	BS5228 Table C 2-31
		Hand-held Hydraulic Breaker	1	15	121	BS5228 Table C 1-7
		Backhoe Mounted Hydraulic Breaker	2	15	116	BS5228 Table C 5-1
		Vibratory Roller	1	20	108	BS5228 Table C 5-21
		Tracked Excavator	2	20	114	BS5228 Table C 1-13
		Tracked Crusher	1	50	110	BS5228 Table C 1-14
Enabling works	Site clearance	Dozer	2	20	103	Dozer
		Tracked Excavator	8	20	106	Tracked Excavator
	Ground excavation / earthworks	Dozer	2	40	103	BS5228 Table C 2-1
		Tracked Excavator	2	50	106	BS5228 Table C 2-3
		Wheeled Loader	2	40	104	BS5228 Table C 2-28
	Rolling and compaction	Vibratory Roller	2	60	101	Vibratory Roller
		Vibratory Plate (Petrol)	1	60	108	Vibratory Plate (Petrol)
	Additional kit	Dump Truck (Tipping Fill)	1	40	107	Dump Truck (Tipping Fill)
		Dump Truck (Empty)	1	40	115	Dump Truck (Empty)
		Tracked Crusher	1	50	110	Tracked Crusher
		Breaker Mounted on Excavator	1	20	118	Breaker mounted on Excavator
		Road Sweeper	1	50	104	Road Sweeper
Construction	Piling works	Large Rotary Bored Piling Rig	1	85	111	BS5228 Table C 3-14
		Mini Tracked Excavator	1	10	96	BS5228 Table C 3-20
		Concrete Pump	1	15	106	BS5228 Table C 3-25
	Concrete works	Tower Crane	1	50	105	BS5228 Table C 4-49
		Tracked Excavator	1	10	105	BS5228 Table C 4-63
		Compressor for Hand-held Pneumatic Breaker	2	50	93	BS5228 Table C 5-5
		Diesel Generator	1	60	93	BS5228 Table C 6-39
		Pump Boom + Vibrating Poker	4	20	99	BS5228 Table C 4-36
		Concrete Pump	2	20	106	BS5228 Table C 3-25
		Concrete Mixer Truck	10	10	108	BS5228 Table C 4-20
		Telescopic Handler	2	40	107	BS5228 Table C 4-54
		Dumper	4	40	104	BS5228 Table C 4-3
		Lorry	2	40	111	BS5228 Table C 11-4

Activity		Equipment	Quantity	% on-time	Lw dB(A)	Source
	Construction (to roof level)	Tower Crane	1	25	105	BS5228 Table C 4-49
		Pump Boom + Vibrating Poker	4	25	99	BS5228 Table C 4-36
		Concrete Pump	1	25	106	BS5228 Table C 3-25
		Concrete Mixer Truck	4	25	108	BS5228 Table C 4-20

10C.1.2 Vibration – empirical data used for bored piles

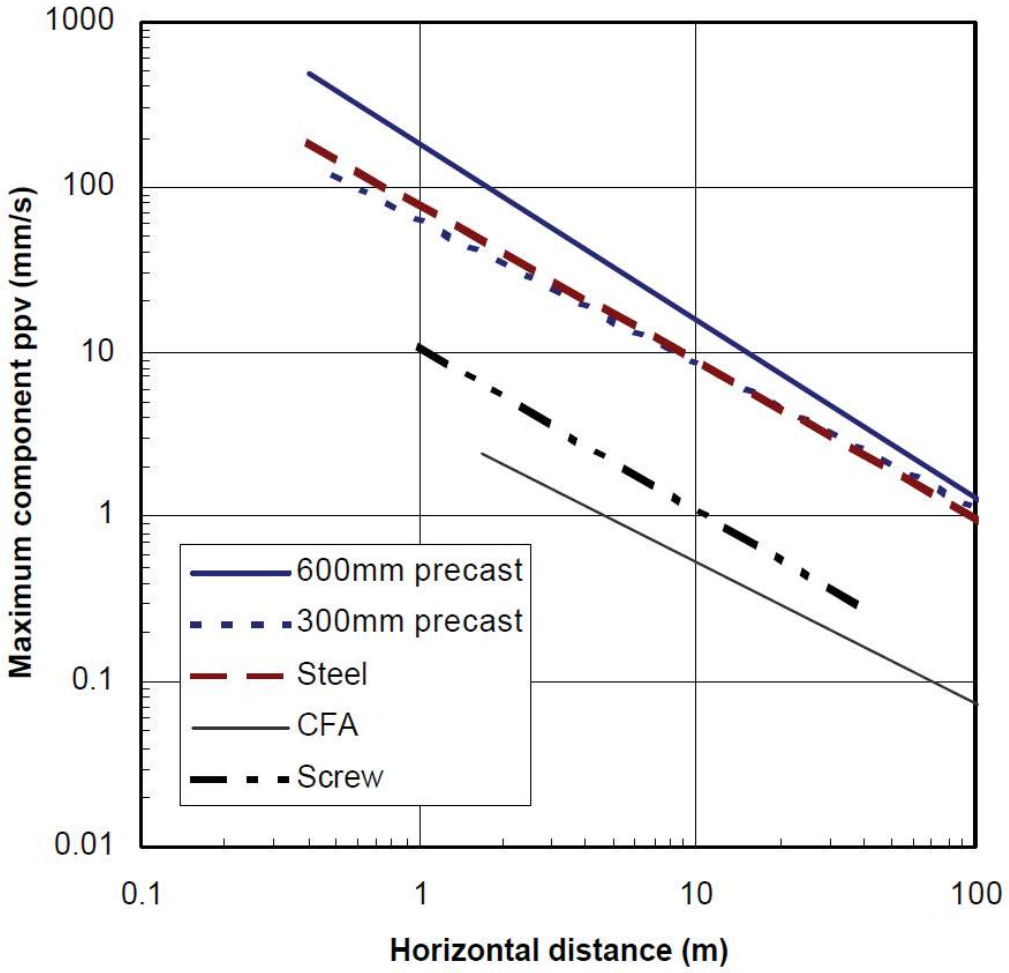
Vibration has been estimated using the methods set out in BS5228 Part 2. Vibration for bored piling is not provided in the standard, it has therefore been estimated based on the published[1] data presented in Figure 10C.1 and Figure 10C.2, which compare data from hammer driven concrete and steel piles with continuous flight auger (CFA) and displacement (screw) piles.

Figure 10C.1 Regression lines for vibration from each pile type



[1] Hiller D (2001) A comparison of noise and vibration from percussive and bored piling. Proc Underground Construction 2001.

Figure 10C.2 95% predictions for vibration from each pile type



Appendix 10D
Road traffic noise assessment

Contents

Tables

10D.1 Traffic Assessment Results

This appendix provides the results of the traffic noise modelling study and describes the assumptions made.

The basic noise level (BNL), which is the level at 10m from the kerb, has been calculated in accordance with CRTN based on data generated by the SATURN traffic model. Results are presented in terms of BNL because this enables a direct comparison to be made of the change in noise level associated with particular sections of road.

The method for determining potential significant effects is described in Chapter 10: Noise and Vibration of the ES. In summary, the traffic noise levels for the 'do something' (DS) (with scheme) scenario have been compared with the 'do minimum' (DM) (without scheme) scenario. Significance criteria are then applied to categories of noise level change.

The predicted road traffic results and associated impacts are provided in Table 10D.2. Links which have low flow of less than 1000 vehicles a day have not been used in the assessment because the CRTN is not valid in the region. Notably, the low flow correction as described in CRTN, which is applicable to flows of between 1000 and 4000 vehicles per day, has not been applied.

Figure 10D.1 shows the links within and closely surrounding the proposed Development. Figure 10D.2 shows the wider road network, with links removed which have no or negligible impact.

Table 10D.2 Predicted daytime traffic noise levels and associated impacts

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
1095_1569	65.0	65.2	65.4	0.2	Between LOAEL and SOAEL	Negligible
1569_1095	63.6	64.1	64.3	0.1	Between LOAEL and SOAEL	Negligible
1123_1095	68.7	68.8	68.9	0.1	Above SOAEL	Negligible
1122_1123	68.7	68.8	68.9	0.1	Above SOAEL	Negligible
1578_1122	68.7	68.7	68.9	0.2	Above SOAEL	Negligible
1122_1581	63.9	64.0	65.6	1.5	Between LOAEL and SOAEL	Negligible
1581_1546	58.6	58.6	58.7	0.1	Between LOAEL and SOAEL	Negligible
9822_1583	63.7	63.7	65.3	1.6	Between LOAEL and SOAEL	Negligible
1581_1583	63.7	63.7	65.3	1.6	Between LOAEL and SOAEL	Negligible
1583_1548	57.8	57.7	62.7	5.0	Between LOAEL and SOAEL	Moderate
1586_9712	67.2	67.4	67.1	-0.3	Between LOAEL and SOAEL	Negligible beneficial
9708_9712	0.0	0.0	0.0	0.0	N/A	N/A
1732_1731	67.6	67.6	67.4	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1732_1586	67.2	67.4	67.1	-0.3	Between LOAEL and SOAEL	Negligible beneficial
1733_1732	58.9	59.2	59.2	0.1	Between LOAEL and SOAEL	Negligible
1121_1733	55.7	55.9	56.0	0.1	Between LOAEL and SOAEL	Negligible
9716_1121	59.2	59.3	59.4	0.1	Between LOAEL and SOAEL	Negligible
1731_9716	0.0	0.0	0.0	0.0	N/A	N/A
9711_9710	0.0	0.0	0.0	0.0	N/A	N/A
9710_1580	67.2	67.4	67.2	-0.2	Between LOAEL and SOAEL	Negligible beneficial
9726_1580	67.2	67.2	67.1	-0.2	Between LOAEL and SOAEL	Negligible beneficial
9726_1731	66.8	67.1	66.9	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1605_9710	67.3	67.5	67.3	-0.2	Between LOAEL and SOAEL	Negligible beneficial

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
1606_1605	0.0	0.0	0.0	0.0	N/A	N/A
1605_1104	67.9	67.9	67.8	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1577_1090	64.3	64.3	64.0	-0.3	Between LOAEL and SOAEL	Negligible beneficial
1577_1104	61.9	62.1	62.2	0.1	Between LOAEL and SOAEL	Negligible
1092_1090	0.0	0.0	0.0	0.0	N/A	N/A
1091_1090	62.2	62.4	62.5	0.1	Between LOAEL and SOAEL	Negligible
1091_1089	64.5	64.3	64.1	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1089_1085	67.5	67.6	67.8	0.1	Between LOAEL and SOAEL	Negligible
1086_1089	65.2	65.5	65.8	0.3	Between LOAEL and SOAEL	Negligible
1085_1086	68.0	68.6	68.8	0.1	Above SOAEL	Negligible
1085_1088	0.0	0.0	0.0	0.0	N/A	N/A
1589_1086	62.7	63.3	63.7	0.4	Between LOAEL and SOAEL	Negligible
1746_1589	62.7	63.3	63.7	0.4	Between LOAEL and SOAEL	Negligible
1746_1087	66.7	67.6	67.6	0.1	Between LOAEL and SOAEL	Negligible
1297_1087	61.1	61.7	61.8	0.0	Between LOAEL and SOAEL	No change
1107_1087	61.7	62.2	62.9	0.7	Between LOAEL and SOAEL	Negligible
1107_1106	64.3	64.6	64.7	0.1	Between LOAEL and SOAEL	Negligible
1109_1107	57.6	57.7	57.7	0.0	Between LOAEL and SOAEL	No change
1108_1107	0.0	0.0	0.0	0.0	N/A	N/A
1116_1106	60.7	61.1	61.8	0.7	Between LOAEL and SOAEL	Negligible
1737_1115	58.5	59.4	59.6	0.2	Between LOAEL and SOAEL	Negligible
1115_1113	66.3	66.1	66.1	0.0	Between LOAEL and SOAEL	No change
1113_1111	66.3	66.1	66.1	0.0	Between LOAEL and SOAEL	No change
1307_1111	66.7	67.3	67.4	0.1	Between LOAEL and SOAEL	Negligible
1742_1307	67.2	68.0	68.1	0.1	Above SOAEL	Negligible

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
1742_1310	68.8	68.9	68.8	0.0	Above SOAEL	No change
1311_1310	67.1	67.9	68.0	0.1	Between LOAEL and SOAEL	Negligible
1312_1311	67.4	68.0	68.2	0.1	Above SOAEL	Negligible
1318_1312	62.5	63.0	63.5	0.5	Between LOAEL and SOAEL	Negligible
1319_1318	62.3	63.0	63.5	0.5	Between LOAEL and SOAEL	Negligible
1320_1319	61.1	62.0	62.6	0.6	Between LOAEL and SOAEL	Negligible
1677_1320	64.9	65.5	66.0	0.5	Between LOAEL and SOAEL	Negligible
1677_1344	64.3	64.3	64.3	0.0	Between LOAEL and SOAEL	No change
1344_1343	61.6	61.6	61.8	0.1	Between LOAEL and SOAEL	Negligible
1343_1342	60.6	60.5	60.7	0.1	Between LOAEL and SOAEL	Negligible
1569_1046	66.2	66.4	66.6	0.2	Between LOAEL and SOAEL	Negligible
1719_1046	63.3	63.5	63.5	0.0	Between LOAEL and SOAEL	No change
1719_1034	66.5	66.7	66.7	0.0	Between LOAEL and SOAEL	No change
1567_1034	61.0	61.0	60.8	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1567_1562	65.9	66.2	66.1	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1562_1062	65.8	66.0	66.0	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1118_1062	62.4	62.7	62.5	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1118_1007	65.9	66.1	66.0	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1007_1003	66.8	67.1	67.1	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1003_1001	62.7	63.2	62.8	-0.4	Between LOAEL and SOAEL	Negligible beneficial
1003_1002	64.6	64.9	65.1	0.2	Between LOAEL and SOAEL	Negligible
1004_1002	61.7	61.7	61.6	0.0	Between LOAEL and SOAEL	No change
1002_1001	65.3	64.9	64.7	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1560_1001	63.9	64.9	65.2	0.3	Between LOAEL and SOAEL	Negligible
1560_1133	67.2	67.1	66.9	-0.3	Between LOAEL and SOAEL	Negligible beneficial

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
1134_1133	63.4	63.4	60.3	-3.1	Between LOAEL and SOAEL	Minor beneficial
9722_1134	60.8	60.7	60.7	0.1	Between LOAEL and SOAEL	Negligible
1134_1135	65.3	65.1	64.7	-0.4	Between LOAEL and SOAEL	Negligible beneficial
1135_1582	63.1	63.1	60.2	-2.9	Between LOAEL and SOAEL	Negligible beneficial
1582_1134	63.2	63.2	60.4	-2.8	Between LOAEL and SOAEL	Negligible beneficial
9718_1135	61.6	61.6	56.2	-5.4	Between LOAEL and SOAEL	Moderate beneficial
9719_9718	62.1	62.1	56.5	-5.6	Between LOAEL and SOAEL	Moderate beneficial
9721_9719	0.0	0.0	0.0	0.0	N/A	N/A
9719_1138	64.0	63.7	55.0	-8.7	Between LOAEL and SOAEL	Moderate beneficial
1140_1138	0.0	0.0	0.0	0.0	N/A	N/A
9728_1138	64.3	64.3	57.4	-6.9	Between LOAEL and SOAEL	Moderate beneficial
9729_9728	0.0	0.0	0.0	0.0	N/A	N/A
9728_1728	64.1	63.7	54.4	-9.3	Between LOAEL and SOAEL	Moderate beneficial
1728_1139	0.0	0.0	0.0	0.0	N/A	N/A
1728_1583	64.0	63.7	54.4	-9.3	Between LOAEL and SOAEL	Moderate beneficial
9723_1587	67.6	67.8	67.6	-0.3	Between LOAEL and SOAEL	Negligible beneficial
9724_9723	0.0	0.0	0.0	0.0	N/A	N/A
1587_1104	67.6	67.8	67.6	-0.3	Between LOAEL and SOAEL	Negligible beneficial
1178_1002	66.4	66.1	65.9	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1179_1178	66.2	65.8	65.7	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1179_1159	67.7	68.7	69.0	0.3	Above SOAEL	Negligible
1159_1155	67.7	68.6	68.9	0.4	Above SOAEL	Negligible
1443_1155	69.3	69.5	69.7	0.1	Above SOAEL	Negligible
1442_1443	0.0	0.0	0.0	0.0	N/A	N/A
1443_1442	0.0	0.0	0.0	0.0	N/A	N/A

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
3063_1442	56.3	56.4	56.4	0.0	Between LOAEL and SOAEL	No change
3061_1154	69.4	69.7	69.7	0.0	Above SOAEL	No change
1443_1154	64.9	65.7	66.5	0.8	Between LOAEL and SOAEL	Negligible
3062_3063	56.3	56.4	56.4	0.0	Between LOAEL and SOAEL	No change
3063_3064	59.0	58.7	62.8	4.0	Between LOAEL and SOAEL	Minor
9850_3061	68.9	68.7	68.8	0.1	Above SOAEL	Negligible
3061_3062	67.5	68.2	68.8	0.6	Above SOAEL	Negligible
3062_3064	73.8	74.6	74.8	0.2	Above SOAEL	Negligible
9850_3062	72.5	73.4	73.4	0.0	Above SOAEL	No change
3060_9850	73.9	74.5	74.6	0.0	Above SOAEL	No change
3055_3056	73.9	74.5	74.5	0.0	Above SOAEL	No change
3064_3055	68.3	69.4	69.5	0.1	Above SOAEL	Negligible
3058_3060	70.0	69.5	69.5	0.0	Above SOAEL	No change
9853_3058	73.6	74.3	74.4	0.0	Above SOAEL	No change
3056_9853	72.4	73.5	73.5	0.0	Above SOAEL	No change
3064_3054	76.2	76.9	77.0	0.1	Above SOAEL	Negligible
3054_9854	75.1	75.6	75.6	0.0	Above SOAEL	No change
9854_3055	74.8	75.1	75.1	0.0	Above SOAEL	No change
9854_3057	62.5	65.7	65.6	-0.1	Between LOAEL and SOAEL	Negligible beneficial
3056_3057	72.2	71.3	71.3	0.1	Above SOAEL	Negligible
9852_9853	69.8	69.2	69.3	0.1	Above SOAEL	Negligible
9852_3059	69.2	70.1	70.0	0.0	Above SOAEL	No change
3058_3059	74.6	76.2	76.2	0.0	Above SOAEL	No change
9851_3060	73.8	75.1	75.1	0.0	Above SOAEL	No change
9851_3061	61.9	64.6	64.4	-0.2	Between LOAEL and SOAEL	Negligible beneficial

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
3054_3045	74.5	74.9	74.9	0.0	Above SOAEL	No change
3045_3054	74.6	75.0	75.0	0.0	Above SOAEL	No change
3036_1970	69.5	70.1	70.3	0.2	Above SOAEL	Negligible
1970_1407	69.5	70.0	70.2	0.2	Above SOAEL	Negligible
1407_1396	65.8	66.3	66.6	0.3	Between LOAEL and SOAEL	Negligible
1407_1406	57.5	61.5	61.5	0.0	Between LOAEL and SOAEL	No change
1396_1391	64.7	65.3	65.5	0.3	Between LOAEL and SOAEL	Negligible
1401_1393	63.8	64.2	64.0	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1771_1401	64.7	65.0	64.8	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1393_1771	0.0	0.0	0.0	0.0	N/A	N/A
1701_1402	65.1	65.3	65.1	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1701_1400	65.1	65.6	65.8	0.2	Between LOAEL and SOAEL	Negligible
1703_1400	67.3	67.4	67.4	0.0	Between LOAEL and SOAEL	No change
1703_1127	66.3	67.0	67.5	0.5	Between LOAEL and SOAEL	Negligible
1474_1127	56.3	56.4	56.4	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1588_1127	64.8	65.4	65.4	0.0	Between LOAEL and SOAEL	No change
1588_1459	65.4	65.8	66.0	0.2	Between LOAEL and SOAEL	Negligible
1459_1126	65.2	65.7	65.9	0.2	Between LOAEL and SOAEL	Negligible
1128_1126	63.7	64.3	64.1	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1352_1126	58.2	58.8	59.2	0.4	Between LOAEL and SOAEL	Negligible
1769_1128	63.3	64.0	63.8	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1940_1132	64.8	64.8	64.8	0.0	Between LOAEL and SOAEL	No change
1767_1125	65.4	65.3	65.3	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1131_1125	67.0	67.5	67.5	0.0	Between LOAEL and SOAEL	No change
1130_1124	67.3	67.4	67.3	-0.1	Between LOAEL and SOAEL	Negligible beneficial

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
1345_1124	58.3	58.4	58.9	0.5	Between LOAEL and SOAEL	Negligible
1124_1120	66.9	67.0	66.8	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1120_1119	66.9	67.0	66.8	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1119_1114	67.0	67.0	66.8	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1114_1105	64.1	64.4	63.8	-0.6	Between LOAEL and SOAEL	Negligible beneficial
1114_1112	64.5	64.1	64.5	0.3	Between LOAEL and SOAEL	Negligible
1115_1112	65.1	65.8	65.9	0.1	Between LOAEL and SOAEL	Negligible
1116_1115	67.4	67.5	67.5	0.0	Between LOAEL and SOAEL	No change
1117_1116	65.0	65.1	65.1	0.0	Between LOAEL and SOAEL	No change
1115_1117	0.0	0.0	0.0	0.0	N/A	N/A
9723_1105	67.1	67.1	66.9	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1400_1399	63.5	63.2	63.6	0.4	Between LOAEL and SOAEL	Negligible
1399_1394	57.8	57.4	58.9	1.4	Between LOAEL and SOAEL	Negligible
1399_1398	62.6	62.5	62.6	0.1	Between LOAEL and SOAEL	Negligible
1398_1385	61.6	61.5	61.8	0.2	Between LOAEL and SOAEL	Negligible
1385_1381	61.7	61.6	61.9	0.3	Between LOAEL and SOAEL	Negligible
1381_1380	67.5	67.9	68.1	0.2	Above SOAEL	Negligible
1380_1379	66.3	66.8	67.0	0.1	Between LOAEL and SOAEL	Negligible
1379_1374	66.3	66.8	67.0	0.1	Between LOAEL and SOAEL	Negligible
1373_1372	66.4	67.0	67.1	0.2	Between LOAEL and SOAEL	Negligible
1372_1370	68.1	69.1	69.4	0.4	Above SOAEL	Negligible
3027_1370	71.2	72.3	72.7	0.4	Above SOAEL	Negligible
3023_2043	69.0	69.4	69.6	0.2	Above SOAEL	Negligible
1379_1375	0.0	0.0	0.0	0.0	Below LOAEL	None
1687_1363	60.5	61.0	61.5	0.4	Between LOAEL and SOAEL	Negligible

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
1687_1375	58.6	59.2	60.1	0.8	Between LOAEL and SOAEL	Negligible
1687_1362	62.6	63.0	63.4	0.4	Between LOAEL and SOAEL	Negligible
1364_1362	59.1	60.0	60.9	0.9	Between LOAEL and SOAEL	Negligible
1365_1364	57.9	59.5	60.5	1.1	Between LOAEL and SOAEL	Negligible
1366_1335	66.9	68.1	68.6	0.4	Above SOAEL	Negligible
3016_1335	68.1	69.1	69.4	0.4	Above SOAEL	Negligible
3010_3002	74.1	74.4	74.4	0.1	Above SOAEL	Negligible
3029_3025	73.7	0.0	0.0	0.0	Below LOAEL	None
1397_1389	55.2	55.2	57.5	2.2	Between LOAEL and SOAEL	Negligible
1389_1388	57.2	57.4	58.9	1.5	Between LOAEL and SOAEL	Negligible
1388_1387	60.6	62.8	63.4	0.6	Between LOAEL and SOAEL	Negligible
1387_1386	59.9	62.5	63.2	0.7	Between LOAEL and SOAEL	Negligible
1386_1372	59.2	61.6	62.3	0.7	Between LOAEL and SOAEL	Negligible
9845_3029	0.0	74.6	74.7	0.0	Above SOAEL	No change
3030_3029	73.7	74.1	74.1	0.0	Above SOAEL	No change
3030_3130	75.0	76.5	76.7	0.2	Above SOAEL	Negligible
3038_3030	74.8	75.5	75.6	0.1	Above SOAEL	Negligible
3130_3032	66.6	69.8	70.1	0.3	Above SOAEL	Negligible
3130_3031	72.7	73.6	73.7	0.1	Above SOAEL	Negligible
1397_1394	0.0	0.0	0.0	0.0	N/A	N/A
1352_1349	57.9	59.3	60.3	1.0	Between LOAEL and SOAEL	Negligible
1350_1349	66.6	66.9	67.0	0.1	Between LOAEL and SOAEL	Negligible
1351_1350	61.9	62.1	62.3	0.1	Between LOAEL and SOAEL	Negligible
9820_1127	0.0	0.0	0.0	0.0	Below LOAEL	None
9820_1136	64.3	65.2	67.5	2.3	Between LOAEL and SOAEL	Negligible

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
9821_1127	67.2	67.2	67.6	0.4	Between LOAEL and SOAEL	Negligible
9821_9820	64.3	65.2	65.9	0.8	Between LOAEL and SOAEL	Negligible
9820_9809	64.3	65.2	67.5	2.3	Between LOAEL and SOAEL	Negligible
9809_1136	64.3	65.2	66.5	1.3	Between LOAEL and SOAEL	Negligible
1136_1133	66.0	66.8	66.5	-0.4	Between LOAEL and SOAEL	Negligible beneficial
1690_9500	67.8	68.5	68.5	-0.1	Above SOAEL	Negligible beneficial
9502_1690	69.1	70.0	70.1	0.1	Above SOAEL	Negligible
1690_1292	69.1	70.0	70.1	0.1	Above SOAEL	Negligible
1641_1292	68.2	69.5	69.5	0.1	Above SOAEL	Negligible
1641_1293	69.4	70.4	70.5	0.1	Above SOAEL	Negligible
1294_1293	67.5	68.5	68.6	0.1	Above SOAEL	Negligible
1645_1294	67.0	67.9	67.9	0.1	Between LOAEL and SOAEL	Negligible
1645_1295	67.5	68.4	68.4	0.1	Above SOAEL	Negligible
1295_1195	67.0	67.9	68.0	0.1	Above SOAEL	Negligible
1630_1195	65.4	65.9	65.9	0.0	Between LOAEL and SOAEL	No change
1630_1287	67.0	67.9	68.0	0.1	Above SOAEL	Negligible
1291_1287	66.9	67.4	67.4	0.0	Between LOAEL and SOAEL	No change
1291_1290	67.2	67.8	67.9	0.1	Between LOAEL and SOAEL	Negligible
1296_1144	67.6	68.2	68.3	0.1	Above SOAEL	Negligible
1290_1145	67.3	67.9	68.0	0.1	Between LOAEL and SOAEL	Negligible
1296_1145	66.1	66.5	66.5	0.0	Between LOAEL and SOAEL	No change
1144_1083	67.6	68.2	68.3	0.1	Above SOAEL	Negligible
1295_1284	60.0	60.7	60.7	0.0	Between LOAEL and SOAEL	No change
1381_1350	64.3	64.6	64.7	0.0	Between LOAEL and SOAEL	No change
1251_1218	65.5	65.4	65.6	0.2	Between LOAEL and SOAEL	Negligible

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
1251_1250	65.7	67.9	68.2	0.3	Above SOAEL	Negligible
1250_1242	66.4	68.3	68.5	0.3	Above SOAEL	Negligible
1243_1242	60.0	61.1	61.0	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1243_1231	61.8	63.2	63.4	0.3	Between LOAEL and SOAEL	Negligible
1231_1243	60.0	61.1	61.0	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1231_1230	69.0	69.4	69.4	0.1	Above SOAEL	Negligible
1230_1231	68.5	69.5	69.5	0.0	Above SOAEL	No change
1559_1230	67.2	68.2	68.2	0.0	Above SOAEL	No change
1559_1229	67.2	67.1	67.2	0.0	Between LOAEL and SOAEL	No change
1565_1229	68.8	69.7	69.8	0.0	Above SOAEL	No change
1565_1030	68.5	69.3	69.3	0.0	Above SOAEL	No change
1030_1565	68.6	69.5	69.6	0.1	Above SOAEL	Negligible
1031_1030	66.8	67.3	67.3	0.0	Between LOAEL and SOAEL	No change
1030_1031	63.3	64.2	64.2	0.1	Between LOAEL and SOAEL	Negligible
1014_1031	60.6	60.5	60.5	0.0	Between LOAEL and SOAEL	No change
1031_1023	63.3	64.2	64.2	0.1	Between LOAEL and SOAEL	Negligible
1794_1023	64.0	65.0	64.9	0.0	Between LOAEL and SOAEL	No change
1794_1792	62.0	63.0	63.1	0.1	Between LOAEL and SOAEL	Negligible
1792_1193	62.5	63.5	63.6	0.1	Between LOAEL and SOAEL	Negligible
1193_1192	63.8	64.1	64.1	0.1	Between LOAEL and SOAEL	Negligible
1192_1191	64.0	64.3	64.4	0.1	Between LOAEL and SOAEL	Negligible
1226_1191	62.9	63.5	63.9	0.3	Between LOAEL and SOAEL	Negligible
1921_1191	62.1	62.0	62.0	0.0	Between LOAEL and SOAEL	No change
1921_1920	63.8	63.9	64.3	0.4	Between LOAEL and SOAEL	Negligible
1917_1916	63.8	63.9	64.3	0.4	Between LOAEL and SOAEL	Negligible

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
1913_1209	63.8	63.9	64.3	0.4	Between LOAEL and SOAEL	Negligible
1912_1209	0.0	0.0	0.0	0.0	N/A	N/A
1909_1908	60.4	61.1	61.4	0.3	Between LOAEL and SOAEL	Negligible
1904_1204	61.4	62.4	62.5	0.1	Between LOAEL and SOAEL	Negligible
1901_1900	63.5	64.1	64.5	0.4	Between LOAEL and SOAEL	Negligible
1897_1200	63.5	64.1	64.5	0.4	Between LOAEL and SOAEL	Negligible
1016_1012	0.0	0.0	0.0	0.0	N/A	N/A
1016_1010	65.8	66.1	66.1	0.0	Between LOAEL and SOAEL	No change
1016_1009	58.7	59.2	59.2	0.0	Between LOAEL and SOAEL	No change
1017_1016	65.2	65.6	65.6	0.0	Between LOAEL and SOAEL	No change
1019_1017	0.0	0.0	0.0	0.0	N/A	N/A
1017_1013	66.4	67.1	67.1	0.0	Between LOAEL and SOAEL	No change
1022_1013	64.2	64.7	64.8	0.1	Between LOAEL and SOAEL	Negligible
1013_1017	65.3	65.7	65.7	0.0	Between LOAEL and SOAEL	No change
1022_1011	63.9	64.3	64.3	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1479_1022	0.0	0.0	0.0	0.0	N/A	N/A
1025_1011	0.0	0.0	0.0	0.0	N/A	N/A
1021_1011	63.4	63.9	64.0	0.1	Between LOAEL and SOAEL	Negligible
1021_1018	0.0	0.0	0.0	0.0	N/A	N/A
1021_1020	63.4	64.0	63.9	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1024_1013	66.9	67.2	67.2	0.0	Between LOAEL and SOAEL	No change
1717_1024	65.6	66.0	65.9	0.0	Between LOAEL and SOAEL	No change
1718_1717	0.0	0.0	0.0	0.0	N/A	N/A
1717_1563	65.4	66.6	66.7	0.1	Between LOAEL and SOAEL	Negligible
1563_1554	59.4	61.2	61.2	0.0	Between LOAEL and SOAEL	No change

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
1563_1528	0.0	0.0	0.0	0.0	N/A	N/A
1563_1033	65.0	66.1	66.2	0.1	Between LOAEL and SOAEL	Negligible
1038_1033	64.6	65.1	65.1	0.0	Between LOAEL and SOAEL	No change
1039_1038	0.0	0.0	0.0	0.0	N/A	N/A
1038_1037	63.4	64.6	64.7	0.1	Between LOAEL and SOAEL	Negligible
1564_1037	0.0	0.0	0.0	0.0	N/A	N/A
1042_1037	66.2	66.7	66.8	0.0	Between LOAEL and SOAEL	No change
1028_1024	60.1	60.5	60.6	0.0	Between LOAEL and SOAEL	No change
1029_1028	60.4	60.8	60.8	0.1	Between LOAEL and SOAEL	Negligible
1029_1030	66.9	67.6	67.7	0.1	Between LOAEL and SOAEL	Negligible
1030_1029	65.5	66.2	66.2	0.0	Between LOAEL and SOAEL	No change
1043_1029	67.2	67.9	68.0	0.1	Between LOAEL and SOAEL	Negligible
1044_1043	0.0	0.0	0.0	0.0	N/A	N/A
1043_1042	62.7	63.6	63.5	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1584_1042	67.7	67.9	68.0	0.1	Above SOAEL	Negligible
1584_1880	0.0	0.0	0.0	0.0	N/A	N/A
1568_1584	67.9	68.1	68.2	0.1	Above SOAEL	Negligible
1048_1568	67.7	67.9	68.0	0.1	Above SOAEL	Negligible
1725_1048	64.1	65.0	65.1	0.1	Between LOAEL and SOAEL	Negligible
1714_1048	67.5	67.8	67.9	0.1	Between LOAEL and SOAEL	Negligible
1714_1049	68.8	69.5	69.7	0.2	Above SOAEL	Negligible
1055_1049	56.0	58.2	58.7	0.5	Between LOAEL and SOAEL	Negligible
1214_1049	66.9	67.0	67.0	0.0	Between LOAEL and SOAEL	No change
1214_1059	63.5	64.1	64.1	0.0	Between LOAEL and SOAEL	No change
1059_1055	62.8	63.4	63.5	0.0	Between LOAEL and SOAEL	No change

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
1056_1055	0.0	0.0	0.0	0.0	N/A	N/A
1152_1055	63.6	64.5	64.7	0.2	Between LOAEL and SOAEL	Negligible
1152_1057	59.1	59.1	59.2	0.1	Between LOAEL and SOAEL	Negligible
1152_1054	62.7	62.9	63.2	0.2	Between LOAEL and SOAEL	Negligible
1054_1148	63.9	64.4	64.6	0.1	Between LOAEL and SOAEL	Negligible
1147_1054	62.8	62.5	62.6	0.1	Between LOAEL and SOAEL	Negligible
1148_1147	65.2	65.2	65.4	0.2	Between LOAEL and SOAEL	Negligible
1571_1147	61.9	61.7	61.5	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1571_1052	64.2	64.3	64.4	0.1	Between LOAEL and SOAEL	Negligible
1064_1052	0.0	0.0	0.0	0.0	N/A	N/A
1570_1052	0.0	0.0	0.0	0.0	N/A	N/A
1590_1064	65.3	65.6	66.0	0.3	Between LOAEL and SOAEL	Negligible
1590_1097	67.2	67.3	67.5	0.2	Between LOAEL and SOAEL	Negligible
1100_1097	66.8	67.1	67.3	0.2	Between LOAEL and SOAEL	Negligible
1100_1096	66.7	66.7	66.9	0.2	Between LOAEL and SOAEL	Negligible
1099_1096	0.0	0.0	0.0	0.0	N/A	N/A
1579_1096	54.9	55.2	54.8	-0.4	Between LOAEL and SOAEL	Negligible beneficial
1579_1101	55.2	55.0	55.0	0.0	Between LOAEL and SOAEL	No change
1100_1102	0.0	0.0	0.0	0.0	N/A	N/A
1102_1101	0.0	0.0	0.0	0.0	N/A	N/A
1104_1101	59.4	59.6	59.9	0.3	Between LOAEL and SOAEL	Negligible
1083_1079	64.0	64.9	64.9	0.1	Between LOAEL and SOAEL	Negligible
1080_1079	0.0	0.0	0.0	0.0	N/A	N/A
1079_1075	64.3	65.1	65.2	0.1	Between LOAEL and SOAEL	Negligible
1075_1081	69.9	70.5	70.7	0.1	Above SOAEL	Negligible

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
1074_1075	69.7	70.1	70.2	0.1	Above SOAEL	Negligible
1075_1079	63.7	64.1	64.1	0.0	Between LOAEL and SOAEL	No change
1081_1067	69.9	70.5	70.7	0.1	Above SOAEL	Negligible
1067_1068	69.4	69.8	69.9	0.1	Above SOAEL	Negligible
1068_1074	69.4	70.0	70.1	0.1	Above SOAEL	Negligible
1575_1074	62.8	62.5	62.4	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1070_1068	65.9	66.3	66.6	0.3	Between LOAEL and SOAEL	Negligible
1071_1070	63.9	64.6	64.7	0.1	Between LOAEL and SOAEL	Negligible
1076_1071	63.5	64.1	64.2	0.1	Between LOAEL and SOAEL	Negligible
1575_1076	61.8	62.5	62.2	-0.3	Between LOAEL and SOAEL	Negligible beneficial
1070_1059	67.8	68.2	68.2	0.1	Above SOAEL	Negligible
1572_1059	67.4	67.6	67.7	0.1	Between LOAEL and SOAEL	Negligible
1572_1265	68.0	68.6	68.6	0.0	Above SOAEL	No change
1275_1265	65.2	64.7	64.7	0.0	Between LOAEL and SOAEL	No change
1265_1264	64.5	63.9	63.8	0.0	Between LOAEL and SOAEL	No change
1266_1265	66.9	67.2	67.2	0.1	Between LOAEL and SOAEL	Negligible
1268_1266	66.9	67.2	67.2	0.1	Between LOAEL and SOAEL	Negligible
1572_1069	60.9	61.8	61.4	-0.3	Between LOAEL and SOAEL	Negligible beneficial
1085_1084	67.3	67.4	67.5	0.1	Between LOAEL and SOAEL	Negligible
1065_1084	66.2	66.9	67.0	0.1	Between LOAEL and SOAEL	Negligible
1084_1065	68.0	68.1	68.1	0.0	Above SOAEL	No change
1065_9841	72.7	72.9	73.0	0.1	Above SOAEL	Negligible
9841_1066	69.7	70.0	70.1	0.1	Above SOAEL	Negligible
1574_1065	69.9	70.4	70.5	0.2	Above SOAEL	Negligible
1066_1574	68.8	69.3	69.5	0.2	Above SOAEL	Negligible

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
1067_1066	69.4	70.0	70.2	0.2	Above SOAEL	Negligible
1149_1066	63.1	64.1	63.8	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1150_1149	56.6	58.6	58.4	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1149_1148	63.6	63.5	63.4	0.0	Between LOAEL and SOAEL	No change
1151_1150	0.0	0.0	0.0	0.0	N/A	N/A
1591_1150	55.5	58.0	57.8	-0.2	Between LOAEL and SOAEL	Negligible beneficial
1591_1552	56.3	57.8	57.8	0.0	Between LOAEL and SOAEL	No change
9841_1573	65.6	65.7	66.0	0.3	Between LOAEL and SOAEL	Negligible
1573_1538	0.0	0.0	0.0	0.0	N/A	N/A
1573_1064	64.8	64.9	65.2	0.3	Between LOAEL and SOAEL	Negligible
1096_1095	66.8	66.8	66.9	0.2	Between LOAEL and SOAEL	Negligible
1095_1096	66.2	66.5	66.6	0.1	Between LOAEL and SOAEL	Negligible
1095_1578	68.5	68.5	68.7	0.2	Above SOAEL	Negligible
1034_1045	0.0	0.0	0.0	0.0	N/A	N/A
1035_1034	66.6	66.9	66.9	0.0	Between LOAEL and SOAEL	No change
1035_1033	65.4	65.5	65.5	-0.1	Between LOAEL and SOAEL	Negligible beneficial
1036_1035	0.0	0.0	0.0	0.0	N/A	N/A
1567_1532	0.0	0.0	0.0	0.0	N/A	N/A
3003_1663	73.6	74.5	74.7	0.2	Above SOAEL	Negligible
3001_3003	66.5	66.9	66.8	-0.2	Between LOAEL and SOAEL	Negligible beneficial
3001_3002	74.0	74.3	74.4	0.0	Above SOAEL	No change
3002_3003	74.1	74.4	74.4	0.1	Above SOAEL	Negligible
3007_3001	72.2	72.9	73.0	0.1	Above SOAEL	Negligible
3038_3031	66.7	67.3	67.2	-0.1	Between LOAEL and SOAEL	Negligible beneficial
3037_3038	70.2	70.8	70.8	0.0	Above SOAEL	No change

Link ID	2016 DM $dBL_{10,18hr}$	2033 DM $dBL_{10,18hr}$	2033 DS_Option2 $dBL_{10,18hr}$	2033 DS_Option2 - DM	LOAEL / SOAEL	Impact
3135_3037	72.4	73.1	73.1	0.0	Above SOAEL	No change
3133_3035	69.2	70.2	70.3	0.2	Above SOAEL	Negligible
3033_3133	76.3	77.1	77.1	0.0	Above SOAEL	No change
3131_3033	71.5	72.4	72.4	0.1	Above SOAEL	Negligible
3032_3033	71.2	71.8	71.7	-0.1	Above SOAEL	Negligible beneficial
3032_1708	70.7	72.2	72.2	0.0	Above SOAEL	No change
1739_1708	72.9	73.6	73.6	0.0	Above SOAEL	No change
1757_1739	71.6	72.2	72.3	0.0	Above SOAEL	No change
1757_1465	74.0	74.8	74.9	0.1	Above SOAEL	Negligible
1465_1437	74.0	74.7	74.8	0.1	Above SOAEL	Negligible
9809_9807	0.0	0.0	62.4	62.4	Between LOAEL and SOAEL	Major
9804_9720	0.0	0.0	61.1	61.1	Between LOAEL and SOAEL	Major
9804_9707	0.0	0.0	66.2	66.2	Between LOAEL and SOAEL	Major
9707_9705	0.0	0.0	65.0	65.0	Between LOAEL and SOAEL	Major
9705_1548	56.3	56.3	64.8	8.5	Between LOAEL and SOAEL	Moderate
1726_1548	0.0	0.0	0.0	0.0	N/A	N/A

Figure 10D.1 Traffic network with link labels

Figure 10D.2 Traffic network coloured by (DS-Option2 2033 – DM 2033) change

Appendix 10E
Site suitability assessment

Contents

Figures

Tables

10E.1 Introduction

This document provides an assessment in noise and vibration terms, of the suitability of the site for residential development. The assessment has been undertaken consistent with the National Planning Policy Framework (NPPF) and the Noise Policy Statement for England (NPSE) and with reference to the government's Planning Practice Guidance – Noise (PPG-N). This document places a reliance on the absolute noise criteria advised in BS8233:2014: Sound insulation and noise reduction for buildings - Code of practice, World Health Organization (WHO) and Guidelines for Community Noise (1999).

Consideration is also given to ProPG: Planning & Noise - Professional Practice Guidance on Planning & Noise - New Residential Development (May 2017). The Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH) jointly supported this document. ProPG is not a government code of practice but is increasingly informing planning decisions related to noise.

Vibration is assessed in accordance with British Standard 6472-1: Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting (BSI, 2008).

10E.2 Noise Policy

10E.2.1 National Planning Policy Framework

Key to this assessment are paragraphs 180 and 182 of the NPPF.

NPPF Paragraph 180 states that *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; and

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

NPPF Paragraph 182 states that *"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of*

use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

10E.2.2 Noise Policy Statement for England

The Explanatory Note 2.24 of the Noise Policy Statement for England confirms that identifying whether the overall effect of the noise exposure is, or would lie between the Significant Observed Adverse Effect Level (SOAEL) and the Lowest Observed Adverse Effect Level (LOAEL) is the first step in assessing the impact of noise.

NPSE defines Observed Effects Levels as follows:

- Significant observed adverse effect level (SOAEL): This is the level above which significant adverse effects on health and quality of life occur.
- Lowest observed adverse effect level (LOAEL): This is the level above which adverse effects on health and quality of life can be detected.
- No observed effect level (NOEL): This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

The NPSE notes that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is for an assessment to identify relevant SOAELs taking account of the different sources of exposure and different receptors.

Any receptor forecast to experience an overall exposure from the proposed Development that exceeds the relevant SOAELs is identified as being subject to significant adverse impact on health and quality of life (under Government noise policy) and hence identified as a likely significant adverse effect.

Where the noise level from the proposed Development is between LOAEL and SOAEL, the NPSE states:

"all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur."

Other factors, such as the number of dwellings affected and the magnitude of noise change, can result in impacts between LOAEL and SOAEL being reported as likely significant effects in EIA terms. The EIA process requires that likely significant effects are identified along with the envisaged mitigation to avoid or reduce these significant effects.

10E.2.3 Planning Practice Guidance on Noise

PPG-N (Paragraph: 003 Reference ID: 30-003-20140306) states that *"Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:*

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved*."

Planning Practice Guidance for noise (PPG-N) draws on the principles of the Noise Policy Statement for England (NPSE) in particular the concepts of No Observed Effect Level (NOEL), Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL). PPG-N presents example outcomes to help characterise these effects (see Table 10E.1).

Table 10E.1: Noise exposure hierarchy based on likely average response (based on PPG-N)

↓ Increasing noise level ↓	**Perception**	**Examples of outcomes**	**Increasing effect level**	**Action**
	Not noticeable	No effect	No observed effect	No specific measures required
	NOEL			
	Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No observed adverse effect	No specific measures required
	LOAEL			
	Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
	SOAEL			
	Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep,	Significant observed adverse effect	Avoid

		premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.		
	Unacceptable Adverse Effect Level (UAEL)			
	Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

10E.2.4 The Professional Practice Guidance on Planning and Noise

ProPG:2017 does not constitute an official government code of practice it is a framework to encourage good acoustic design of new residential schemes in England. It reflects NPSE, NPPF and PPG-N and so maintains established government noise criteria. It advocates a two-stage, risk-based approach to acoustic design as follows:

1. An initial noise risk assessment of the proposed site. This assessment indicates the level of risk from a noise perspective, excluding any acoustic effects caused by the scheme design.
2. A systematic consideration of four key elements:
    a. Demonstrating a '*good acoustic design process'*
    b. Observing internal *'noise level guidelines'*
    c. Undertaking an *'external amenity area noise assessment'*
    d. *Consideration of* 'other relevant issues' *(*e.g. unintended consequences caused by acoustic designs)

The outcome of this framework presents one of four options to the decision maker:

1. Grant without conditions
2. Grant with conditions
3. Avoid
4. Prevent

This approach is underpinned by the creation of an Acoustic Design Statement (ADS) which should provide sufficient evidence that these stages have been followed. For the avoidance of doubt this report constitutes an ADS.

10E.2.5 Guidance and standards

This assessment has taken account of the following relevant guidance and standards in addition to those named above:

- Guideline for Community Noise (World Health Organization, 1999)
- Night Noise Guidelines (NNG) for Europe (World Health Organization Europe, 1999)
- BS8233 Guidance on sound insulation and noise reduction for buildings (British Standards Institution, 2014)
- BS4142 2014 Methods for rating and assessing industrial and commercial sound (British Standards Institution, 2014)
- Calculation of Road Traffic Noise (CRTN) (Welsh Office, 1988)

10E.3 Noise and vibration criteria

10E.3.1 Noise thresholds

Noise effects upon the proposed new residential dwellings have been considered by reference to criteria predominantly from BS8233:2014, which are based on the WHO Guidelines for Community Noise, summarised in Table 10E.2.

Table 10E.2: Ambient noise level criteria for proposed new residential development

Activity	**Location**	**07:00 to 23:00**	**23:00 to 07:00**
Resting	Living room	35dB$L_{Aeq,16hour}$	-
Dining	Dining room / area	40dB$L_{Aeq,16hour}$	-
Sleeping	Bedroom	35dB$L_{Aeq,16hour}$	30dB$L_{Aeq,8hour}$
Outdoor living / amenity areas		50 – 55dB$L_{Aeq,16hour}$	-

BS8233:2014 does not suggest maximum noise limits for bedrooms at night. WHO:1999 however advises that events exceeding 45dB$L_{Amax,F}$ should occur no more than 10-15 times per night. CYC have aligned their criteria with that stated in Table 10E.2 but have set a limit of 50 dB$L_{Aeq,16hour}$ for outdoor areas and 35dB$L_{Aeq,16hour}$ in all habitable rooms.

For this assessment, the above internal noise criteria are considered to represent the LOAEL. PPG-N advises that, at these levels, sound can be heard, but would not cause any change in behaviour or attitude, so no additional mitigation measures would be required.

Further to the above, the following external free-field LOAEL and SOAEL values have been adopted for this project as show in Table 10E.3. These values are taken

from the HS2 in Information Paper E22: "Control of Noise from the operation of stationary systems".

Table 10E.3: Precedent LOAEL and SOAEL noise level values

Daytime ($dBL_{Aeq,16h}$)		**Night-time ($dBL_{Aeq,8h}$)**	
LOAEL	**SOAEL**	**LOAEL**	**SOAEL**
50	65	40	55

E3.1.1 ProPG:2017 Pre-planning application advice

ProPG:2017 states the levels of day and night-time noise that are likely to cause increasing risk in obtaining planning permission. The values for each risk level are listed in Table 10E.4 and shown in Figure 10E.1 taken from ProPG:2017.

Table 10E.4: The risk of acoustic acceptability for planning permission associated with day and night-time levels of noise, taken from ProPG:2017

Risk level without mitigation	**Indicative daytime noise levels $dBL_{Aeq,16hr}$**	**Indicative night-time noise levels $dBL_{Aeq,8hr}$**
Negligible	<50	<40
Low	50 < dB < 60	40 < dB < 50
Medium	60 < dB < 70	50 < dB < 60
High	>70	>60

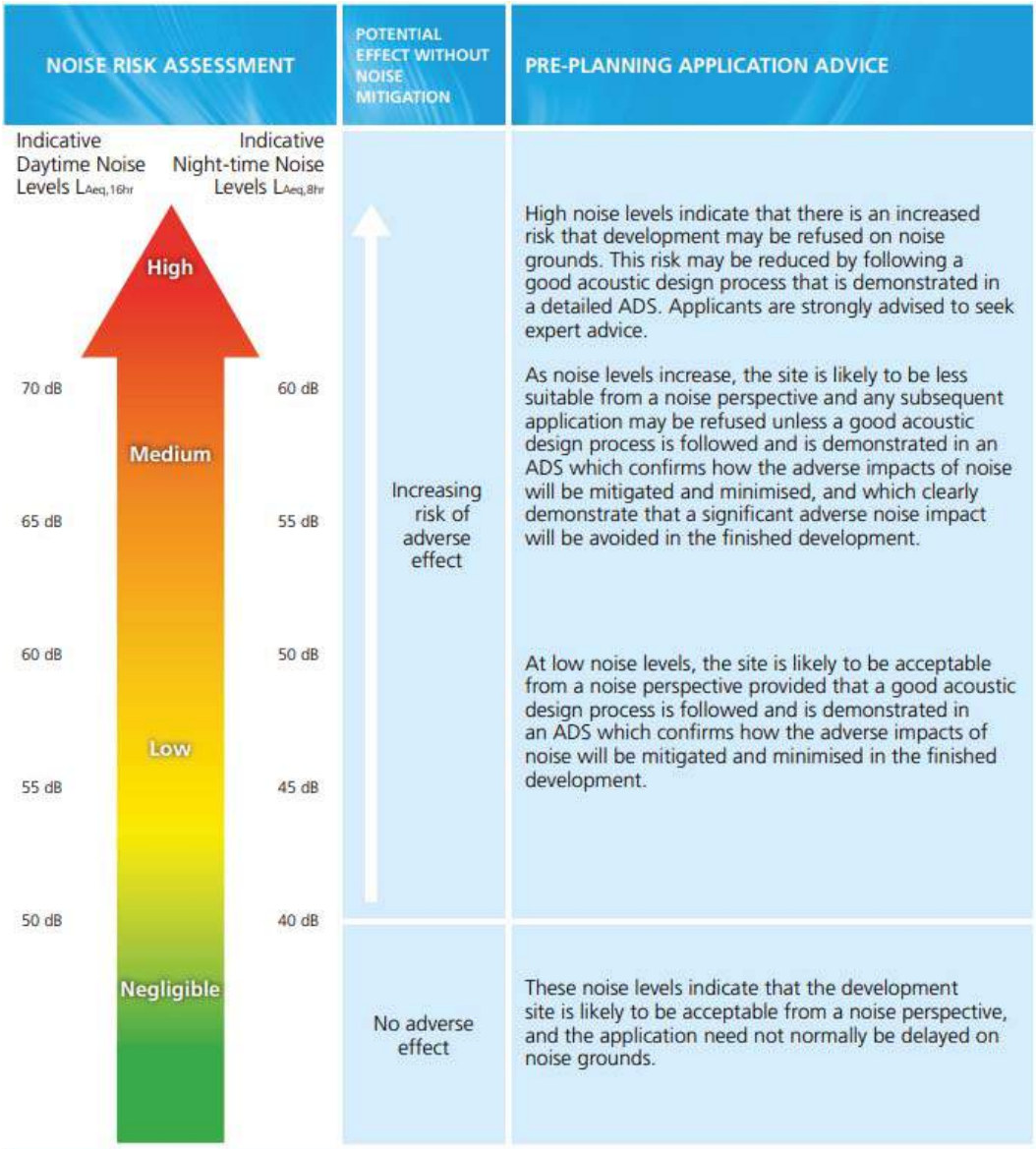


Figure 10E.1: Initial site noise risk assessment (ProPG 2017)

10E.3.2 Vibration thresholds

Guidance on the impact of vibration on people in buildings is presented in British Standard 6472-1: Guide to evaluation of human exposure to vibration in

buildings. Vibration sources other than blasting (BSI, 2008). Part 1 of this standard assesses the impact of vibration using the Vibration Dose Value (VDV). This indicator takes into account how people respond to vibration in terms of frequency content, vibration magnitude and the number and duration of vibration events during an assessment period. For dwellings, vibration from train is assessed using the criteria presented in Table 10E.5.

The LOAEL values, corresponding to the threshold for a minor adverse impact in EIA terms, are taken as the lower end of the range of values for which BS6472-1 indicates a 'low probability of adverse comment'. The SOAEL values are taken where a level of exposure is the lower value for 'adverse comment probable' in BS6472-1.

Table 10E.5: Thresholds of likely effects of vibration for residential buildings (derived from BS 6472-1: 2008

Threshold (residential)	**Impact classification**	**Vibration exposure[1]**	
		VDV daytime (07:00 – 23:00) ($m.s^{-1.75}$)	**VDV night time (23:00 – 07:00) ($m.s^{-1.75}$)**
LOAEL	Minor	0.2	0.1
-	Moderate	0.4	0.2
SOAEL	Major	0.8	0.4
Determined at the worst location on a normally loaded floor (usually the centre of the floor)			

10E.4 Baseline noise and vibration climate

For the purposes of this assessment, the following track names will be used, as shown in Figure 10E.2:

- East Coast main line (ECML)
- Freight avoiding line (FAL)
- Station avoiding line (SAL)
- National Railway Museum line (NRML)

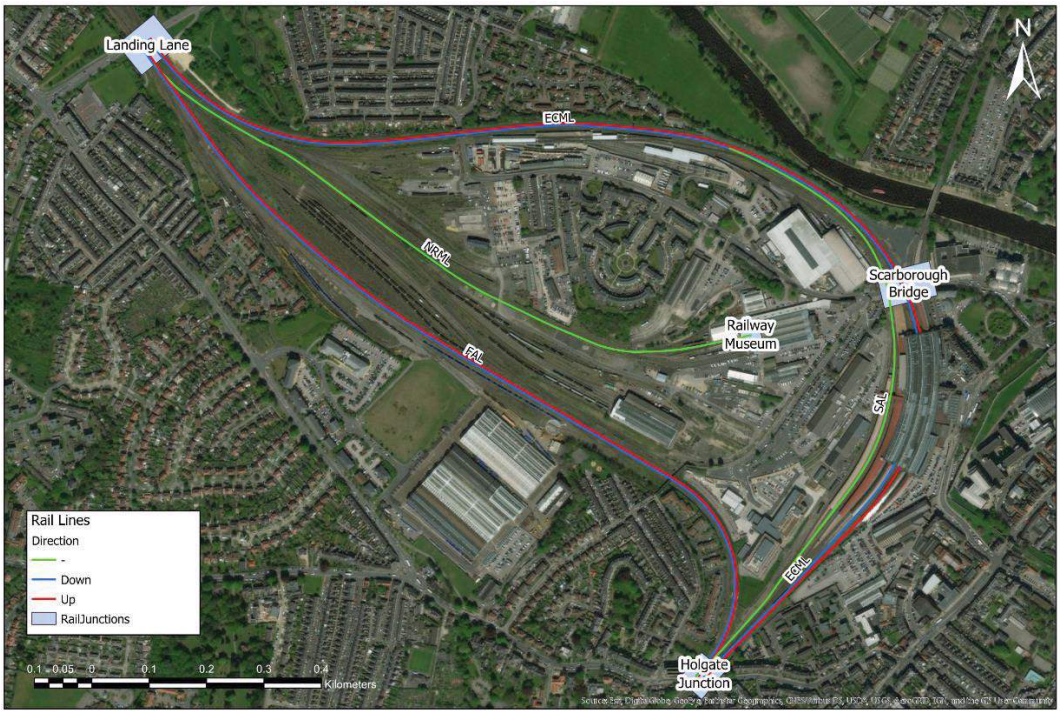


Figure 10E.2: Simplified rail lines surrounding the proposed Development

10E.4.1 Baseline noise climate

Full results are presented in Appendix 10B. All measurements pertinent to the assessment of site suitability are presented in this section.

Noise measurement locations are reproduced in Figure 10E.3. A summary of measured noise levels are presented in Table 10E.6 – Table 10E.11.

Figure 10E.3: Site layout and noise measurement locations

Table 10E.6: Summary of measured daytime noise levels for train pass-bys

Measurement Location (Figure 10E.3)	Duration of Survey and number of train events	Description	Sound pressure level, dB re. 20µPa	
			L_{AE}	$L_{AMax,F}$
N_01	40mins – 12 events	East Coast Main Line – North	90	68 - 89
N_02	1hr15 – 20 events	East Coast Main Line – Leeman Road	85	58 - 84

Based upon the sample SEL measurements described above the following daytime L_{Aeq} noise metrics have been calculated as follows assuming the rate of rail movements is maintained throughout the day:

- N_01 – 67dB$L_{Aeq,16h}$
- N_02 – 61dB$L_{Aeq,16h}$

Table 10E.7: Summary of measured attended daytime noise levels
** Metric not measured, see Appendix 10B for $L_{AMax,S}$ values

Measurement Location (Figure 10E.3)	Description	Sound pressure level, dB re. 20µPa			
		$L_{A90,T}$	$L_{Aeq,T}$	$L_{A10,T}$	$L_{AMax,F}$
N_03	Siemens Depot	48	58	61	74 - 76
N_05	Leeman Road / Martins Court	50	68	72	79 - 80
N_06	National Railway Museum entrance	49	63	64	84

N_08	Carleton Street East	38	57	56	76 - 87
N_09	National Railway Museum South carpark	42	48	49	60 - 62
N_12	York Railway Station	46	70	76	**
N_13	Freight Avoiding Line South	42	47	50	64

Table 10E.8: Summary of measured attended evening noise levels

Measurement Location (Figure 10E.3)	**Description**	**Sound pressure level, dB re. 20µPa**			
		$L_{A90,T}$	**$L_{Aeq,T}$**	**$L_{A10,T}$**	**$L_{AMax,F}$**
N_03	Siemens Depot	45	55	59	70 - 74
N_05	Leeman Road / Martins Court	42	65	69	86 - 90
N_06	National Railway Museum entrance	43	58	63	72 - 76

Table 10E.9: Summary of measured attended night-time noise levels
** Metric not measured, see Appendix 10B for $L_{AMax,S}$ values

Measurement Location (Figure 10E.3)	**Description**	**Sound pressure level, dB re. 20µPa**			
		$L_{A90,T}$	**$L_{Aeq,T}$**	**$L_{A10,T}$**	**$L_{AMax,F}$**
N_03	Siemens Depot	42	48	47	**
N_05	Leeman Road / Martins Court	35	53	46	**
N_06	National Railway Museum entrance	34	43	40	**

Table 10E.10: Summary of unattended long-term noise measurements at Location N_11 – Freight Avoiding Line midway (see Figure 10E.3)

Date	**Sound pressure level, dB re. 20µPa**	
	$L_{Aeq,16hr}$ (Day)	**$L_{Aeq,8hr}$ (Night)**
19/06/2018	53	51
20/06/2018	55	52
21/06/2018	48	45
22/06/2018	54	54
23/06/2018	60	45
24/06/2018	43	39
25/06/2018	59	51
26/06/2018	54	53
27/06/2018	55	50
28/06/2018	53	47
29/06/2018	54	52
Average	*55*	*51*

Table 10E.11: Summary of unattended long-term noise measurements at Location N_14 – Freight Avoiding Line South (see Figure 10E.3)

Date	Sound pressure level, dB re. 20μPa	
	$L_{Aeq,16hr}$ (Day)	$L_{Aeq,8hr}$ (Night)
19/06/2018	53	53
20/06/2018	53	53
21/06/2018	52	47
22/06/2018	55	49
23/06/2018	52	50
24/06/2018	47	38
25/06/2018	53	47
26/06/2018	53	54
27/06/2018	54	49
28/06/2018	53	51
29/06/2018	51	52
30/06/2018	49	54
01/07/2018	53	53
02/07/2018	50	42
03/07/2018	51	55
04/07/2018	-	55
Average	*52*	*52*

10E.4.2 Baseline vibration climate

Full results are presented in Appendix 10B.

Vibration measurement locations are reproduced in Figure 10E4. A summary of measured vibration levels are presented in Table 10E.12.

Figure 10E4: Site layout and vibration measurement locations

Table 10E.12: Summary of measured vibration levels (see Figure 10E4)

Location	Date	Period	Vibration level, VDV ($m.s^{-1.75}$)		
			$VDV_{,Wd}$ X	**$VDV_{,Wd}$ Y**	**$VDV_{,Wb}$ Z**
V_01	19/06/2018	16-hour day	0.0234	0.0137	0.1740
	20/06/2018		0.0142	0.0163	0.2262
	Average		*0.0188*	*0.0150*	*0.2001*
	18-19/06/2018	8-hour night	0.0096	0.0075	0.0739
	19-20/06/2018		0.0054	0.0129	0.1664
	20-21/06/2018		0.0036	0.0084	0.0767
	Average		*0.0062*	*0.0096*	*0.1057*
V_02	*Calculated*	*16-hour day*	*0.0166*	*0.0138*	*0.1644*
	Calculated	*8-hour night*	*0.0096*	*0.0080*	*0.0952*
V_03	21/06/2018	16-hour day	0.0028	0.0026	0.0225
	22/06/2018		0.0027	0.0024	0.0233
	Average		*0.0028*	*0.0025*	*0.0229*
	20-21/06/2018	8-hour night	0.0039	0.0030	0.0158
	21-22/06/2018		0.0039	0.0029	0.0193
	22-23/06/2018		0.0038	0.0031	0.0176
	Average		*0.0039*	*0.0030*	*0.0176*

For Locations V_01 and V_03, 16-hour daytime and 8-hour night time VDVs were calculated from all measured events recorded on the vibration logger for the full assessment period. For Location V_02, 16-hour daytime and 8-hour night

time VDVs have been estimated from measured events over the 1-hour 10-minute attended monitoring period (between 16:05 and 17:15 on the 19th June 2018).

10E.5 Noise assessment

This section sets out the adopted methodology for selecting representative noise levels for the proposed Development and goes on to assess the noise effects in accordance with ProPG and the Noise Policy Statement for England.

ProPG recommends an initial noise risk assessment of the proposed development site, which has been conducted to provide an indication of the likely risk of adverse effects from noise excluding any effects from mitigation from the scheme. Figure 10E.1 (extracted from ProPG) shows the level of risk associated with indicative daytime and night time noise levels, which have been summarised in Table 10E.4.

The observed effect level described in NPSE, has been calculated and the level of effect recognised within the results presented below in this section.

10E.5.1 Noise climate

The most significant noise sources affecting the Proposed Development site are road traffic from Water End along the north-west boundary of the site, the A59 along the south-west and south boundaries and Leeman Road inside the north boundary. Railway movements from the East Coast Main Line, the Freight Avoiding Line and the National Railway Museum Line also contribute significantly to the noise environment during train pass-bys. The roads are less busy at night but remain a substantial noise source especially during peak periods (beginning and end of the night period). The East Coast Main Line is quiet at night-time due to no passenger train services running, however the freight trains run during the night.

To the south of the development site are premises operated by Network Rail (the Holgate depot) and the York Campus including the Rail Operating Centre. To the north of the development site is the Siemens Traincare Depot that is used as a train maintenance base. Noise of an industrial nature is subjectively more prominent at locations in the southern and northern parts of the site and during times when road traffic noise is subdued.

10E.5.2 Daytime noise assessment

E5.2.1 Road noise

The daytime noise level due to road traffic noise at Locations N_03, N_05, N_06 have been calculated from three individual noise measurements, based upon the principles of the *'shortened measurement procedure'* described at Section 43 of Calculation of Road Traffic Noise (CRTN).

This method has been used to calculate a noise level in terms of $L_{A10,18hr}$. A further correction has been applied in accordance with Section 6.2.2 of the BS8233:2014 to convert the noise levels to $L_{Aeq,16hr}$. This process is summarised below.

$$L_{A10,18hr} = L_{A10,3hr} - 1dB(A) \qquad \text{(CRTN)}$$

$$L_{Aeq,16hr} \approx L_{A10,18hr} - 2dB(A) \qquad \text{(BS8233:2014)}$$

$$L_{Aeq,16hr} \approx L_{A10,3hr} - 3dB(A)$$

The resultant daytime noise levels have been calculated and assessed in Table 10E.13:

Table 10E.13: Assessment of sites exposed to daytime road traffic noise

Location	Description	Noise exposure ($dBL_{Aeq,16h}$)	ProPG risk category	Observed effect level
N_03	Siemens Depot	58	Low	Between LOAEL and SOAEL
N_05	Leeman Road / Martins Court	69	Medium	Higher than SOAEL[1]
N_06	National Railway Museum entrance	61	Medium	Between LOAEL and SOAEL

E5.2.2 Rail noise

The daytime noise level due to rail traffic noise at Locations N_12 to N_14 have been calculated as a logarithmic average of the measured L_{Aeq} levels. The resultant daytime noise levels have been calculated and assessed in Table 10E.14.

The measurement at Location N_12 consisted of three 15-minute measurements where train activity was present. Due to site access constraints, Location N_13 consists of one 15-minute measurement, during which there were no train pass-bys. Therefore, reliance has been placed on the noise logger at Locations N_11 and N_14.

Table 10E.14: Assessment of sites exposed to daytime rail noise

Location	Description	Noise exposure ($dBL_{Aeq,16h}$)	ProPG risk category	Observed effect level
N_01	East Coast Main Line – North	67	Medium	Between LOAEL and SOAEL
N_02	East Coast Main Line – Leeman Road	61	Medium	Between LOAEL and SOAEL
N_11 (logger)	Freight Avoiding Line midway	55	Low	Between LOAEL and SOAEL
N_12	York Railway Station	70	High[2]	Higher than SOAEL[2]

[1] This location is located on Leeman Road, which is expected to reduction in road traffic noise of 8dB or more as a result of the proposed Development
[2] this location is not envisaged for residential use in the Masterplan and commercial uses would be much more resilient to noise exposure.

N_13[2]	Freight Avoiding Line South	47	Negligible	Lower than LOAEL
N_14 (logger)	Freight Avoiding Line South	52	Low	Between LOAEL and SOAEL

E5.2.3 Road and rail noise

The daytime noise level due to both road and rail traffic noise at Locations N_08 and N_09 have been calculated as a logarithmic average of the measured L_{Aeq} levels The resultant daytime noise levels have been calculated and assessed in Table 10E.15.

Table 10E.15: Assessment of sites exposed to daytime road traffic and rail noise

Location	Description	Noise exposure ($dBL_{Aeq,16h}$)	ProPG risk category	Observed effect level
N_08	Carleton Street East	57	Low	Between LOAEL and SOAEL
N_09	National Railway Museum South carpark	48	Negligible	Lower than a LOAEL

E5.2.4 Industrial / commercial daytime noise

Network Rail Holgate Depot & York Campus

Attended noise measurements were taken close to the Network Rail Holgate Depot at Location N_13 during the day and long-term logging at Locations N_11 and N_14 during both the day and night.

The Network Rail depot produced industrial noise including loud, intermittent clangs that were only present during the day-time. The Network Rail York Campus including the Rail Operating Centre was the apparent source of building services noise that was present at all times during the daytime and night-time, being more prominent at night-time due to the decrease in road traffic noise.

Industrial noise did not dominate during the day and has therefore been assessed as rail noise (see Section E5.2.2).

Siemens Depot

Noise measurements were taken at multiple locations in proximity to the Siemens Depot (N_03, N_05, N_06). The resultant daytime noise levels have been calculated and assessed in Table 10E.13.

[2] One 15-minute attended measurement was taken at this location (N_13) during which there was no train activity. Therefore assessments of this location have been made using the long-term unattended measurements at Locations N_11 and N_14.

Whilst industrial noise such as metallic clangs and banging was audible at the Siemens depot during the daytime, it was masked by dominant road traffic noise. As industrial noise did not dominate during the day, these measurement locations have therefore been assessed as road noise (see Section E5.2.1).

10E.5.3 Night-time noise assessment

E5.3.1 Road noise - $L_{Aeq,T}$ levels

The night-time noise level due to road traffic noise was measured at Locations N_03, N_05 and N_06. The acoustic environment during the night-time was dominated by industrial / commercial noise therefore the results are assessed in Section E5.3.4.

E5.3.2 Rail noise - $L_{Aeq,T}$ levels

Attended measurements at the proposed Development were not undertaken over night-time periods, though long-term measurements were taken at Locations N_11 and N_14.

The night-time noise level due to rail traffic noise at Locations N_11 and N_14 have been calculated as a logarithmic average of the measured L_{Aeq} levels. The resultant night-time noise levels have been calculated and assessed in Table 10E.16.

Table 10E.16: Assessment of sites exposed to night-time rail noise

Location	Description	Noise exposure ($dBL_{Aeq,8h}$)	ProPG risk category	Observed effect level
N_11	Freight Avoiding Line midway	51	Medium	Between LOAEL and SOAEL
N_14	Freight Avoiding Line South	52	Medium	Between LOAEL and SOAEL

E5.3.3 Road and rail noise

The night-time noise level due to both road and rail traffic noise at Locations N_08 and N_09 were not measured through attended measurements but long-term measurements were undertaken at N_10. Although this logger was installed to measure the noise from the miniature railway, the miniature railway does not operate during the night-time so the data from this location can be used to represent Location N_09. The resultant night-time noise levels have been calculated and assessed in Table 10E.17.

Table 10E.17: Assessment of sites exposed to night-time road and rail noise

Location	Description	Noise exposure ($dBL_{Aeq,8h}$)	ProPG risk category	Observed effect level

N_10	National Railway Museum Miniature Railway	43	Low	Between LOAEL and SOAEL

E5.3.4 Industrial / commercial night-time noise - $L_{Aeq,T}$ levels

Network Rail Holgate Depot and York Campus

The Network Rail Holgate Depot was not audible at night. The York Campus building services noise was present throughout both the day and the night-time therefore being more audible at night due to the quieter road traffic.

Industrial noise did not dominate during the night and has therefore been assessed as rail noise (see Section E5.3.2).

Siemens Depot

Noise measurements were taken at multiple locations in proximity to the Siemens (N_03, N_05, N_06) site during the night-time. As industrial noise dominated the acoustic environment during the night-time, the results are summarised in Table 10E.18 with the full results shown in Appendix 10B.

Noise measurements were taken during the typically quietest part of the night period (01:00 – 05:00) and corrected to an average for the whole of the night based upon logger data from Location N_04. The correction based on the logger is +1dB.

Industrial noise dominated the night-time acoustic environment, with intermittent metallic clangs and banging. This became more apparent at night-time without the masking road traffic noise from Leeman Road. The evening and night shift work produced higher levels of car pass-bys on the depot approach road and electric entrance gate noises near to the measurement position.

Table 10E.18: Assessment of sites exposed to night-time industrial noise

Location	Description	Noise exposure ($dBL_{Aeq,8h}$)	ProPG risk category	Observed effect level
N_03	Siemens depot	49	Low	Between LOAEL and SOAEL
N_05	Leeman Road / Martins Court	54	Medium	Between LOAEL and SOAEL
N_06	National Railway Museum entrance	44	Low	Between LOAEL and SOAEL

10E.5.4 Summary and ProPG assessment

With reference to Figure 10E.1 as well as Table 10E.3 and Table 10E.4, the risk of effects associated with the unmitigated noise levels are summarised in .

Table 10E.19.

Table 10E.19: Summary of the measured day and night-time $dBL_{Aeq,T}$ values and their corresponding risk

Location	Description	$L_{Aeq,16hr}$ (Day)	ProPG risk category	Observed Effect Level	$L_{Aeq,8hr}$ (night)	Risk	ProPG risk category
N_01	East Coast Main Line – North	67	Medium	Between LOAEL and SOAEL	-	-	-
N_02	East Coast Main Line – Leeman Road	61	Medium	Between LOAEL and SOAEL	-	-	-
N_03	Siemens depot	58	Low	Between LOAEL and SOAEL	49	Low	Between LOAEL and SOAEL
N_05	Leeman Road / Martins Court	69	Medium	Higher than SOAEL	54	Medium	Between LOAEL and SOAEL
N_06	National Railway Museum entrance	61	Medium	Between LOAEL and SOAEL	44	Low	Between LOAEL and SOAEL
N_08	Carleton Street East	57	Low	-	-	-	-
N_09	National Railway Museum South car park	48	Negligible	-	-	-	-
N_10	National Railway Museum Miniature Railway	-	-	-	43	Low	Between LOAEL and SOAEL
N_11	Freight Avoiding Line midway	55	Low	Between LOAEL and SOAEL	51	Medium	Between LOAEL and SOAEL
N_12	York Railway Station	70	High	Higher than SOAEL	-	-	-
N_13	Freight Avoiding Line South	47	Negligible	Lower than LOAEL	-	-	-

N_14	Freight Avoiding Line South	52	Low	Between LOAEL and SOAEL	52	Medium	Between LOAEL and SOAEL

The majority of measurement locations lie within the Low – Medium risk ProPG categories and below a SOAEL. Locations N_05 and N_12 are above SOAEL with Location N_05 being medium risk and Location N_12 high risk.

Importantly Location N_05 is located on Leeman Road, is expected to see a reduction in road traffic noise of 8dBA or more as a result of the proposed Development. Also, Location N_12 is not envisaged for residential use in the Masterplan and the commercial uses proposed would be substantially more resilient to noise exposure.

With the adoption of Good Acoustic Design, the above risk levels will be expected to decrease. Importantly outline noise mitigation is advised in Section 10E.5.5.

In summary, our recommendation with regards to noise in relation to the planning application is to **Grant with Conditions.**

10E.5.5 Outline noise barrier mitigation

Outline mitigation measures have been developed to demonstrate the scale of the noise reduction that would be afforded by noise barriers (also building massing) as shown in Figure 10E.5.

A 2.4m high noise barrier is suggested at various locations around the site boundary. These are positioned to protect potential residential development next to the railway lines. The aim of the barriers is primarily to reduce the noise level experienced in the outdoor amenities (i.e. gardens). It will also serve to protect the ground floor living rooms. The effect the barriers have on upper floors is dependent on the barrier / source height.

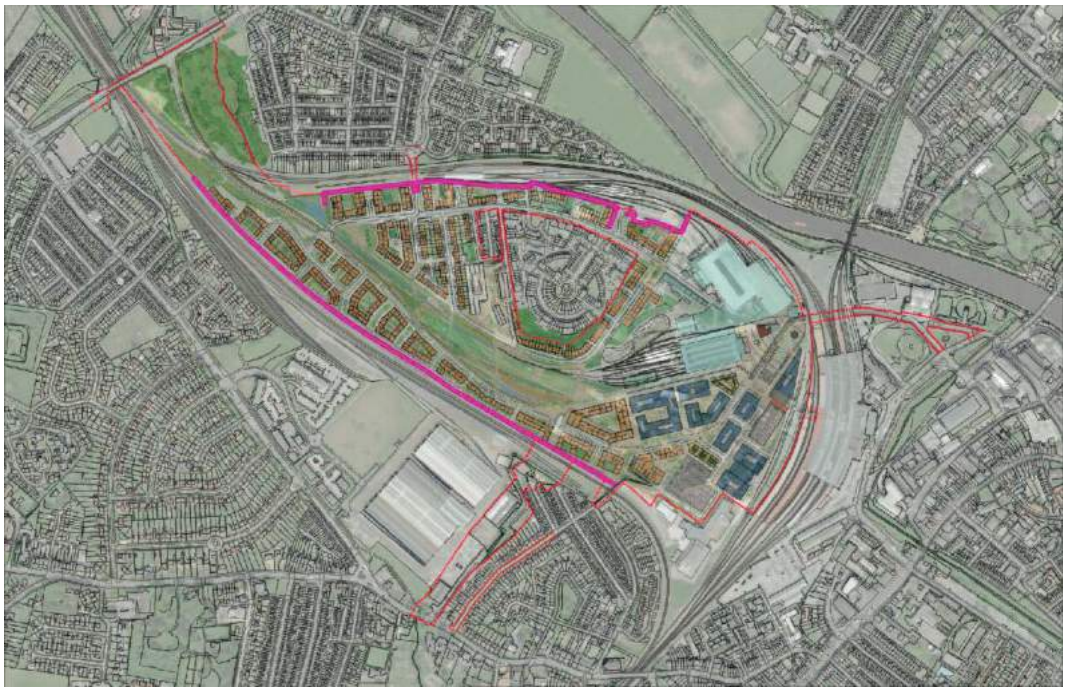


Figure 10E.5: Indicative mitigation using long, continuous barriers (magenta lines)

E5.5.1 Noise barrier requirements

It is suggested that any noise barriers should be constructed having regard to the following design documents:

- DMRB Volume 10 Environmental Design and Management Section 5 Environmental Barriers Part 2 HA 66/95 Technical Requirements;
- DMRB Volume 10 Environmental Design Section 5 Environmental Barriers Part 1 HA 65/94;
- British Standard BS EN 1793: Parts 1-6 "Road traffic noise reducing devices. Test method for determining the acoustic performance"
- Manual of Contract Documents for Highway Works, Volume 1 - Specification for Highway Works: Series 2500 Special Structures.

With regards to the proposed noise barrier this could be achieved with a narrow structure such as a timber, aluminium or composite noise barrier. The visual impact could be moderated by planting. Examples of noise barriers are shown in

Figure 10E.6 to Figure 10E.9.

Figure 10E.6: Metal / composite noise barrier, on top of a bund

Figure 10E.7: Timber fence noise barrier

Figure 10E.8: Gabion walling noise barrier

Figure 10E.9: Planted noise barrier

10E.5.6 Building envelope sound insulation

Building envelope sound insulation performance can be enhanced in order to reduce internal noise level to those adopted in section 10E.3.1.

A standard thermal double glazed unit with a non-acoustic ventilation opening not exceeding 8000mm^2 would provide at least 26dB sound insulation when closed. Table 10E.20 shows predicted internal noise levels excluding potential noise barrier attenuation.

Table 10E.20: Outline noise break-in calculations for basic glazing and ventilation provision (windows closed)

Location	Description	$L_{Aeq,16hr}$ (Day)		$L_{Aeq,8hr}$ (night)	
		External noise level	Predicted internal noise level	External noise level	Predicted internal noise level
N_03	Siemens depot	58	32	49	23
N_05	Leeman Road / Martins Court	69	43	54	28
N_06	National Railway Museum entrance	61	35	44	18
N_08	Carleton Street East	57	31	-	
N_09	National Railway Museum South car park	48	22	-	
N_10	National Railway Museum Miniature Railway	-		43	17
N_11	Freight Avoiding Line midway	55	29	51	25
N_12	York Railway Station	70	44	-	
N_13	Freight Avoiding Line South	47	21	-	
N_14	Freight Avoiding Line South	52	26	52	26

Importantly Location N_05 is located on Leeman Road, is expected to see a reduction in road traffic noise of 8dBA or more as a result of the proposed Development. Also, Location N_12 is not envisaged for residential use in the Masterplan and the commercial uses proposed would be significantly more resilient to noise exposure.

Therefore, in all cases the internal noise level criteria in section 10E.3.1 can be met, on a windows closed basis, with basic glazing and ventilation provision.

It is however recommended that further detailed noise studies and modelling are undertaken as part of any reserved matters planning application in order to shape the development of residential plots in accordance with ‘good acoustic design’.

10E.6 Vibration assessment

10E.6.1 Vibration climate

The most significant vibration sources are the trains travelling along the East Coast Main Line and the Freight Avoiding Line. The East Coast Main Line provides little vibration during the night-time due to there being no passenger train services. The Freight Avoiding Line runs throughout both the day and night-times, therefore being the primary source of vibration at night. The results obtained are summarised in Table 10E.12.

An analysis of vibration in terms of Vibration Dose Value (VDV) has been performed based on British Standard 6472-1 (2008). For Locations V_01 and V_03, 16-hour daytime and 8-hour night time VDVs were calculated from all measured events recorded on the vibration logger for the full period of time.

For Location V_02 16-hour daytime and 8-hour night time VDVs have been estimated from measured events over the 90 minute monitoring period (between 16:05 and 17:15 on the 19th June 2018). The average VDV of a single train event was multiplied in accordance with British Standard 6472-1 (2008) to equal the number of trains during the day (07:00 – 23:00) and the night (23:00 – 07:00).

In order to predict the potential VDVs at levels further up the buildings, a transfer function of 4 has been applied to the vibration levels acquired, which allows for 'worst-case' amplification on the upper floor levels. This is based on Arup Acoustics' empirically based experience from previous studies of vibration transmission through buildings. However, this can reasonably be expected to reduce for floors above first floor level. The daytime and night-time results are presented in the following sections.

10E.6.2 Daytime vibration assessment

The daytime vibration levels were measured at Locations V_01, V_02 and V_03 and the VDV at ground level and 1st floor level within the proposed buildings has been calculated. The results are shown in Table 10E.21 along with the probability of adverse comments, taken from Table 10E.5.

Table 10E.21: Calculated daytime VDVs at 1st floor level within buildings

Location	Time period	VDV,Wb Z ($m.s^{-1.75}$)	Worst case VDV,Wb Z at 1st floor level ($m.s^{-1.75}$)	Threshold	Impact classification	Probability of adverse comment ($m.s^{-1.75}$)
V_01	Daytime (07:00 – 23:00)	0.200	0.800	SOAEL	Major	Adverse comment possible
V_02		0.164	0.658	Between LOAEL and SOAEL	Moderate	Adverse comment possible

Location	Time period	VDV,$_{Wb}$ Z ($m.s^{-1.75}$)	Worst case VDV,$_{Wb}$ Z at 1st floor level ($m.s^{-1.75}$)	Threshold	Impact classification	Probability of adverse comment ($m.s^{-1.75}$)
V_03		0.023	0.091	Less than LOAEL	Minor	Less than low probability of adverse comment

10E.6.3 Night-time vibration results

The night-time vibration levels were measured at Locations V_01, V_02 and V_03 and the VDV at ground level and 1st floor level within the proposed buildings has been calculated. The results are shown in Table 10E.22 along with the probability of adverse comments, taken from Table 10E.5.

Table 10E.22: Calculated night-time VDVs at 1st floor level within buildings

Location	Time period	Ground floor VDV,$_{Wb}$ Z ($m.s^{-1.75}$)	Worst case VDV,$_{Wb}$ Z at 1st floor level ($m.s^{-1.75}$)	Threshold	Impact classification	Probability of adverse comment ($m.s^{-1.75}$)
V_01	Night-time (23:00 - 07:00)	0.106	0.423	SOAEL	Major	Adverse comment probable
V_02		0.095	0.381	Between LOAEL and SOAEL	Moderate	Adverse comment possible
V_03		0.018	0.070	Less than LOAEL	Minor	Less than low probability of adverse comment

10E.6.4 Summary

As shown in Table 10E.21 and Table 10E.22, vibration levels at Location V_01 potentially exceed a SOAEL, however there are important mitigating factors to consider.

Location V_01 is located immediately adjacent to and between the East Coast Main Line (18 metres away) and the Freight Avoiding Line (40 metres away). It is also located 6 metres from another line which connects into the National Railway Museum and Freightliner depot. During the attended part of the vibration survey a Network Rail Mobile Maintenance System 69.70 trainset was observed using this line, which produced very high levels of vibration which will

have skewed the results. It is therefore considered that a number of trains may have used this line during the unattended vibration survey, which will not be the case once in the future. The freightliner depot will be demolished and the superfluous tracks decommissioned to make way for the proposed Development. The predicted vibration level is therefore considered likely to reduce to below a SOAEL and the impact classification reduce to Moderate.

Considering that Location V_01 is exposed to both the East Coast Main Line and the Freight Avoiding Line and is expected to be below a SOAEL, it is considered that vibration from the whole of Freight Avoiding Line is likewise less than a SOAEL, even though it was not possible to obtain measurements along it.

Vibration levels at Location V_02 lie between a LOAEL and a SOAEL. Location V_02 is located immediately adjacent the East Coast Main Line (17 metres away). These results for this location are considered representative.

Vibration levels at Location V_03 are less than a LOAEL. Location V_02 is located next to the Siemens depot and adjacent to the East Coast Main Line (70 metres away). These results for this location are considered representative.

Where levels are between a LOAEL and a SOAEL PPG_N requires the following action, “Mitigate and reduce to a minimum”.

In practice, the only cost effective mitigation would be to apply stand-off distances from the track, to residential development. It is therefore recommended that further detailed vibration studies are undertaken as part of any reserved matters planning application in order to shape the development of residential plots and ensure vibration exposures are at acceptable levels.

Importantly there is significant local precedent for the development of new residential properties in proximity to both the East Coast Mainline and the Freight avoiding Line. Many of the properties forming part of the Aldborough Way development are located 24 metres from the East Coast Main Line. Many of the properties forming part of the St Pauls Mews development are located 14 metres from the Freight Avoiding Line.

In summary our recommendation with regards to vibration in relation to the planning application is to **Grant with Conditions** to ensure further detailed vibration studies are undertaken to establish appropriate setbacks.

10E.7 Conclusion

A noise impact assessment has been conducted for the proposed Development which considers the suitability for residential uses.

Consideration has been given to the National Planning Policy Framework (NPPF), Planning Practice Guidance – Noise (PPG-N), the Noise Policy Statement for England (NPSE), the Professional Practice Guidance on Planning and Noise (ProPG) and consultation with CYC. A noise and vibration survey has been conducted to identify noise sources within the local area and to evaluate the baseline noise environment.

External noise levels are elevated in some locations, but are or will be below a SOAEL. Outline noise barrier mitigation has been proposed to protect outdoor living / amenity areas. In all cases adopted internal noise level criteria can be met, on a windows closed basis, with basic glazing and ventilation provision.

Vibration levels are elevated in some locations, but are expected to below a SOAEL. It is recommended that further detailed vibration studies are undertaken as part of any reserved matters planning application in order to shape the development of residential plots. Importantly there is significant local precedent for the development of new residential properties in proximity to both the East Coast Mainline and the Freight avoiding Line.

In summary our recommendation with regards to noise and vibration in relation to the planning application is to **Grant with Conditions.**

Appendix 11A
Reptile Survey

York Central

Reptile survey

October 2016

Control Sheet

Job reference:	CSE075-002
Title:	York Central
Type:	Reptile Survey
Client:	ARUP
Prepared by:	Craig Sandham
Version:	v1.0
Status:	FINAL
Restricted distribution:	No
Reviewed and approved for issue:	 Craig Sandham
Date:	13.10.16

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Opinions and information provided in the report are on the basis of CS Ecology Ltd using due skill, care and diligence in the preparation of the same. It should be noted, that whilst every effort is made to meet the client's brief, no site investigation can ensure complete assessment or prediction of the natural environment.

Contents

1 Introduction

1.1 Background

CS Ecology Ltd. was commissioned by Arup in August 2016 to undertake a reptile survey of the site known as York Central. The site comprises numerous large railway sheds, industrial units, brick built buildings (both in use and disused), small areas of scrub/ grassed habitat and railway sidings. The survey is required in order to ascertain the status of reptiles at the site prior to any development works taking place. ARUP had previously undertaken a Phase 1 Habitat Survey and identified areas of the site to be targeted by the reptile survey.

1.2 Personnel

Craig Sandham BSc (Hons) MRes CEnv MCIEEM led the survey work; he is an experienced 'general' ecologist who has undertaken many reptile surveys and translocations for a variety of projects over the last twelve years. In addition he is an active member of Yorkshire Amphibian & Reptile Group. Yan-Yee Lau, graduate ecologist of ARUP also provided assistance in the field.

1.3 Survey objectives

The objectives here are to determine the presence or likely absence of reptiles at the site and make recommendations as appropriate.

2 Methodology

2.1 Field survey

The site was surveyed for reptiles during appropriate weather conditions using 'direct observation' - walking carefully and slowly, scanning along habitat transitional areas and potential basking spots and the use of 'artificial cover objects' (ACOs) as described in Froglife (1999).

Approximately 300 ACOs comprising roofing felt, onduline (corrugated bitumen roofing) and tin were positioned in suitable habitat on the 19th August 2016 across the site and their positions marked using a GPS. These were left (bedding-in period) until the first of seven survey visits commenced three weeks later. Surveys were undertaken throughout September on non-consecutive days.

Weather conditions were recorded on each visit using a hand-held Kestrel 2500 weather meter, cloud cover was estimated using 0/8 as a clear cloudless day, through to 8/8 as full cloud cover.

3 Results & Evaluation

3.1 Weather conditions

Date	Start time	Temp (°C)	Wind (average MPH)	Cloud cover	Notes
7.9.16	9.15	20.6	1.1	6/8	Humid
9.9.16	9.10	22.2	2.9	4/8	Sunny spells
13.9.16	8.00	16.8	1.2	1/8	Sunny
15.9.16	17.00	27.6	0.7	0/8	Sunny
20.9.16	16.00	16.9	0.8	7/8	Sunny spells
23.9.16	9.00	12.7	2.6	1/8	Clear & dry
27.9.16	16.00	17.1	2.5	7/8	Sunny spells

3.2 Presence/ likely absence survey

No reptiles or signs of reptile presence (e.g. sloughed skin) were recorded during the survey, indicating a likely absence of reptiles at the site. Although areas of the site do appear to be ideal reptile habitat (in particular for common lizard and slow-worm), it is likely given plant species composition that some of those habitats are relatively new and in addition almost all are isolated from potential reptile areas located beyond the site boundary.

3.3 Other species

Two adult common toads *Bufo bufo* were recorded using the main 'teardrop' area of the site, in addition numerous immature common toads were recorded on each survey visit to the 'allotment' area of the site along with a single common frog *Rana temporaria*.

Although widespread, the common toad is no longer 'common' as it has undergone major declines with colony losses and it described as being 'at risk'. As such it is listed as a Species of Principal Importance on S41 of the NERC Act 2006.

4 Conclusion & Recommendations

4.1 Reptile survey

If no development occurs at the site within the next three years, it is recommended that the survey is repeated as wider-ranging species may colonise the site in the interim period.

4.2 Common toad

The presence of the common toad at the site is a 'material consideration' in any planning application determination. It is recommended that ponds and terrestrial habitats and their linkages be maintained and/ or created which may include toad underpasses and fencing (Amphibian & Reptile Conservation, 2011). It is also important to maintain or create hibernation sites; hibernacula similar to that described for great crested newts (English Nature, 2001) could be constructed at strategic locations at the site.

Provision of ponds and terrestrial habitat suitable for common toads will also benefit the local environment through a likely increase in associated biodiversity.

5 References

Amphibian and Reptile Conservation (2011). Common toads and roads – guidance for planners and highway engineers in England.

English Nature (2001). Great Crested Newt Mitigation Guidelines.

Froglife Advice Sheet 10 (1999). Reptile Survey – an introduction to planning, conducting and interpreting surveys for snake and lizard conservation.

Appendix 1 - Legislative and Planning Context

This section summarises the legislation which is relevant, in ecological terms, to this assessment, i.e. legislation relevant to species present or potentially present within the survey area is included here along with legislation relevant to protected sites in the vicinity. Note that qualified legal expertise should be sought in case of any uncertainty.

National Planning Policy Framework (NPPF, 2012)

The NPPF states that: If significant harm to biodiversity resulting from a development cannot be avoided or adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused (NPPF Para 118); Planning decisions should contribute to conserving and enhancing the natural environment (NPPF Para 17).

Natural Environment and Communities Act (NERC, 2006)

The Natural Environment and Rural Communities (NERC) Act came into force on 1st Oct 2006. Section 40 of the Act requires all public bodies to have regard to biodiversity conservation when carrying out their functions. This is commonly referred to as the 'Biodiversity duty'.

This duty extends to all public bodies the biodiversity duty of section 74 of the Countryside and Rights of Way Act 2000 (CROW), which placed a duty on Government and Ministers.

The aim of the biodiversity duty is to raise the profile of biodiversity in England and Wales, so that the conservation of biodiversity becomes properly embedded in all relevant policies and decisions made by public authorities.

Appendix 11B
Black Redstart Scoping Survey

York Central

Black redstart scoping survey

October 2016

Control Sheet

Job reference:	CSE075-001
Title:	York Central
Type:	Black Redstart Scoping Survey
Client:	ARUP
Prepared by:	Craig Sandham
Version:	v1.0
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Opinions and information provided in the report are on the basis of CS Ecology Ltd using due skill, care and diligence in the preparation of the same. It should be noted, that whilst every effort is made to meet the client's brief, no site investigation can ensure complete assessment or prediction of the natural environment.

Contents

1 Introduction

1.1 Background

CS Ecology Ltd. was commissioned by Arup in August 2016 to undertake a black redstart *Phoenicurus ochruros* scoping and habitat suitability survey of the site known as York Central. The site comprises numerous large railway sheds, industrial units, brick built buildings (both in use and disused), small areas of scrub/ grassed habitat and railway sidings. The survey is required in order to determine the likelihood of black redstart breeding at the site prior to any development works taking place.

1.2 Personnel

Tim Marlow BSc (Hons) MCIEEM undertook the survey work, he is an experienced ornithologist and 'general' ecologist who has undertaken many bird assessments and surveys for a variety of projects over the last fifteen years.

1.3 Survey objectives

Although little research has been undertaken in the United Kingdom on the ecology of black redstarts; experts are in agreement that there are five key ecological requirements which breeding sites typically possess[1] (see Section 2.1). The objectives here are to determine the presence and or absence of such features at the site and make recommendations as appropriate with regard to black redstart and other species potentially present at the site.

1.4 Survey constraints

The breeding bird season runs from approximately March through to August, so any breeding activity will have been missed by the field survey component of this assessment.

[1] http://www.blackredstarts.org.uk/pages/ecoredstart.html

2 Methodology

2.1 Field survey

The site was assessed for its suitability as a potential breeding site for black redstart with respect to the following five ecological requirements:

1. Availability of sparsely vegetated stony ground for foraging;
2. presence of complex structures in the form of large buildings which function as facsimiles of the species natural breeding habitat of cliffs;
3. a variety of ledges or holes for nest sites;
4. proximity to water which increases the volume of insect prey available to feed young; and
5. an absence of an extensive shrub layer which is favourable to the European Robin *Erithacus rubecula,* which is thought to outcompete black redstart.

3 Results

3.1 Field survey

With regard to the five ecological criteria for breeding sites:

1. There is extensive suitable foraging habitat present across much of the site, particularly in the form of railway sidings with sparsely vegetated ballast.
2. In total 21 buildings at the site were considered to be potentially suitable for black redstart (see below).
3. Although the buildings represent good substitutes for natural habitat preferences (e.g. cliffs), few visible potential egress points were recorded and ledges were not especially numerous.
4. The site is close to water as the River Ouse runs immediately to the north, therefore insect abundance is likely to be positively correlated with this resource.
5. Few areas of extensive shrubs, which is more favourable to the European robin.

3.2 Potentially suitable buildings

B18a Freightline depot

Two large buildings of old brick and some corrugated metal sheeting with extensive foraging habitat immediately available nearby.

Plate 1. B18a Freightline depot

B19, B20 & B23 Low, old brick buildings

These buildings appeared to be well-sealed and lacked obvious external features to provide nest sites, but could be used as song posts.

B34 & B35 Corrugated new buildings

Unlikely to provide nesting opportunities but could be used as song posts.

Plate 2. B34/B35

B15 Portakabins

Unlikely to provide nesting opportunities but could be used as song posts.

B7 Large, old brick industrial buildings

Appeared well-sealed and lacked obvious external features to provide nest sites, but could be used as song posts.

Plate 3. B7 brick-built industrial buildings

B12 The National Railway Museum

A very large modern building, unlikely to be used for nesting, but could be used as a song post.

B9 & B10 Derelict brick buildings (at the entrance to Cinder Lane)

Ideal buildings but appeared well-sealed and nesting opportunities may be limited.

B11 The National Railway Museum

A very large modern building, nesting opportunities may be limited.

B29 (a & b) Brick and corrugated asbestos buildings

Unlikely to provide nesting opportunities but could be used as song posts.

B36 Old brick buildings

A missing dormer window in the roof would provide egress and this building is perhaps one of the better potential nesting sites.

Plate 4. B36 old brick-built buildings

11. **B37** Old brick and corrugated sheet industrial buildings

A female house sparrow was seen entering a hole in the side of this building and it is perhaps another of the better potential nesting sites.

Plate 5. B37 brick/ corrugated steel buildings

Plate 6. B37

12. **B31, B32 & B33** Old brick buildings used as offices

Old industrial buildings now used as offices with a large housing estate nearby comprised of blocks of flats of medium height. Potential song posts, but limited nesting opportunities.

13. **B1, B2 & B4** Warehouse units

Warehouse units close to York Rail Station and adjacent to the Cinder Lane car park along which there is an old brick wall with a vegetated ledge running along its entire length. Potential song posts and suitable foraging habitat nearby.

Plate 7. B40 large former industrial buildings

14. **B40** Large, old brick industrial buildings

Appeared well sealed and obvious external features to provide nest sites were few in number. Potentially could be used as a song post.

3.3 Incidental observations

Three species which breed in or on buildings: pied wagtail *Motacilla alba*, common house Martin *Delichon urbicum* and house sparrow *Passer domesticus* were recorded during the black redstart habitat suitability survey.

4 Conclusions

4.1 Summary of the survey

For the reasons outlined in Section 3.1 and the potential, albeit predominantly sub-optimal nesting sites listed in Section 3.2, it is considered that black redstart may use the site for breeding purposes.

In addition, other birds are likely to utilise the site for breeding and/ or foraging purposes including, but not limited to those recorded during the field survey (house martin, house sparrow and pied wagtail).

5 Recommendations

5.1 Black redstart

It is recommended that the status of black redstart is ascertained at the site before any future development occurs so that appropriate mitigation measures can be adopted, if the species is found to be present.

At least five fortnightly survey visits are required between mid-April and the end of June. A transect route should be walked as to incorporate all suitable foraging areas and buildings (as identified here). Time should be taken to listen for singing black redstarts, and it is recommended that stops of predetermined time periods are made at designated locations along the route. The methodology is a refinement of that described in Gilbert et al. 1998.

5.2 Potential mitigation options for black redstart

Development affecting black redstart should look to accommodate the following mitigation options[2]:

- Sparsely vegetated green roofs (typical of stressed or nutrient poor areas).
- Provision of internal ledges and holes within building design to act as potential nest sites.
- Sparsely vegetated green walls to complement and extend green roof habitat.
- Provision of nest boxes at suitable sheltered locations (3 – 50m above ground) e.g. Schwegler woodcrete box 2HW.

Plate 8. Schwegler 2HW box with black redstart feeding young.

- Provision of ponds or other water features to attract insect food.

[2] For full details see: http://www.gmbp.org.uk/site/images/stories/pdf/Black%20Redstart%20BAP.pdf

5.3 Other bird species

Other breeding bird species could be mapped during any black redstart survey, but it is considered unlikely that further Schedule 1 species would be encountered.

6 References

Gilbert, G., Gibbons, D.W. & Evans, J. (1998) Bird Monitoring Methods: a manual of techniques for key UK species. RSPB, Sandy.

Appendix 1 - Legislative and Planning Context

This section summarises the legislation which is relevant, in ecological terms, to this assessment, i.e. legislation relevant to species present or potentially present within the survey area is included here along with legislation relevant to protected sites in the vicinity. Note that qualified legal expertise should be sought in case of any uncertainty.

Birds

The Wildlife and Countryside Act 1981 (as amended) is the principal legislation affording protection to UK wild birds. Under this legislation all birds, their nests and eggs are protected by law and it is an offence, with certain exceptions to recklessly or intentionally:

a) Kill, injure or take any wild bird;

b) Take, damage or destroy the nest of any wild bird while in use or being built;

c) Take or destroy the egg of any wild bird.

In addition, species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) are specially protected at all times.

National Planning Policy Framework (NPPF, 2012)

The NPPF states that: If significant harm to biodiversity resulting from a development cannot be avoided or adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused (NPPF Para 118); Planning decisions should contribute to conserving and enhancing the natural environment (NPPF Para 17).

Natural Environment and Communities Act (NERC, 2006)

The Natural Environment and Rural Communities (NERC) Act came into force on 1st Oct 2006. Section 40 of the Act requires all public bodies to have regard to biodiversity conservation when carrying out their functions. This is commonly referred to as the 'Biodiversity duty'

This duty extends to all public bodies the biodiversity duty of section 74 of the Countryside and Rights of Way Act 2000 (CROW), which placed a duty on Government and Ministers.

The aim of the biodiversity duty is to raise the profile of biodiversity in England and Wales, so that the conservation of biodiversity becomes properly embedded in all relevant policies and decisions made by public authorities.

Appendix 11C
Badger Report

Contents

Drawings

Executive Summary

Ove Arup and Partners Ltd (Arup) were commissioned by York Central in June 2016 to complete a Preliminary Ecological Appraisal (PEA) of the Site known as York Central. This survey highlighted the potential for badgers to construct setts within the sidings, which form part of the larger Site. Consequently Arup were commissioned to undertake a badger survey within the sidings area of the Site.

A single mammal burrow was identified within the Site boundary during the survey. It was considered that due to the size of the entrance (burrow) hole that this could have been excavated by badger. However no further signs were recorded that would confirm badger use. In addition no other signs of badger were observed within the wider Site e.g. excavations, latrines, badger hair.

In two further locations adjacent to the Site boundary mammal burrows were recorded that potentially may have been excavated by badgers. However, as before no additional or complementary signs of badger activity were recorded at these locations.

It is recommended that the mammal burrows are monitored to establish mammal usage and/or badger presence. This monitoring should take the form of a pre-construction survey a minimum of three months prior to works commencing on Site.

1 Introduction

Ove Arup and Partners Ltd (Arup) was commissioned by York Central Partnership (YCP) in June 2016 to complete a Preliminary Ecological Appraisal (PEA) of the Site known as York Central ('the Site'). This survey highlighted the potential for badgers to construct setts within the rail sidings. Consequently, Arup was commissioned to undertake a badger survey of the areas within the Site comprising rail sidings.

1.1 Site and Proposed Development Description

The Site is located to the west of York City Centre predominantly to the west of York Railway Station on an area of railway sidings. There is a parcel of land comprising the Millennium Green Land on the north-east of the York Central Site. The remainder of the Site includes amenity parklands, car parking and allotments. The dominant land use surrounding the Site is residential with smaller areas of land occupied by commercial businesses and greenspace.

Holgate Beck, a tributary of the River Ouse, runs north westwards across the Site, entering a culvert close to Holgate Road on the southern corner of the Site and re-emerging at surface in Millennium Green

It is proposed that the Site is redeveloped to be of mixed-use to provide an improved infrastructure within a close proximity to York Railway Station. The proposed Development would allow for the potential redevelopment of the National Railway Museum and provide space for commercial and residential properties. This will also include the incorporation of open public/greenspace through the Site.

1.2 Survey Objectives

The aim of this study was to undertake a field survey to identify the presence or likely absence of badger *Meles meles*, within the rail sidings of the Site.

1.3 Report Structure

The report includes:

- Section 2: Legal Context;
- Section 3: Methodology;
- Section 4: Results; and
- Section 5: Discussion and Recommendations.

2 Legal Context

The badger receives strict protection under the Protection of Badger Act 1992. Under the act it is an offence to:

- Wilfully kill, injure, take or attempt to kill, injure or take a badger;
- Possess a dead badger or any part of a badger;
- Sell or offer for sale or control any live badger;
- Mark, tag or ring a badger;
- Use badger tongs in the course of killing, taking or attempting to kill a badger; and
- Dig for a badger.

In addition to the protection of the animal specifically, the sett itself is also protected and it is an offence to:

- Interfere with a badger sett by damaging a sett or any part thereof;
- To wilfully destroy a sett, obstruct access to a sett or disturb a badger while occupying a sett; and
- Cause a dog to enter a sett.

The 1992 Act defines a badger sett as ‘any structure or place which displays signs indicating current use by a badger.’

Works, which may disturb a sett, are illegal without having obtained a licence from Natural England to do so. However, disturbance may be indirect and difficult to determine. In addition some activities such as pile driving or use of explosives may be subject to special consideration by the licensing authority.

3 Methodology

3.1 Desk Study

Species records within a 2 km radius surrounding the Site were obtained from the local records centre (North and East Yorkshire Ecological Data Centre (NEYEDC)).

Network Rails Hazard Directory was consulted to identify if the database held any records of badgers on Site or within 2 km of the Site.

In addition, historical reports produced by Arup which were undertaken in close proximity to the study area were reviewed:

- Arup (2008) Phase 1 Habitat Survey and Protected Species Constraints Report. [Issued to Network Rail].

3.2 Field Survey

A badger field survey of the sidings was undertaken by a suitably qualified ecologist, to determine the presence or likely absence of badger setts. Surveys were undertaken in accordance with standard survey methodology[1] in August and November 2016. If a sett was identified it was assigned a category as follows:

- Main setts: Possess a comparatively large number of entrances compared to the other setts within the territory (from approximately eight to thirty or more), and are constantly occupied by badgers;
- Annexe setts: Are clearly linked to the main sett (or sometimes setts of other rank) by well-worn badger tracks. They may comprise any number of entrances and are normally in frequent use by badgers, but they are not necessarily constantly occupied;
- Subsidiary setts: Support a variable number of entrance holes, normally in the range of three to eight, and are not connected to the main sett by well-worn badger tracks. The frequency of use of subsidiary setts varies greatly, but rarely will they be constantly occupied and often they are in sporadic use; and
- Outlier setts: Usually comprise one or two entrances only and are not connected to the main sett by well-worn tracks. They are often in sporadic use only, but may display periods of highly active use when local seasonal resources are available (for example outlier setts near fruit trees may experience periods of high use during autumn).

The activity level was also recorded, *via* the interpretation of field signs.

[1] Harris, S., Cresswell, P & Jefferies, D., (1989). *'Surveying Badgers – An occasional publication of the Mammal Society.'* No. 9. Mammal Society, London.

3.3 Survey Limitations

Badgers are a highly mobile species and can occupy a number of different setts over a number of years and seasons. Therefore, the absence of evidence of any badger signs or setts should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, professional judgement allows for the likely presence of these species to be predicted with sufficient certainty so as to not significantly limit the validity of these findings.

Any grid references provided within this report are approximate (obtained through handheld GPS devices) and are to be used as a guide only.

4 Results

4.1 Desk Study

One record of badger was identified by the local records centre within the 2 km search radius surrounding the Site (Table 4.1).

Table 4.1: Records of badger within 2km search radius.

Species	Closest Record Direction from Site	Closest records approximate distance from Site	Number of records within 2km
Eurasian Badger *Meles meles*	North-west	2 km	1

Network Rails Hazard Directory did not contain any records of badgers on site or within 2 km of the Site.

In 2008, Arup identified three badger setts in the wider area:

- badger sett with two entrance holes, located in York Yard North Sidings, with fresh footprints indicating that the sett was active at this time;
- disused badger sett with two entrance holes was recorded within an unvegetated sand bank to the west of the Site (Klondyke Yard), with no evidence of use at that time; and
- badger sett with two entrances was observed within a vegetated sand bank to the south-west (Ballast stock piles – Up Yard).

4.2 Field Survey

The badger field survey identified a large mammal burrow within the sidings (approximate location Drawing 1; TN1). No signs of badger use were identified at the time of the survey e.g. fresh excavation, badger hairs. The substrate in this location was observed to be loose/sandy, therefore, this entrance hole could have been excavated by a mammal other than badger. However the burrow entrance had the characteristic D-shaped entrance hole and a large spoil heap often associated with badger.

No other signs of badger were identified within the sidings area of the Site. Other holes were identified throughout the Site, however these were identified as rabbit holes due to the size and narrowness of the burrows.

The survey covered a minimum of 50 m beyond the boundary of the Site, where habitats were suitable for badger to construct setts and safe access was available (e.g. avoiding active rail line).

Mammal burrows were recorded 15 m outside of the Site boundary, adjacent to the Holgate Facility (Drawing 1; TN2, approximate grid reference SE 588517). Four entrance holes were recorded, orientated north, adjacent to the rail line. Three of these had the appearance of rabbit holes, but activity levels were low. However, one of the entrance holes had the appearance of a badger sett entrance

demonstrating a D-shaped entrance and wide tunnel. However, no signs of badger were identified. One rabbit dropping was found on the spoil heap and a small number of small rabbit hairs at the entrance. The entrance did not appear in active use (e.g. material collecting at entrance, no fresh excavation) and it was noted that the ground was very sandy, therefore, the large size of the entrance does not confirm that it was constructed by badger.

A number of stockpiled sand/substrate mounds were recorded in a service yard located to the north of the Holgate facility. One of these is comprised of sand (Drawing 1; TN3, approximate grid reference SE 586518 – 65 m from the Site boundary). This feature was observed to contain in excess of seven burrows of variable size and activity level. A number of the burrows (4+) were in active use by mammals; however the only species signs that were recorded were fox (prints in spoil heaps, odour within burrow and scat). Large claw marks were visible around the entrance to several of the mammal burrows, which were potentially indicative of badger. However, there were also clear fox prints exiting these burrows.

No signs were found that would confirm that the burrows described (TN 2 & 3) above were currently in use by badger.

5 Discussion and Recommendations

One disused mammal burrow was identified during the field survey within the sidings at the Site. However, no signs were identified, including latrines, badger hair, bedding or fresh excavations that would suggest that badger are currently using this burrow. It is possible that the mammal entrance has been excavated by another mammal as the substrate is sandy/loose in this location. It is common in such situations to record oversized rabbit and fox holes.

Outside of the Site boundary, burrows were identified in two locations adjacent to the Holgate Facility. The appearance of these burrows would suggest that they had been excavated by badger. However, on detailed inspection evidence of badger was not recorded. The only mammal signs recorded included fox and rabbit.

Badger are a highly mobile species and will re-occupy setts which have previously been abandoned. It is recommended that the burrows at TN1, 2 and 3 are monitored for activity. Monitoring should include a pre-construction survey a minimum of three months prior to works on Site. Ideally the survey should be undertaken during the winter period (November to March) so vegetation does not restrict the survey.

If at a later date an active badger sett is recorded on Site or within the zone of influence of the Site and this feature could be disturbed, damaged or destroyed by the proposed works, an ecologist must be consulted. The ecologist will determine whether a licence from Natural England is required and whether mitigation would need to be provided.

It is recommended that where practicable, excavations should not be left open overnight or allow for egress points to avoid mammals becoming trapped.

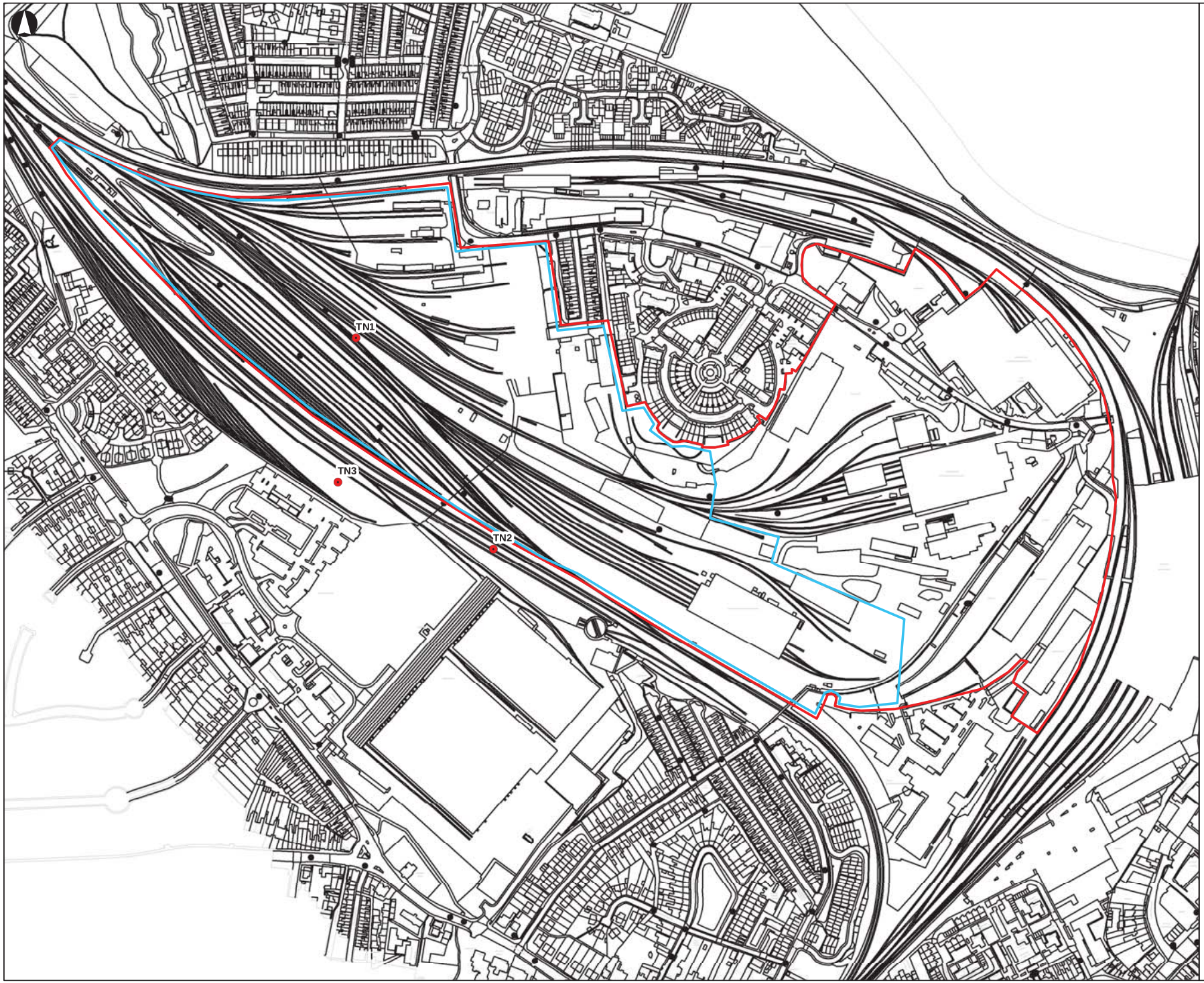
Disclaimer

This report is the result of survey work undertaken in August and November 2016. This report refers, within the limitations stated, to the condition or proposed Development of the site at the time of the inspections. Changes in legislation, guidance, best practice, etc. may necessitate a re-assessment/survey. It is also advised that if there is a delay of over a year in undertaking the works, a re-survey may be required. No warranty is given as to the possibility of future changes in the condition of the site.

This report is produced solely for the benefit of and no liability is accepted for any reliance placed on it by any other party. This report is prepared for the proposed uses stated in the report and should not be used in a different context.

Drawings

A3



Legend

- Survey area
- Sidings redline boundary
- Target note

TN1: Mammal burrow
TN2: Mammal burrow
TN3: Mammal burrow

Issue	Date	By	Chkd	Appd
P1	18-10-16	YL	RC	RC

Metres
0 50 100 200

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Job Title
York Central

Badger Survey Map

Scale at A3
1:4,000

Job No	Drawing Status
250114-00	**Issue**

Drawing No	Issue
Drawing 1	**P1**

MXD Location

Appendix 11D
York Groundsel Report

Contents

Drawings

Executive Summary

Ove Arup and Partners Ltd (Arup) were commissioned by to undertake a survey for the York groundsel (*Senecio eboracensis)* plant within the sidings area of the York Central Site.

York groundsel was first discovered locally in 1979 between the York Railway Station and car park. Anecdotal evidence has reported the presence of the plant species by Lendal Bridge and within the car park of Dalton Terrace Church. However the species has not been officially recorded by the local biological data centre records centre on the Site or within a 2 km search area.

No records of York groundsel were recorded during the field survey. A number of *Senecio* species were recorded on the Site but these specimens did not contain the corresponding number of as ray florets found with York groundsel.

Based on the results of this survey, no further recommendations are made regarding York groundsel and the development proposed for York Central.

1 Introduction

Ove Arup and Partners Ltd (Arup) were commissioned by York Central Partnership to undertake a survey for the ruderal plant species York groundsel *S. eboracensis,* within the sidings area of the Site.

1.1 Site Scheme and Description

The Site is located to the west of York City Centre predominantly to the west of York Railway Station on an area of railway sidings. This area is largely composed of ephemeral, brownfield and bare ground habitats. There is a parcel of land comprising the Millennium Green Land on the north-east of the York Central Site. The remainder of the Site includes amenity parklands, car parking and allotments. The dominant land use surrounding the Site is residential with smaller areas of land occupied by commercial businesses and greenspace.

Holgate Beck, a tributary of the River Ouse, runs north westwards across the Site, entering a culvert close to Holgate Road on the southern corner of the Site and re-emerging at surface in Millennium Green

It is proposed that the Site is redeveloped to be of mixed-use to provide an improved infrastructure within a close proximity to York Railway Station. The proposed Development would allow for the potential redevelopment of the National Railway Museum and provide space for commercial and residential properties. This will also include the incorporation of open public/greenspace through the Site.

1.2 Survey Objectives

The aim of this study was to undertake a field survey to identify the presence or absence of *S. eboracensi,* within the railway sidings of the proposed Development, York Central.

1.3 Report Structure

The report includes:

- Section 2: Methodology;
- Section 3: Results; and
- Section 4: Discussion and Recommendations.

2 Methodology

2.1 Desk Study

Flora species records within a 2 km radius surrounding the Site were obtained from the local records centre (North and East Yorkshire Ecological Data Centre (NEYEDC)).

2.2 Field Survey

A field survey was undertaken in August 2016 to identify the location and extent of the plant species *S. eboracensi.* Surveyors primarily focused on suitable habitats such as the railway sidings area within the wider Site.

The relative abundance of the notable species was recorded using the DAFOR scale (Dominant, Abundant, Frequent, Occasional, Rare) which is based on percentage cover.

- Dominant: >75% ;
- Abundant: 75 – 51%;
- Frequent: 50 – 26%;
- Occasional: 25 – 11%; and
- Rare: 10 – 1%

Where present, the location and extent of the species were mapped using an iPad with GPS.

2.3 Survey Limitations

Botanical surveys are limited by factors which affect the presence of plants, such as time of year, weather conditions and the presence of grazing animals. The absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, professional judgement allows for the likely presence of these species to be predicted with sufficient certainty so as to not significantly limit the validity of these findings.

3 Results

3.1 Desk Study

Table 3.1 details the protected / notable / invasive species identified within a 2 km search radius.

Table 3.1: Protected / notable / invasive species identified within a 2 km search radius.

Species recorded	Closest record direction from the Site	Closest records approximate distance from the Site	Number of records within 2 km
Japanese Knotweed *Fallopia japonica*	Within the Site	North-west corner	4
Giant Hogweed *Heracleum mantegazzianum*	Within the Site	North-west corner	2
Galingale *Cyperus longus*	Within the Site	North-west corner	1
Bee Orchid *Ophrys apifera*	East	0.3 km	1
Tubular Water-dropwort *Oenanthe fistulosa*	North	0.6 km	4
Field garlic *Allium oleraceum*	North	0.8 km	6
Thyme-Leaved Sandwort *Arenaria serpyllifolia*	South	0.9 km	4
Snowdrop *Galanthus nivalis*	East	0.9 km	5
Marsh Pea *Lathyrus palustris*	North	0.9 km	2
Water-soldier *Stratiotes aloides*	North	1.1 km	2
Stiff Saltmarsh-grass *Puccinellia rupestris*	East	1.3 km	1
Bluebell *Hyacinthoides non-scripta*	North	1.3 km	1
Northern Marsh-orchid *Dactylorhiza purpurella*	North-west	1.6 km	2
Loose Silky-bent *Apera spica-venti*	North	1.9 km	1
Common Cudweed *Filago vulgaris*	North	1.9 km	1
Corn Spurrey *Spergula arvensis*	North	1.9 km	1

3.2 Field Survey

The presence of *S. eboracensi* was not recorded within the Site during the field survey. Other groundsel species *Senecio sp.* was recorded in locations around the Freightliner building (Drawing 1; TN1), however the number of ray florets exceeded those described within Lowe and Abbott (2003)[1]. *S. eboracensi* is a hybrid product of *S. vulgaris* and *S. squalidus*.

S. eboracensis possesses a number of morphological features that distinguish it from several closely related *Senecio* taxa found in the British Isles. The identifying features of the species are described by Lowe and Abbott (2003) where *S. eboracensis* may be distinguished in the field from inland forms of radiate groundsel by its longer achenes (<2·5 mm in S. vulgaris), and longer, more lobate and lanceolate shaped leaves (usually around 12 lobes in S. vulgaris). Primary peduncles are well developed and tend to be clustered at stem apex in *S. eboracensis* and are longer than those *of S. vulgaris.* Comparison of pollen grains (three-pored and 20–25 μm in diameter in *S. vulgaris*) and presence of stigmatic papillae (absent in *S. vulgaris*) may also be used in determination of herbarium material or fresh material in the laboratory. These characters, in addition to the presence of ray florets, may also be used to distinguish *S. eboracensis* from the eligulate *S. vulgaris* var. vulgaris.

Additionally, an orchid, likely to be common spotted *Dactylorhiza fuchsia*, was recorded within the sidings (Drawing 1; TN2). Confirmation of species identification would need to be carried out during late spring.

[1] Lowe A.J. & Abbott R.J. (2003) A new British species, *Senecio eboracensis* (Asteraceae), another hybrid derivative of S. *vulgaris* L. and *S. squalidus* L. Watsonia 24: 375-388.

4 Discussion and Recommendations

No York groundsel was recorded on Site, additionally, no records were provided by the local record centre.

York groundsel grows in ruderal and brownfield type habitats such as disturbed earth and pavement cracks. It is a relatively new species, first collected in 1979 from the edge of a car park near York Railway Station (Lowe and Abbott 2003)[1] as well as additional records at Lendal Bridge and Dalton Terrace Church.

Population sizes were originally perceived to be large (up to 100 individuals), however city developments and increased weeding was reported to have led to more recent declines.[1]

Due to the results of the survey, there are no further recommendations regarding York groundsel and the proposed Development at York Central.

This report is the result of survey work undertaken in August 2016. This report refers, within the limitations stated, to the condition or proposed Development of the Site at the time of the inspections. Changes in legislation, guidance, best practice, etc. may necessitate a re-assessment/survey. It is also advised that if there is a delay of over a year in undertaking the works, a re-survey may be required. No warranty is given as to the possibility of future changes in the condition of the Site.

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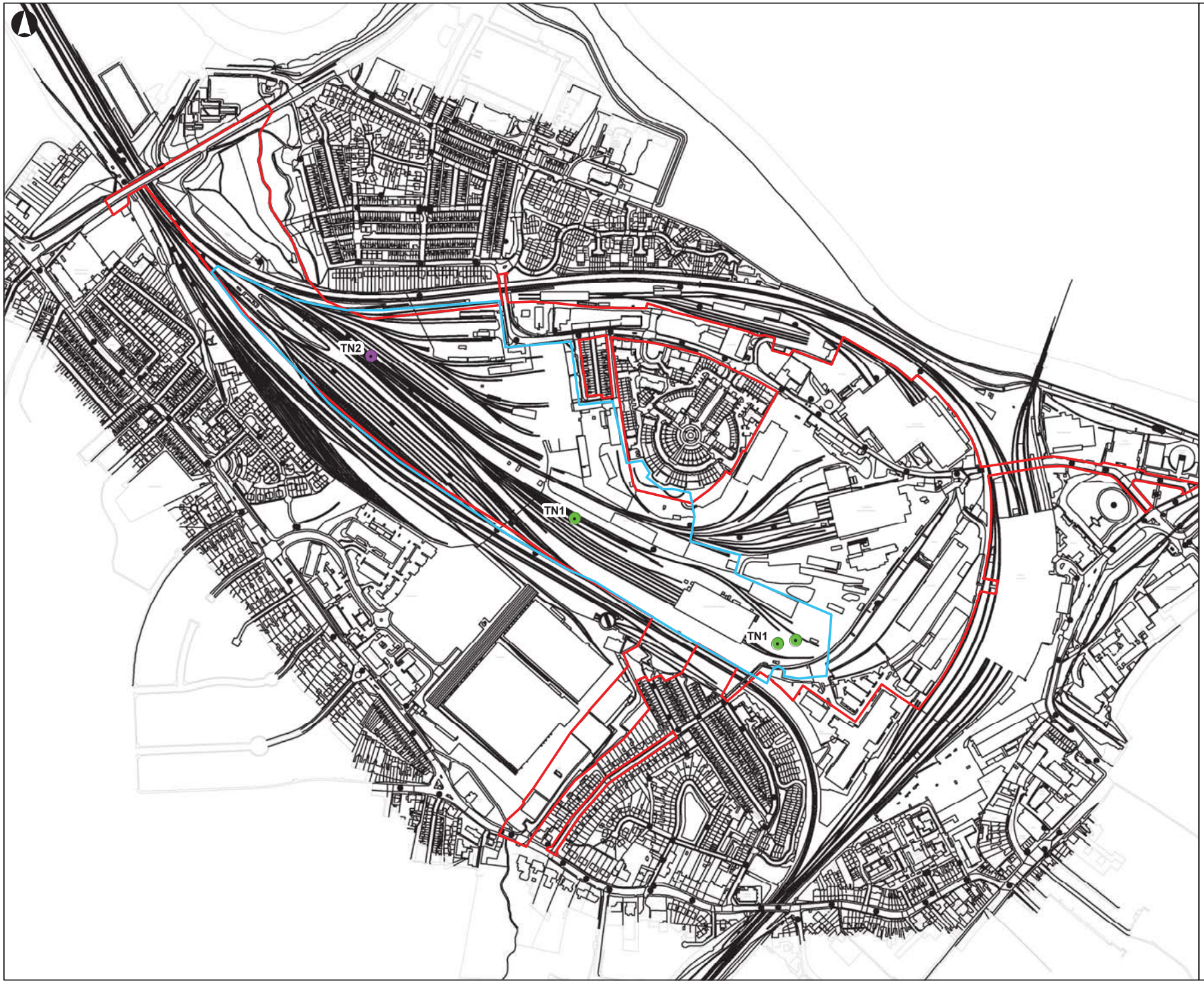
Drawings

A3



Legend

- Redline boundary
- Survey area
- Orchid
- Other groundsel species

Issue	Date	By	Chkd	Appd
P1	01-11-16	YL	RC	RC

Metres
0 75 150 300

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Client
York Central Partnership

Job Title
York Central

York Groundsel Survey Map

Scale at A3
1:5,500

Job No	Drawing Status
250114-00	**Issue**

Drawing No	Issue
Drawing 1	**P1**

MXD Location

Appendix 11E
Bat Report

York centr

Contents

Drawings

Appendices

Executive Summary

Ove Arup and Partners Ltd. (Arup) was commissioned by York Central Partnership to undertake detailed internal and external surveys of 32 buildings, three trees and one bridge identified to have bat roost suitability within the York Central Site. Bat activity surveys were subsequently undertaken in accordance with the results of the external and internal surveys. Potential roost feature surveys were undertaken on the trees.

The bat activity surveys were undertaken during suitable weather conditions following current guidelines. The surveys were undertaken in August and September 2016 and May, June, July and August 2017.

Two buildings were identified to contain a confirmed common pipistrelle day roost. Prior to works which may disturb roosting bats or lead to the loss of their roosting site, a bat licence must be obtained from Natural England.

The potential roost feature surveys identified the trees to have negligible suitability for roosting bats.

The Site was identified to have low to moderate bat activity, with high activity within pockets of foraging habitat to the south of the Site.

1 Introduction

Ove Arup and Partners Ltd. (Arup) was commissioned by York Central Partnership (YCP) to undertake detailed external and internal surveys of 32 buildings, three trees and one bridge identified to have bat roost suitability within the York Central Site (the Site). Additionally, bat activity surveys were scheduled on each building in accordance with the results of the external and internal surveys.

1.1 Survey Context

A Preliminary Ecological Assessment (PEA) was undertaken at the Site in June 2016.[1] The PEA included a Phase 1 Habitat survey and bat roost suitability assessment of all buildings and trees within the Site. Thirty-two buildings were assessed to have bat roost suitability (Drawing 1). It was recommended that a detailed external and internal (where access was permitted/safe to enter and asbestos information) inspections were undertaken of the buildings. This was to confirm the bat roost suitability of the buildings and to inform the bat activity surveys.

In addition, an update of the PEA was undertaken in 2017 which included an area to the north of the Site known as Millennium Green. The bridge at Water End was identified to have low bat roost suitability and three trees were identified to have bat roost suitability; two to have low suitability and one to have moderate suitability (Drawing 2).

Bat activity surveys were undertaken on all buildings confirmed to have bat roost suitability. A potential roost feature survey was undertaken on the trees. Automatic bat detectors were also installed around the Site to monitor bat activity in the local area.

1.2 Report Objectives

The purpose of the external and internal surveys was to confirm the bat roost suitability of each building (low, moderate or high suitability). This subsequently informed the level of bat roost activity surveys required. The purpose of the bat activity surveys was to ascertain the presence or likely absence of bat roosts within the surveyed structures. An assessment of bat usage of the Site as a whole was also included. This report presents the findings of the surveys, identifies whether further survey works are required and recommends enhancement measures as appropriate.

1.3 Report Structure

- Section 2: Methodology;
- Section 3: Results;

[1] Arup (2016) Preliminary Ecological Appraisal, York Central.

- Section 4: Discussion and Recommendations; and
- Section 5: Conclusions.

2 Methodology

2.1 Desk Study

Protected species records and non-statutory designated sites information within a 2 km radius surrounding the Site were obtained from the local records centre (North and East Yorkshire Ecological Data Centre (NEYEDC)) in 2016.

2.2 Field Survey

2.2.1 Internal and External Building Inspections

The internal and external inspections were undertaken in line with current guidelines.[2]

The following bat roost suitability was assigned to each of the buildings and bridge at Water End:

- Negligible bat roost suitability: 2, 3, 4, 7, 8, 13, 14, 15, 17, 18, 28, 29b, 30, 34, 35, 37, 38a, 39, 44, 46, 49, 50, 51 and 52;
- Low bat roost suitability: 1, 6, 9, 23, 25, 26, 27, 29a, 38, 47 and bridge at Water End;
- Moderate bat roost suitability: 5, 10, 11, 12, 16, 18a, 19, 20, 21, 22, 24, 30, 41, 42, 43 and 48; and
- High bat roost suitability: 31, 32, 33, 36, 40 and 45.

Following the internal and external surveys, the following buildings were downgraded or upgraded in terms of bat roost suitability due to a number of bat roost features identified from the surveys:

- Building 9 downgraded from low to negligible bat roost suitability;
- Building 18a upgraded from moderate to high bat roost suitability;
- Building 27 upgraded from low to moderate bat roost suitability;
- Building 19 downgraded from moderate to negligible bat roost suitability;
- Building 22 downgraded from moderate to negligible bat roost suitability;
- Building 26 downgraded from low to negligible bat roost suitability;
- Building 29a downgraded from low to negligible bat roost suitability; and
- Building 42 upgraded from moderate to high bat roost suitability.

Subsequently, the number of bat activity surveys required for each building reflects the results of the internal and external surveys (Drawing 1).

[2] Collins, J. (ed.) (2016) at Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.

2.2.2 Bat Activity Surveys

All dusk emergence/dawn re-entry surveys were undertaken in line with current guidelines.[2]

The internal and external survey inspections informed the bat activity surveys required for each building.

Consequently, a programme of activity surveys was undertaken, in line with bat Conservation trust (BCT)[1] guidelines:

- High suitability – three dusk/dawn emergence/re-entry surveys;
- Moderate suitability – two dusk/dawn emergence/re-entry surveys; and
- Low suitability – one dusk/dawn emergence/re-entry survey.

If a structure was confirmed as a bat roost, a total of three dusk/dawn emergence/re-entry surveys were undertaken.

Bat activity surveys were undertaken in August and September 2016 and June, July and August 2017 under suitable weather conditions (Table 2.1). The dusk emergence surveys began approximately 30 minutes before sunset until two hours after, or, until it was considered that all bats would have emerged. The dawn re-entry surveys were undertaken from approximately two hours before sunrise until sunrise (or 15 minutes after last bat, whichever was the latest). A suitable number of surveyors was utilised to ensure all features of potential were monitored during surveys. All surveyors used bat box duets to identify species during the surveys and all bats heard during the surveys were recorded.

Buildings identified to have high bat roost suitability that were surveyed in 2016 had the third survey undertaken in 2017 due to the time of year that bat activity surveys were started in 2016.

All surveys were undertaken with an experienced ecologist who holds a level 2 (CL18) bat survey licence as supplied by Natural England:

- Belinda Wiggs (Class Licence Registration 2015-15859-CLS-CLS);
- Jonathan Moore (Class Licence Registration 2015-15080-CLS-CLS);
- Jon Goodrick (Class Licence Registration 2015-14117-CLS-CLS);
- Paul Liptrot (Class Licence Registration 2016-23024-CLS-CLS0029);
- Louisa Molloy (Class Licence Registration 2016-22694-CLS-CLS);
- Elizabeth McBride (Class Licence Registration 2017-29301-CLS-CLS); and
- Aran Leaf (Class Licence Registration 2016-26710-CLS-CLS).

The timings and weather conditions of the 2016 surveys are provided in Table 2.1 and 2017 surveys in Table 2.2. Building numbers and location are provided in Drawing 1.

Table 2.1: Bat activity survey timings and weather conditions 2016.

Date	Type of survey	No. of surveyors	Timings	Location	Weather conditions
09/08/16	Dusk	11	Sunset: 20:46 Start: 20:34 End: 22:00	Buildings: 1, 6, 12, 10, 11 and 27	Precipitation: Light rain shower (20:34 – 20:38 (4 mins)) Cloud: 90% Wind: Beaufort: 1 Start Temperature: 13°C
10/08/16	Dawn	11	Sunrise: 05:34 Start: 04:13 End: 05:59	Buildings: 25, 31, 43, 45 and 48	Precipitation: Light Cloud: 100% Wind: Beaufort: 0 Start Temperature: 9°C
24/08/16	Dusk	5	Sunset: 20:13 Start: 19:58 End: 21:50	Buildings: 5, 16, 18a	Precipitation: None Cloud: 90% Wind: Beaufort: 2 Start Temperature: 19°C
06/09/16	Dawn	9	Sunset: 20:13 Start: 19:58 End: 21:50	Buildings: 31, 32, 33, 43, 45, 47 and 48	Precipitation: None Cloud: 90% Wind: Beaufort: 0 Start Temperature: 21°C
07/09/16	Dawn	10	Sunset: 20:13 Start: 19:58 End: 21:50	Buildings: 10, 11, 12, 16, 18a and 27	Precipitation: None Cloud: 85% Wind: Beaufort: 2 Start Temperature: 23°C

Table 2.2: Bat activity survey timings and weather conditions 2017.

Date	Type of survey	No. of surveyors	Timings	Location	Weather conditions
19/06/17	Dusk	7	Sunset: 21:40 Start: 21:25 End: 23:40	Buildings: 21, 31, 45	Precipitation: None Cloud: 5% Wind: Beaufort: 2 Start Temperature: 24°C
20/06/17	Dawn	7	Sunrise: 04:32 Start: 02:32 End: 04:47	Buildings: 18a, 24, 40	Precipitation: None Cloud: 20% Wind: Beaufort: 2 Start Temperature: 18°C
06/07/17	Dusk	4	Sunset: 21:37 Start: 21:22 End: 23:07	Buildings: 20, 42	Precipitation: None Cloud: 90% Wind: Beaufort 0 Start Temperature: 20°C
07/07/17	Dawn	4	Sunrise: 04:42 Start: 02:42 End: 04:42	Buildings: 5, 33	Precipitation: None Cloud: 0% Wind: Beaufort 1 Start Temperature: 16°C

Date	Type of survey	No. of surveyors	Timings	Location	Weather conditions
19/07/17	Dusk	4	Sunset: 21:24 Start: 21:09 End: 22:54	Buildings: 33, 38	Precipitation: None Cloud: 100% Wind: Beaufort 2 Start Temperature: 21°C
20/07/17	Dawn	4	Sunrise: 04:58 Start: 02:29 End: 05:00	Buildings: 32	Precipitation: None Cloud: 80% Wind: Beaufort 2 Start Temperature: 18°C
20/07/17	Dusk	4	Sunset: 21:24 Start: 21:07 End: 22:54	Buildings: 36	Precipitation: None Cloud: 10% Wind: Beaufort 1 Start Temperature: 15°C
21/07/17	Dawn	4	Sunrise: 05:00 Start: 02:57 End: 05:00	Buildings: 41, 42	Precipitation: None Cloud: 60% Wind: Beaufort 1 Start Temperature: 11°C
02/08/17	Dusk	4	Sunset: 21:01 Start: 20:31 End: 22:35	Buildings: 32	Precipitation: Occasional light showers Cloud: 95% Wind: Beaufort 4 Start Temperature: 14°C
03/08/17	Dusk	5	Sunset: 20:59 Start: 20:28 End: 22:28	Buildings: 23, 30, 41	Precipitation: None Cloud: 85% Wind: Beaufort 3 Start Temperature: 15°C
03/08/17	Dawn	4	Sunrise: 05:21 Start: 03:21 End: 05:21	Buildings: 36	Precipitation: None Cloud: 0% Wind: Beaufort 1 Start Temperature: 14°C
04/08/17	Dawn	5	Sunrise: 05:22 Start: 03:22 End: 05:22	Buildings: 40	Precipitation: None Cloud: 90% Wind: Beaufort 3 Start Temperature: 15°C
10/08/17	Dusk	4	Sunset: 20:45 Start: 20:30 End: 22:15	Buildings: 24, 33	Precipitation: None Cloud: 0% Wind: Beaufort 3 Start Temperature: 14°C
11/08/17	Dawn	4	Sunrise: 05:35 Start: 03:54 End: 05:51	Buildings: 20, 21	Precipitation: None Cloud: 0% Wind: Beaufort 2 Start Temperature: 10°C
17/08/17	Dusk	8	Sunset: 20:29 Start: 20:10 End: 22:00	Buildings: 32, 40	Precipitation: None Cloud: 60% Wind: Beaufort 2 Start Temperature: 19°C
18/08/17	Dawn	8	Sunrise: 05:48 Start: 03:55 End: 05:48	Buildings: 30, 36, 42	Precipitation: None Cloud: 5% Wind: Beaufort 2 Start Temperature: 14°C
21/08/17	Dusk	4	Sunset: 20:22 Start: 20:00 End: 21:52	Bridge on Water End	Precipitation: Light drizzle at start of survey Cloud: 100% Wind: Beaufort 0 Start Temperature: 17°C

2.2.3 Potential Roost Feature (PRF) Survey – Trees

The PRF inspection was undertaken in August 2017 in compliance with current guidance [2] .The PRF inspection was undertaken using a ladder. It involved a detailed inspection of PRFs using torches, mirrors and endoscopes in order to further assess their likely suitability for bats. Evidence of bats including droppings, staining and odour was also searched for. These surveys are valuable to prevent unnecessary dusk emergence/dawn return survey work where features appear to be of high suitability from the ground but are actually of limited or no suitability.

The aim of the survey was to reclassify the PRFs identified during the ground level assessment, to determine the presence/likely absence of bats at the time of the survey and to identify the need for future survey and/or mitigation.

The survey was undertaken by an appropriately licensed and experienced ecologist (Louisa Molloy- Natural England Bat Licence Number: 2016-22694-CLS-CLS) which enabled the ecologist to survey bats using artificial light and endoscopes.

3 Results

3.1 Desk Study

The results of the desk study and data provided by NEYEDC are provided in Appendix A. A summary is outlined below.

3.1.1 Statutory Designations

No statutory designations were identified within the Site boundary or adjacent to the Site. Five statutory sites were recorded within the 2 km search buffer surrounding the Site (Table 3.1). None of the sites are designated specifically for bats, however the habitat mosaic will provide a range of foraging opportunities for bats.

Table 3.1: Statutory designated sites recorded within a 2 km buffer of the Site.

Name	Location	Reason for designation
Clifton Ings and Rawcliffe Meadows Site of Special Scientific Interest (SSSI)	330m north	Clifton Ings and Rawcliffe Meadows SSSI is a nationally important site for its species-rich neutral grassland. The site also supports tansy beetle *Chrysolina graminis*, an iridescent green leaf beetle with a highly restricted range. Thought to support the only remaining populations in the British Isles
Hob Moor Local Nature Reserve (LNR)	680m south-west	Unimproved pasture managed to provide habitat for skylark *Alauda arvensis* and meadow pipit *Anthus pratensis*
St Nicholas Fields LNR	1.3km east	This is an ex-landfill site which has recovering biodiversity with various habitats including young woodland, scrub, meadow, rough grassland, coppice and a stream. The stream is known to support water vole
Fulford Ings SSSI	1.3km south-east	Fulford Ings is an important example of flood plain mire
Clifton Backies LNR	1.7km north-east	Species rich meadow and scrub

3.1.2 Non-Statutory Designations

Two non-statutory designated sites, Sites of Local Interest (SLI), were identified within and adjacent to the Site boundary. York Central SLI located within the Site and Holgate Park Drive SLI located adjacent to the Site.
Nineteen Sites of Importance for Nature Conservation (SINC) were identified within the 2 km search radius surrounding the Site (Table 3.2). Clifton Bridge is the only SINC specifically designated as a bat roosting resource. However, as with the statutory sites, the habitat mosaic of the non-statutory sites will provide a range of foraging opportunities for bats.

Table 3.2: Non-statutory sites located within 2km radius.

Name and site code	Location	Reason for designation
York Central – Site of Local Interest	On-site	Remnant old meadow containing long established ant hills
Holgate Park Drive – Site of Local Interest	Adjacent to Site	Re-establishing grassland with areas of scrub
Holgate Millennium Green (103) - SINC	Approx. 0.1km north of the Site	Urban greenspace managed for Nature Conservation under Criteria Gr1, the presence of Mg4 grassland
Severus Hill Reservoir Basin (35) – SINC	Approx. 0.4km south-west of the Site	The outer slopes of the reservoir are very steep and dominated by dense thorn scrub, mainly hawthorn *Crataegus monogyna*, with some blackthorn *Prunus spinosa*, ash *Fraxinus excelsior* and sycamore *Acer pseudoplatanus*. The calcicolous grassland within the basin appears to be much more diverse. The grassland is mostly an open and quite flower-rich type of false oat-grass *Arrhenatherum elatius*, sward but with locally-frequent upright brome *Bromopsis erecta*
Clifton Bridge (13) – SINC	Approx. 0.5km north of the Site	Clifton Bridge houses important nursery colonies of noctule, Daubenton's and Pipistrelle Bats which occupy cavities between the pillars and the underside of the bridge. This site is designated for its mammal interest under Criteria M1b and M1c
Clifton Ings (14) – SINC	Approx. 0.6km north of the Site.	Clifton Ings is designated as a Site of Importance for Nature Conservation as an example of species-rich flood meadow grassland under Criteria Gr1, Gr4, and Sw1
Rawcliffe Meadows (31) – SINC	Approx. 0.6km north of the Site	Most of the site is floodplain hay meadow, with the richest grassland occurring towards the southern end. Great burnet *Sanguisorba officinalis*, meadowsweet *Filipendula ulmaria*, meadow vetchling *Lathyrus pratensis*, meadow buttercup *Ranunculus acris* and common sorrel *Rumex acetosa*, are at least locally-frequent with grasses including meadow foxtail *Alopecurus pratensis*, Yorkshire fog *Holcus lanatus*, meadow fescue *Festuca pratensis* and, in small amounts, meadow barley *Hordeum secalinum*. However, there are also species-poor stands dominated by creeping bent *Agrostis stolonifera* and creeping buttercup *Ranunculus repens*
Extn to Hob Moor Community School (198) – SINC	Approx. 0.9km south of the Site.	Hob moor is designated as a Site of Importance for Nature Conservation as an example of old permanent pasture habitat with areas of MG5 grassland, semi-natural acidic grassland and scrub
Hob Moor (20) – SINC	Approx. 0.9km south of the Site	The land is unimproved pasture which is traditionally grazed over the summer. This has ensured that a special floristic habitat thrives and provides valuable breeding habitat for skylark and meadow pipit, both of which are endangered species in the United Kingdom
R. Ouse (63) – SINC	Approx. 1km south-east of the Site.	The River Ouse is designated as a Site of Importance for Nature Conservation under Criteria F2 for migratory fish species
Poppleton Glassworks (5-30) (202) – SINC	Approx. 1km north-west of the Site.	No information available

Name and site code	Location	Reason for designation
Fishpond Wood (104) – SINC	Approx. 1.2km west of the Site.	Fishponds Wood is designated as a Site of Importance for Nature Conservation primarily for its invertebrate interest under Guideline H2 for the presence of a rare species in Yorkshire. However, the spring communities present are also of interest. Such communities have become increasingly scarce as a result of extensive habitat loss through intensification of farming and forestry and urban development
Danebury Crt (106) – SINC	Approx. 1.2km west of the Site.	The site is designated as a Site of Importance for Nature Conservation under Guideline Gr1, the presence of MG5 grassland over 0.1ha
British Sugar Sidings (203) – SINC	Approx. 1.3km north-west of the Site.	No information available
Bachelor Hill (4) – SINC	Approx. 1.8km west of the Site	Grassy slopes and a hill top of pine trees supporting a large diversity of invertebrates
Poppleton Ings South – Ditch (217) – SINC	Approx. 1.8km north-east of the Site.	No information available
Cherry Lane (264) – SINC	Approx. 1.9km south of the Site.	Cherry Lane hedgerows are designated as a Site of Interest for Nature Conservation under Guideline Gr7a (Species rich hedgerows)
Clifton Backies (12) – SINC	Approx. 2km north-east of the Site	In recent memory the site was part of the former Clifton Airfield but after its last use in the Berlin Airlift in the late 1940's, it was allowed to return to nature. Contains established grasslands
Knavesmire Stables Meadow (23) – SINC	Approx. 2km south of the Site	The reserve supports a flora characteristic of species-rich neutral grassland. Great burnet *Sanguisora officinalis*. Pignut *Conopodium majus*, betony *Stachys officinalis*, common birdsfoot trefoil *Lotus corniculatus*, common sorrel *Rumex acetosa*, meadow buttercup *Ranunculus acris* and bulbous buttercup *Rumex bulbosus* are abundant, with a variety of fine-leaved grasses. Associated insects include butterflies such as the Common Blue and abundant burnet moths
Rawcliffe Ings Dyke (32) – SINC	Approx. 2km north-west of the Site	The hedgerow extending north along the Ings Dyke is very species-rich, containing purging buckthorn *Rhamnus catharticus*, hazel *Corylus avellana*, guelder rose *Viburnum opulus* and red currant *Ribes rubrum*, amongst more common trees and shrubs. Plants associated with ditch banks include tansy *Tanacetum vulgare*, teasel *Dipsacus fullonum*, creeping jenny *Lysimachia nummularia* and field garlic *Allium oleraceum*
Rawcliffe Lake and Grasslands (261) – SINC	Approx. 2km north of the Site.	The Rawcliffe Lake and grasslands is designated as a Site of Importance for Nature Conservation for its sps rich grassland sward under Guideline Gr1 and Gr4 and as an area of standing water with a reasonably diverse emergent flora under Guideline Mh1 for mosaic habitats

3.1.3 Bat Records

Records provided by NEYEDC included records of Daubentons *Myotis daubentonii*, noctule *Nyctalus noctula*, whiskered *Myotis mystacinus*, common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *Pipistrellus pygmaeus*.

A summary of bat records is provided within Table 3.3 with full details provided in Appendix A.

Table 3.3: Bat records within 2km of the Site.

Species	Closes record direction from Site	Closest records approximate distance from Site	Number of records within 2km
Daubenton's Bat *Myotis daubentonii*	North	0.2km	6
Unidentified Myotis bat	East	1.5km	2
Whiskered Bat *Myotis mystacinus*	Unknown	Unknown	1
Noctule Bat *Nyctalus noctula*	North	0.2km	28
Unidentified Pipistrelle bat	West	0.06km	17
Common Pipistrelle *Pipistrellus pipistrellus*	Within the Site	Within the Site	113
Soprano pipistrelle *Pipistrellus pygmaeus*	Within the Site	Within the Site	4
Unidentified Vespertilionidae	West	0.4km	11

3.2 Field Survey

3.2.1 Internal and External Building Inspections

Further external and internal inspections were undertaken where possible. Table 3.4 details results of surveys and any variation to the original bat roost suitability assessment.

Table 3.4: Results of internal and external building inspections of buildings identified as having bat roost suitability.

Building	External inspection results	Internal inspection results	Any change in bat roost suitability from initial assessment	Bat roost suitability
1	No evidence of bats found on exterior of building. Southern end has greatest potential due to warped metal soffit, but no evidence of bats on exterior of wall or floor.	Suspended ceiling, but ceiling tiles were not accessible to enable an inspection.	No	Low
5	Two storey timber building with pitched roof. Thin slate roof tiles, concrete ridge tiles and windows boarded up. Potential access points around the windows and front door where the boards	No roof void and layer of dust on all surfaces. No droppings found. No access to the rear shed on the western end – bat surveys to	No	Moderate

Building	External inspection results	Internal inspection results	Any change in bat roost suitability from initial assessment	Bat roost suitability
	have lifted around them. Eastern end of building timber has been lost from the gable. Security light present but unsure whether it is working. Mortar lost from ridge tile and occasional tile lifted. The vent on the northern side could provide access. No bat droppings identified around the building. Building surrounded by elder, birch and white beam.	concentrate on this area.		
6	Warehouse with brick lower and metal upper and roof. There are gaps where metal and brick meet but pot likely to be low for bats.	No access to roof void.	No	Low
9	Single storey substation. Flat roof. No evidence of bats.	Flat roof suspended ceiling, covered in felt. No signs of bats.	No	Low
10	Two storey, red brick, disused building. Tiled roof. No evidence of bats.	Ground floor no light, no evidence of droppings or locations for bats to roost. First floor well lit from natural light, no evidence of bat droppings. Loft hatch too high to access. Loft hatch has lifted and internal surface lined with felt, therefore potential for bats to roost between felt and tiles. No evidence of bats below hatch entrance.	No	Moderate
11	Single storey flat roof building. No evidence of bats.	Suspended ceiling, east side well sealed in void, but looks more open on west side. Void too small to look inside for signs of presence.	No	Moderate
12	Two storey building on the east side with large warehouse building attached to the west. No evidence of bats.	No access to roof void as ceiling too high. Skylights on the western end of the roof but do not extend into roof void, therefore roof void space should still be	No	Moderate

Building	External inspection results	Internal inspection results	Any change in bat roost suitability from initial assessment	Bat roost suitability
		dark and suitable for bats.		
16	One storey building, flat roof with felt which is fitted tightly. Barge board set back from wall on east and west side, but does not give bats access to roof void. No evidence of bats. Survey constrained by window guards on both east and west side which were inspected.	Currently occupied building for office workers. No roof void.	No	Moderate
18a	Large, high ceiling warehouse with pitched roof and no roof void.	Main building has glass roofing and is well lit on the inside. No areas for bats to roost in. Metal/wooden dividing wall between rooms, one arch where brick has crumbled and has potential for roosting.	Yes. Upgraded from moderate to high bat roost suitability.	High
19	Red brick one storey office building with tiled roof. Roof is in good condition, no obvious gaps or features for access.	Internal space utilised as office.	Yes. From moderate to negligible bat roost suitability.	Negligible
20	Slipped/ missing roof tiles on north western corner and on south-east corner. Rest is in good condition. Gutter board all tight to wall.	Accessed loft hatch, bitumen lined roof, all in good condition, ladders did not fit to completely enter.	No	Moderate
21	Red brick warehouse building. Slipped slates, access at eaves, fascia gap.	Internal no felt or void, joists straight onto slates, potential areas where pips may tuck up inside but quite light due to windows. Pigeons inside but not major.	No	Moderate
22	Red brick building with corrugated metal roof. Window open at eastern end, potentially draughty. Gap in wooden door on south side. Internally lit due to access points and glass panels in roof. Cannot see any suitable roosting features, wooden beams are stood off corrugated sheets.	No internal access but large gap at eastern end allowed surveyors to look inside up towards roof.	Yes. From moderate to negligible bat roost suitability.	Negligible
23	Red brick warehouse building with corrugated	Light and warm inside. Some of the	No	Low

Building	External inspection results	Internal inspection results	Any change in bat roost suitability from initial assessment	Bat roost suitability
	metal/asbestos roof plus some plastic sheeting letting light in. Southern end of building is a more recent extension, gutter boarding present but tight to wall. At the south-east corner the fascia is coming loose and there is a gap at the apex too.	smaller storage areas have flat boarded roofs then up to the corrugated sheeting. No evidence of bats internally.		
24	One storey red brick outbuilding, gaps around glass where bats could tuck up under slates.	Evidence of pigeon inside, some slates lifted also. Suitable wooden joists inside and gaps at eaves for entry.	No	Moderate
25	Some cracks in bricks and mortar but cobwebs observed within these holes concluding they are not currently used. No evidence of bats.	Flat roof with parapet, no cavity just three bricks. No evidence of bats and no access points.	No	Low
26	Red brick, corrugated roof, pretty much flat, very slight pitch. Could not see any features suitable for use by bats or any access points.	Interior of roof has asbestos and has been sprayed with foam and is filled with insulation. No evidence of bats internally.	Yes. From low to negligible	Negligible
27	No evidence of bats.	Building divided into four quarters. The high voltage room is completely sealed, dropped roof with roof void. Loft hatch to roof void but inaccessible. No evidence of bats in this room. North-west facing area covered in pigeon guano therefore did not enter. No dropped ceiling.	Yes. Upgraded from low to moderate bat roost suitability.	Moderate

Building	External inspection results	Internal inspection results	Any change in bat roost suitability from initial assessment	Bat roost suitability
29a	Two storey brick building with flat and corrugated metal pitched roof sections. Typically in good condition. Windows boarded up but close fitting.	No internal access.	Yes. From low to negligible bat roost suitability	Negligible
30	Single storey brick building with a single pitch covered in slates. Potential for bats to enter where roof meets brick wall.	No internal access.	No	Moderate
31	Two storey brick building connecting to a warehouse, made of brick. House has pitched roof with slate ridge made of felt. Disused. Lifted tiles, gaps around windows, lifted felt, limited vegetation surrounding the building. High bat potential. Large number of access points into the warehouse building, due to failed soffits and lifted roof overhang. Roof consists of corrugated concrete.	Survey not possible due to dilapidation of building.	No	High
32	Very complex roof to a two and single storey building. Slate and clay tile roof, in need of repair.	Southern end contains shutter style door and used for storage of cars.	No	High
33	Brick building with pitched, hipped roof with slates. Mortar lost from ridge tiles, therefore several potential access points.	Building used as office space.	No	High

Building	External inspection results	Internal inspection results	Any change in bat roost suitability from initial assessment	Bat roost suitability
36	Brick building with pitched roof in poor state of repair. Multiple flat roofed building. Adjacent to trees.	No access internally.	No	High
38	Large warehouse conversion into office space. Soffit box with access points on north and south of building	No roof void in northern end. Southern end has roof void but very light due to corrugated plastic and metal sheeting. No felt. No slates or tiles.	No	Low
40	Most of gymnasium is straight to timber boards then felt then roof.	No internal potential, however some gaps at top of brickwork for crevice dwellers. At eastern end in ping pong rooms there is a roof void, can see through to timbers, ceilings too tall for ladders. This end also has slate pitched roof with some lifted tiles. High at east end, low rest of building.	No	High/Low
41	Daym gym and pigeon loft. Gym end west negligible, flat roof. Eastern end moderate.	No access inside eastern end of building.	No	Moderate
42	Gaps at eaves around soffit can see into building. Also some lifted roof tiles.	Band room, loft void, musician reported hearing things in the roof in the evening.	Yes. From moderate to high bat roost suitability.	High
43	Red brick building with cement cladding on end of roof. Pitched slated roof. Slipped slates on east side. Roof in better condition on the west side. Bricks crumbling on east side. Adjacent building with timber cladding on north side and slate roof in good condition. Vented posts may provide access. Also potential access where roof adjoins timber cladding wall on the northern end. No evidence of bats. Building surrounded by buddleja and silver birch.	Survey not possible.	No	Moderate

Building	External inspection results	Internal inspection results	Any change in bat roost suitability from initial assessment	Bat roost suitability
44	Brick substation with flat felt roof. Small gaps in mortar between a couple of bricks but covered in cobwebs. Wooden fascia boards abut the roof which are tight to the bricks. No evidence of bats.	Small substation with no void or access for bats.	No	Negligible
45	Three storey brick building adjacent to larger two storey warehouse style building. Taller building contains pitched roof with few slates that have lifted slightly on the southern side. Warehouse building has pitched corrugated metal roof. A few bricks missing in the walls allowing access into the building,	Taller section of building contain loft hatch which was too high to access. Roof felt behind roof tiles and large roof void. No evidence of bats. Warehouse building is damp and fairly well lit. No evidence of bats.	No	High
46	Prefab building with timber soffit box, flat felt roof and open wooden doors. Glass window lines the south and east of the building. No evidence of bats.	No roosting opportunities.	No	Negligible
47	Brick building with pitched slate roof. Wooden fascia tight again top of walls. Few slates missing on roof and ridge tiles missing. No roof void. Two glass windows and wooden door with hole in allowing access. No roof void.	No internal access.	No	Low
48	Red brick building with corrugated metal roof and metal fascia. North-west fascia come away slightly providing access to the soffit box. A few missing slates in south-west bottom corner, otherwise intact. Some brick eroding around pipes that are sticking out from the north side, but holes pinch in with no further access. Timber slates on roof.	No sign of access from outside. Heavily used building with lights, plus skylights throughout roof. Cold, brick building adjoining to the east has sloped roof with glass skylight and slates.	No	Moderate

3.2.2 Activity Survey Results

The most frequent bat species documented during the activity surveys was common pipistrelle. Noctule, soprano pipistrelle and *Myotis sp.* were also

recorded. Building 31 was identified as a confirmed common pipistrelle roost and building 18a was identified as an unconfirmed[3] common pipistrelle roosting site. A summary of the activity survey results are presented in Table 3.5 and Table 3.6, with full results in Appendix B.

Table 3.5: Results of the bat activity surveys during 2016.

Date	Location	Sunset/sunrise time	Species recorded	Results
09/08/16	Buildings: 6, 10, 11, 12, 27	Sunset: 20:46	Common pipistrelle	First bat: 21:36 Activity: Low activity. Four instances of commuting or foraging recorded identified near building 10, 11 and 12. Roosts identified: No
09/08/16	Building: 1	Sunset: 20:46	None	First bat: N/A Activity: No bats recorded Roosts identified: No
10/08/16	Buildings: 43, 45, 48	Sunrise: 05:34	Common pipistrelle	Last bat: 05:10 Activity: Low activity. Five instances of commuting or foraging were recorded around building 43. Roosts identified: No
10/08/16	Buildings: 25, 31	Sunrise: 05:34	Common pipistrelle	Last bat: 04:58 Activity: Low levels of commuting recorded. Roosts identified: No
24/08/16	Buildings: 5, 16, 18a	Sunset: 20:13	Common pipistrelle	First bat: 20:34 Activity: Low activity of commuting and foraging across the buildings. A possible roost identified in the north corner of building 18a. Roosts identified: **Unconfirmed**
06/09/16	Buildings: 31	Sunset: 19:42	Common pipistrelle	First bat: 20:05 Activity: Moderate levels of foraging and commuting recorded around the building. An unconfirmed roost from west side of single storey. Roosts identified: **Yes**
06/09/16	Buildings: 43, 45, 47, 48	Sunset: 19:42	Common pipistrelle, soprano pipistrelle, noctule	First bat: 20:05 Activity: Moderate levels of foraging and commuting recorded around the buildings. Roosts identified: No
07/09/16	Buildings: 11, 12 and 27	Sunset: 19:39	Pipistrelle species	First bat: 19:57 Activity: Low levels of commuting activity recorded around the buildings. Roosts identified: No
07/09/16	Buildings: 16, 18a	Sunset: 19:39	Common pipistrelle, Myotis species	First bat: 19:57

[3] Undetermined egress point from the building and bats seen flying adjacent to the building.

Date	Location	Sunset/sunrise time	Species recorded	Results
				Activity: Low levels of foraging activity recorded around the buildings. Roosts identified: No
19/06/17	Buildings: B21, B31, B45	Sunset: 21:40	Noctule, Common pipistrelle	First bat: 22.07 Activity: Foraging activity recorded around building B31 Roosts identified: No
20/06/17	Buildings: 18a, B24, B40	Sunrise: 04:32	Common pipistrelle	First bat: 19:57 Activity: Low levels of foraging and commuting activity recorded around buildings B40 and 18a. Roosts identified: No

Table 3.6: Results of the bat activity surveys during 2017.

Date	Location	Sunset/sunrise time	Species recorded	Results
19/06/17	Buildings: 21, 31, 45	Sunset: 21:40	Common pipistrelle, noctule	First bat: 22:07 Activity: Moderate foraging activity recorded around building 31 and low commuting and foraging activity recorded around building 45. No bat activity recorded at building 21. Roosts identified: No
20/06/17	Buildings: 18a, 24, 40	Sunrise: 04:32	Common pipistrelle	First bat: 03:08 Activity: Low foraging activity recorded around building 18a and low commuting activity recorded around building 40. No bat activity recorded at building 24. Roosts identified: No
06/07/17	Buildings: 20, 42	Sunset: 21:37	Common pipistrelle	First bat: 22:02 Activity: Low activity. Two instances of foraging and commuting recorded at building 20 and foraging activity identified at building 42. Roosts identified: No
07/07/17	Buildings: 5, 33	Sunrise: 04:42	Common pipistrelle	First bat: 02:57 Activity: Low activity at building 33 with foraging and commuting recorded. No bat activity at building 5. Roosts identified: No.
19/07/17	Buildings: 33, 38	Sunset: 21:24	Common pipistrelle	First bat: 21:24 Activity: Low activity. One instance of commuting recorded at both building 33 and 38. Roosts identified: No

Date	Location	Sunset/sunrise time	Species recorded	Results
20/07/17	Buildings: 32	Sunrise: 04:58	Common pipistrelle	First bat: 03:00 Activity: Moderate levels of foraging and commuting across the building. Roosts identified: No
20/07/17	Buildings: 36	Sunset: 21:24	None	First bat: N/A Activity: No bats recorded Roosts identified: No
21/07/17	Buildings: 41, 42	Sunrise: 05:00	Common pipistrelle	First bat: 03:00 Activity: Low activity. One instance of commuting bat recorded. Roosts identified: Yes – common pipistrelle roost identified within building 40 (adjacent to buildings being surveyed)
02/08/17	Buildings: 32	Sunset: 21:01	Common pipistrelle, noctule	First bat: 21:25 Activity: Moderate levels of foraging and commuting across the building. Roosts identified: No
03/08/17	Buildings: 23, 30, 41	Sunset: 20:59	Common pipistrelle	First bat: 21:16 Activity: Low levels of commuting and foraging activity recorded at building 41. No bat activity recorded at building 23 and 30. Roosts identified: No*
03/08/17	Buildings: 36	Sunrise: 05:21	Common pipistrelle, noctule	First bat: 03:26 Activity: Low levels of foraging and commuting activity recorded at building 36. Roosts identified:
04/08/17	Buildings: 40	Sunrise: 05:22	None	First bat: N/A Activity: None Roosts identified: No
10/08/17	Buildings: 24, 33	Sunset: 20:45	Common pipistrelle	First bat: Activity: Low commuting and foraging activity recorded at building 33. No bat activity recorded at building 24. Roosts identified:
11/08/17	Buildings: 20, 21	Sunrise: 05:35	Noctule	First bat: 04:30 Activity: Low activity. One record of commuting bat at building 20. No bat activity recorded at building 21. Roosts identified:
17/08/17	Buildings: 32, 40	Sunset: 20:29	Common pipistrelle, noctule	First bat: 20:52 Activity: Moderate levels of foraging and commuting recorded at building 32. Low levels of foraging and commuting recorded at building 40.

Date	Location	Sunset/sunrise time	Species recorded	Results
				Roosts identified: No
18/08/17	Buildings: 30, 36, 42	Sunrise: 05:48	Common pipistrelle	First bat: 04:27 Activity: Low levels of foraging and commuting activity recorded at building 42 with two instances recorded. No bat activity recorded at building 30 and 36. Roosts identified: No
21/08/17	Bridge on Water End	Sunset: 20:22	Common pipistrelle, noctule	First bat: 20:43 Activity: Moderate levels of commuting and foraging activity recorded. Roosts identified: No

** A single bat dropping was identified on a concrete shelf below the fascia of building 23, however, no roosts or bat activity identified during the survey undertaken. The correct number of surveys were undertaken of the building and no bat roosts were identified. Therefore, it is concluded that the building contains no confirmed bat roosts.*

3.2.3 Automated Bat Detector Results

A summary of the results collected on the automated detector surveys are presented within Tables Table 3.7 – Table 3.16.

Activity at most locations was deemed to be low, with a low diversity of bat species recorded at all locations. However, activity at Location 5 and Location 9 (Drawing 1) were deemed to be moderate and high, respectively. It is considered that the Site is used predominantly for commuting, with occasional foraging areas. The species most frequently recorded across the locations was common pipistrelle. Noctule were recorded at Location 5 and 9 (Drawing 1) within the Network Rail Holgate Depot. Soprano pipistrelle were recorded in half of the locations.

Location 5 (Drawing 1) recorded the highest total number of common pipistrelle with moderate activity levels logged. Four of the five nights recorded over 90 passes. The activity level recorded suggests foraging behaviour due to the close time intervals recorded between registrations. The calls were recorded approximately 30 minutes after sunset and during the first hours of the evening. This also suggests that bats are utilising the habitat for foraging and are commuting from roost locations off-site, based on the times at which passes have been recorded.

Location 9 (Drawing 1) was placed in a similar location to Location 5 further north of the wooded area, two months later. A low number of common pipistrelle were recorded. However a high number of noctule passes were recorded on two of the nights, with over 150 passes recorded. The activity recorded suggests foraging behaviour due to the close time intervals recorded between registrations. The calls were recorded over one hour after sunset for approximately three hours. This also

suggests that bats are utilising the habitat for foraging and are commuting from roost locations off-site, based on the times at which passes have been recorded.

A moderate number of common pipistrelle was recorded on one night at Location 7 (Drawing 1). However, records for the other nights and activity in similar locations (Location 1, Location 2 and Location 3 Drawing 1) provided no records or low levels of activity for all bat species. The weather conditions were suitable for foraging on these other days and suggests that this location is used as an occasional foraging resource for common pipistrelle.

A high level of noise was recorded at Location 2 (Drawing 1) which may have reduced the detection of bats at this location. However records of activity within locations surrounding Location 2 with similar habitat (Location 1 and Location 3 Drawing 1), were found to have low activity, with the exception of Location 7 (Drawing 1), with one night of moderate common pipistrelle activity.

Table 3.7: Bat automated detector results Location 1.

	18/08/16	**19/08/16**	**20/08/16**	**21/08/16**	**22/08/16**
	No records	No records	No records	No records	No records

Table 3.8: Bat automated detector results Location 2.

	18/08/16	**19/08/16**	**20/08/16**	**21/08/16**	**22/08/16**
Common pipistrelle	1	1	4	9	3
Soprano pipistrelle	No records	No records	No records	No records	No records
Myotis species	No records	No records	No records	No records	No records
Noctule	No records	No records	No records	No records	No records

Table 3.9: Bat automated detector results Location 3.

	14/09/16	**15/09/16**	**16/09/16**	**17/09/16**	**18/09/16**
Common pipistrelle	No records	17	14	13	6
Soprano pipistrelle	No records	3	1	No records	No records
Myotis species	No records	1	No records	No records	No records
Noctule	No records	No records	No records	No records	No records

Table 3.10: Bat automated detector results Location 4.

	14/09/16	**15/09/16**	**16/09/16**	**17/09/16**	**18/09/16**
Common pipistrelle	No records	30	2	2	No records
Soprano pipistrelle	No records	2	No records	No records	1
Myotis species	No records	No records	No records	No records	No records
Noctule	No records	No records	No records	No records	No records

Table 3.11: Bat automated detector results Location 5.

	03/05/17	**04/05/17**	**05/05/17**	**06/05/17**	**07/05/17**
Common pipistrelle	93	117	182	122	39
Soprano pipistrelle	1	4	1	No records	No records
Myotis species	No records	No records	2	No records	No records
Noctule	No records	No records	No records	No records	No records

Table 3.12: Bat automated detector results Location 6.

	03/05/17	**04/05/17**	**05/05/17**	**06/05/17**	**07/05/17**
Common pipistrelle	40	28	8	12	2
Soprano pipistrelle	1	3	1	2	No records

	03/05/17	04/05/17	05/05/17	06/05/17	07/05/17
Myotis species	No records	No records	No records	No records	No records
Noctule	No records	No records	No records	No records	No records

Table 3.13: Bat automated detector results Location 7.

	24/06/17	25/06/17	26/06/17	28/06/17	29/06/17
Common pipistrelle	20	3	2	101	10
Soprano pipistrelle	No records	No records	No records	No records	No records
Myotis species	No records	No records	No records	No records	No records
Noctule	No records	No records	No records	No records	No records

Table 3.14: Bat automated detector results Location 8.

	24/06/17	25/06/17	26/06/17	28/06/17	29/06/17
Common pipistrelle	4	5	No records	No records	2
Soprano pipistrelle	No records	No records	No records	No records	No records
Myotis species	No records	No records	No records	No records	No records
Noctule	No records	No records	1	1	No records

Table 3.15: Bat automated detector results Location 9.

	21/07/17	22/07/17	23/07/17	24/07/17	25/07/17
Common pipistrelle	19	27	1	2	32
Soprano pipistrelle	No records	No records	No records	No records	No records
Myotis species	No records	No records	No records	No records	No records
Noctule	192	9	18	7	177

Table 3.16: Bat automated detector results Location 10.

	21/07/17	22/07/17	23/07/17	24/07/17	25/07/17
Common pipistrelle	36	2	6	12	11
Soprano pipistrelle	No records	No records	No records	2	No records
Myotis species	No records	No records	No records	No records	No records
Noctule	No records	No records	No records	No records	No records

3.2.4 PRF Survey – Trees

A summary of the results of the PRF survey on the three trees is summarised in Table 3.17.

Table 3.17: Summary of results from the PRF Survey.

Target note number (Drawing 2) and tree species	Description and level of bat roost suitability
TN6 – Salix species	Despite ivy cover on the tree being dense, tree is juvenile and has very slender stems so rarely creates a cavity between the ivy stem and the trunk large enough for a bat to roost within. Some peeling bark was noted on the south facing limb but the opening points upwards rendering it open to the elements and unsuitable for roosting. No evidence of roosting bats was observed during the inspection. Negligible suitability for supporting roosting bats.
TN7 – Salix species	The PRF identified included a hole into the tree approximately 3cm x 1.5cm and

Target note number (Drawing 2) and tree species	Description and level of bat roost suitability
	approximately 1.2m above the ground. An endoscope was used to inspect the hole and there is a large hollow section within the trunk. However, no evidence of roosting bats was found internally or externally. No other PRFs were present on the tree. Negligible suitability for supporting roosting bats.
TN8 – Salix species	The PRFs identified included rot hole and crevices within the tree. All of the PRFs identified were found to either be too shallow or too open to the elements to be suitable for roosting bats. Most PRFs were covered in cobwebs. A wood mouse *Apodemus sylvaticus,* was present within a hole in the tree, though this hole was cobwebbed. A disused woven birds nest was also present near to the base of the trunk. Negligible suitability for supporting roosting bats**.**

4 Discussion and Recommendations

4.1 Bat Roosts

The 2016 dusk emergence/dawn return surveys identified building 31 as a confirmed common pipistrelle day roost and building 18a was an unconfirmed[3] common pipistrelle roosts (Table 3.5). A third final survey was undertaken on building 31 and 18a in 2017 and no bat roosts were identified during these surveys (Table 3.6). The 2017 dusk emergence / dawn return surveys identified building 40 as a confirmed common pipistrelle day roost (Table 3.6).

The bat activity recorded at building 18a was low and no further evidence of roosting bats was recorded at this building. It is therefore concluded that the building was not being used as a bat roost at the time of surveys.

The bat dropping identified on a concrete shelf on the fascia below building 23 was considered in combination with the bat activity surveys and automated recorders. The building was identified as having low bat roost suitability. During the bat activity survey no bat roosts or bat activity was recorded. In addition, the bat automated surveys in Location 4 (Table 3.10) recorded low activity. Therefore it is concluded that the building does not contain confirm bat roosts.

Building 31 and building 40 were confirmed as common pipistrelle day roosts. The damage, destruction or disturbance of bat roosts is an offence under the Conservation of Habitats and Species Regulation 2010 (as amended) without a European Protected Species (EPS) licence from Natural England.

Consequently prior to works that may disturb roosting bats or lead to the loss of their roosting site, a bat licence must be obtained from Natural England. A licence takes 30 working days to process from submission of all relevant information. To obtain a licence, the survey data needs to be up to date (collected in the last bat active season May-September) and suitable mitigation needs to be provided to compensate for the impacts on the bats. Planning permission is required in advance of the submission of a licence application to Natural England.

The licensable works would involve the exclusion of bats from roosts and potential roost features within the identified buildings. These works are restricted to outside the period of most sensitivity to bats i.e. the maternity and hibernation seasons. Therefore exclusion works must be undertaken within either:

- Spring (end of March to end of April – dependent on suitable weather conditions where temperatures are above 5°c) or;
- Autumn (end of September to early November – dependent on suitable weather conditions where temperatures are above 5°c).

The bat licence would need to include the provision of mitigation for the loss of confirmed roosts. The mitigation would look to replace roosting opportunities within the buildings identified for demolition or disturbance, for example the installation of bat boxes or bat slates. The mitigation should be put in place prior to the exclusion works commencing to provide roosts for bats to move into.

4.2 Bat Activity

The bat activity and automated surveys identified that the highest level of bat activity recorded include building 31, 32 and the Network Rail Holgate Depot area to the south (Drawing 1; Location 5, Location 9 and buildings 43, 44, 45 and 46).

The Network Rail Holgate Depot area includes stands of trees creating a small pocket of woodland. Building 31 is surrounded by hardstanding and a small public park to the north. Foraging and commuting activity was recorded surrounding the buildings and vegetation within these areas.

The most frequent species recorded was common pipistrelle, followed by soprano pipistrelle, noctule and *Myotis sp.* Moderate common pipistrelle activity was recorded at Location 5 and Location 7 (Drawing 1). High activity levels of noctule were recorded within the Network Rail Holgate Depot area to the south. This species was not recorded within the central area of the Site. Two records of single *Myotis sp*. were recorded within Location 2 (Drawing 1), suggesting that they were commuting rather than foraging.

The survey data demonstrate high activity in the Network Rail Holgate Depot area and moderate to low activity across the wider Site. Records of bat activity were identified to occur a minimum of 30 minutes after sunset. This suggests that the patches of suitable habitat are utilised for foraging. Additionally, the wider Site is used predominantly as a corridor to higher quality sites such as the River Ouse to the north.

4.3 PRF Survey

The results of the PRF surveys recorded no evidence of bats roosting within the trees. It was determined that the PRFs for TN6 and TN8 (Drawing 2) were negligible for suitable roosting features. The PRF for TN7 (Drawing 2) was identified as a hole extending up into the tree. However, no evidence of bats roosting was recorded. Therefore, all trees were identified as providing negligible bat roosting suitability and consequently do not require any further surveys prior to disturbance or removal. If works are not undertaken within two years of the surveys, it is recommended that updated assessment for roost within the trees is undertaken.

4.4 Enhancement Opportunities

There is the opportunity to enhance the overall connectivity throughout the Site. Enhancements may include planting of trees and hedgerows and including dark corridors which will promote foraging opportunities for species less tolerant of light such as *Myotis sp*. The pockets of suitable foraging habitat such as the wooded area around Network Rail Holgate Depot should be retained where possible.

Consideration should be given as to whether other buildings or structures within the Site may be enhanced for bats through the installation of bat roosting features such as bat boxes, bricks or slates e.g. 1FF Schwegler bat box.

5 Conclusions

The surveys undertaken in 2016 and 2017 identified that building 31 and building 40 contained confirmed common pipistrelle day roosts. Prior to works that may disturb roosting bats or lead to the loss of their roosting site, a bat licence must be obtained from Natural England.

Bat activity levels across the Site were identified as low to moderate. High levels of bat activity was recorded within the Network Rail Holgate Depot area to the south.

The PRF surveys of trees identified to have PRF recorded no evidence of bats roosting within the trees. Therefore, no further surveys are required prior to disturbance or removal.

The activity surveys identified that there are existing corridors across different sections of the Site, which are used by common bat species. There is the opportunity to enhance the connectivity within and across the Site through planting of trees and hedgerows, including dark corridors. The wooded area at Network Rail Holgate Depot provides suitable foraging resources for bats. Therefore, it is recommended that this area is retained where possible. If this is not possible, it is recommended that it is replaced on a like for like basis and is connected to existing or new habitat corridors.

Disclaimer

This report is the result of survey work undertaken in August and September 2016 and May, June, July and August 2017. This report refers, within the limitations stated, to the condition or proposed Development of the Site at the time of the inspections. Changes in legislation, guidance, best practice, etc. may necessitate a re-assessment/survey. It is also advised that if there is a delay of over a year in undertaking the works, a re-survey may be required. No warranty is given as to the possibility of future changes in the condition of the Site.

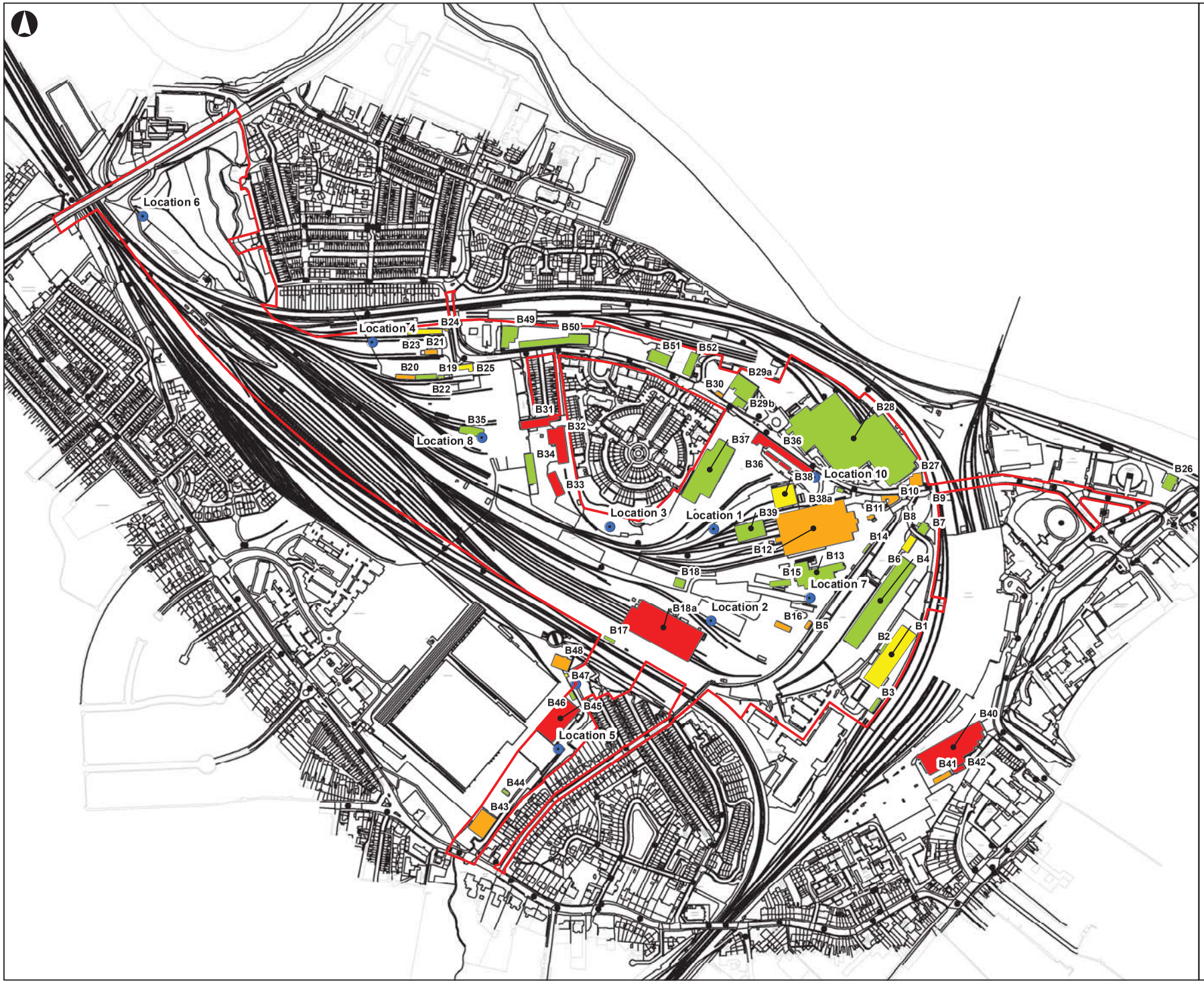
This report is produced solely for the benefit of York Central Partnership and no liability is accepted for any reliance placed on it by any other party. This report is prepared for the proposed uses stated in the report and should not be used in a different context.

Drawings

Drawing 1: Bat activity surveys on buildings with bat roost suitability and location of automated bat detectors.

Drawing 2: Location of trees with potential roost features.

A3



Legend

- Redline boundary
- Bat automated detector location
- High bat roost suitability
- Moderate bat roost suitability
- Low bat roost suitability
- Negligible bat roost suitability

Issue	Date	By	Chkd	Appd
P1	25-06-18	YL	RC	RC

Metres
0 75 150 300

ARUP

13 Fitzroy Street
London W1T 4BQ
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www.arup.com

Job Title
York Central

Drawing 1 - Bat activity surveys on buildings with bat roost suitability and location of automated bat detectors

Scale at A3
1:5,500

Job No	Drawing Status
251869-00	Issue

Drawing No	Issue
Drawing 1	P1

MXD Location

A3

Legend

- Redline boundary
- Target note
- A2.2- Scattered scrub
- A3.1- Broadleaved parkland/scattered trees
- J2.1.2- Intact species-poor hedgerow
- J2.4 - Fence
- J2.5 - Wall
- Waterbody
- A1.1.1- Broadleaved woodland - semi-natural
- A1.1.2- Broadleaved woodland plantation
- A1.2.2 - Coniferous woodland plantation
- B2.2- Semi-improved grassland
- C3.1- Tall ruderal herbs
- J1.2- Amenity improved grassland
- J1.3- Cultivated/disturbed land - ephemeral/short perennial
- J2.5 - Wall
- J3.6- Buildings
- J4- Bareground
- Buildings and hardstanding

Issue	Date	By	Chkd	Appd
P1	16-7-18	YL	RC	RC

Metres
0 75 150 300

ARUP

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Job Title
York Central

Drawing 2 - Location of trees with potential roost features.

Scale at A3
1:5,500

Job No	Drawing Status
251869-00	**Final**

Drawing No	Issue
251869/BRP/2	**Rev 1.0**

MXD Location

Appendix A

Biological Records

Our ref:	E02247
Date:	29/06/2016
Species list for data search of area:	Site within boundary + 2km buffer all centred at SE 590518

The table below lists all species for which records have been found within the search area. The date refers to the most recent occurrence for each species.

SPECIES LIST

Scientific name	Common name	Taxonomic group	Year	Designated as
Bufo bufo	Common Toad	amphibian	2015	UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b)
Lissotriton vulgaris	Smooth Newt	amphibian	2011	Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b)
Rana temporaria	Common Frog	amphibian	2011	Habitats Directive Annex 5 Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b)
Triturus cristatus	Great Crested Newt	amphibian	2011	Bern Convention Appendix 2 Habitats Directive Annex 4 The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)
Accipiter gentilis	Northern Goshawk	bird	1981	Bonn Convention Appendix 2 EC CITES Annex A RDB Birds - 2 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Accipiter nisus	Eurasian Sparrowhawk	bird	2015	Bonn Convention Appendix 2 EC CITES Annex A
Alauda arvensis	Sky Lark	bird	2009	UK BAP Non-strict
Alcedo atthis	Common Kingfisher	bird	2014	Bern Convention Appendix 2 Birds Directive Annex 1 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Anas clypeata	Northern Shoveler	bird	1984	Bonn Convention Appendix 2 EC CITES Annex C RDB Birds - 4b
Anas crecca	Eurasian Teal	bird	1999	Bonn Convention Appendix 2 EC CITES Annex C RDB Birds - 1b
Anas platyrhynchos	Mallard	bird	2004	Bonn Convention Appendix 2
Anser anser	Greylag Goose	bird	2002	Bonn Convention Appendix 2 RDB Birds - 1b Wildlife and Countryside Act 1981 (Schedule 1 Part 2)
Anthus pratensis	Meadow Pipit	bird	2003	Bern Convention Appendix 2
Asio flammeus	Short-eared Owl	bird	1986	Bern Convention Appendix 2 Birds Directive Annex 1 EC CITES Annex A
Aythya ferina	Common Pochard	bird	1984	Bonn Convention Appendix 2 RDB Birds - 1b RDB Birds - 2
Aythya fuligula	Tufted Duck	bird	1984	Bonn Convention Appendix 2
Botaurus stellaris	Great Bittern	bird	1981	Bern Convention Appendix 2 Birds Directive Annex 1 RDB Birds - 2 RDB Birds - 3 RDB Birds - 4a UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Branta canadensis	Greater Canada Goose	bird	2003	Bonn Convention Appendix 2 Wildlife and Countryside Act 1981 (Schedule 9 Part 1)

Scientific name	Common name	Taxonomic group	Year	Designated as
Caprimulgus europaeus	European Nightjar	bird	1981	Bern Convention Appendix 2 Birds Directive Annex 1 RDB Birds - 5 UK Biodiversity Action Plan priority species
Carduelis cannabina	Common Linnet	bird	2009	Bern Convention Appendix 2 UK BAP Non-strict
Carduelis carduelis	European Goldfinch	bird	2009	Bern Convention Appendix 2
Carduelis chloris	European Greenfinch	bird	2009	Bern Convention Appendix 2
Carduelis flammea	Common Redpoll	bird	1998	Bern Convention Appendix 2
Carduelis flavirostris	Twite	bird	1986	Bern Convention Appendix 2 RDB Birds - 1a RDB Birds - 1b UK BAP Non-strict
Circus cyaneus	Hen Harrier	bird	1979	Birds Directive Annex 1 Bonn Convention Appendix 2 EC CITES Annex A RDB Birds - 5
Crex crex	Corn Crake	bird	1981	Bern Convention Appendix 2 Birds Directive Annex 1 Bonn Convention Appendix 2 RDB Birds - 3 UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Cuculus canorus	Common Cuckoo	bird	1996	UK Biodiversity Action Plan priority species
Cyanistes caeruleus	Blue Tit	bird	2005	Bern Convention Appendix 2
Dendrocopos major	Great Spotted Woodpecker	bird	2003	Bern Convention Appendix 2
Egretta garzetta	Little Egret	bird	2009	Bern Convention Appendix 2 Birds Directive Annex 1 EC CITES Annex A
Emberiza calandra	Corn Bunting	bird	2009	UK BAP Non-strict
Emberiza citrinella	Yellowhammer	bird	2009	Bern Convention Appendix 2 UK Biodiversity Action Plan priority species
Emberiza schoeniclus	Reed Bunting	bird	2009	Bern Convention Appendix 2 UK Biodiversity Action Plan priority species
Erithacus rubecula	European Robin	bird	2005	Bern Convention Appendix 2
Falco columbarius	Merlin	bird	1996	Bern Convention Appendix 2 Birds Directive Annex 1 Bonn Convention Appendix 2 EC CITES Annex A RDB Birds - 5 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Falco peregrinus	Peregrine Falcon	bird	1985	Bern Convention Appendix 2 Birds Directive Annex 1 Bonn Convention Appendix 2 EC CITES Annex A RDB - Internationally Important RDB Birds - 1a Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Falco subbuteo	Eurasian Hobby	bird	2009	Bern Convention Appendix 2 Bonn Convention Appendix 2 EC CITES Annex A Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Falco tinnunculus	Common Kestrel	bird	2003	Bern Convention Appendix 2 Bonn Convention Appendix 2 EC CITES Annex A
Gallinago gallinago	Common Snipe	bird	2009	Bonn Convention Appendix 2
Gallinula chloropus	Common Moorhen	bird	2014	Bonn Convention Appendix 2

Scientific name	Common name	Taxonomic group	Year	Designated as
Gavia arctica	Black-throated Diver	bird	1986	Bern Convention Appendix 2 Birds Directive Annex 1 RDB Birds - 1b RDB Birds - 2 UK Biodiversity Action Plan priority species
Gavia stellata	Red-throated Diver	bird	1985	Bern Convention Appendix 2 Birds Directive Annex 1 Bonn Convention Appendix 2 RDB Birds - 1a RDB Birds - 1b
Grus grus	Common Crane	bird	2009	Bern Convention Appendix 2 Birds Directive Annex 1 Bonn Convention Appendix 2 EC CITES Annex A RDB Birds - 2
Lymnocryptes minimus	Jack Snipe	bird	2009	Bonn Convention Appendix 2
Milvus milvus	Red Kite	bird	2009	Birds Directive Annex 1 Bonn Convention Appendix 2 EC CITES Annex A IUCN (2001) - Lower risk - near threatened RDB Birds - 2 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Motacilla flava subsp. flavissima	Yellow Wagtail	bird	1996	UK Biodiversity Action Plan priority species
Muscicapa striata	Spotted Flycatcher	bird	2009	Bern Convention Appendix 2 Bonn Convention Appendix 2 UK Biodiversity Action Plan priority species
Oenanthe oenanthe	Northern Wheatear	bird	1996	Bern Convention Appendix 2
Parus major	Great Tit	bird	2004	Bern Convention Appendix 2
Passer domesticus	House Sparrow	bird	2005	UK Biodiversity Action Plan priority species
Passer montanus	Eurasian Tree Sparrow	bird	2009	UK Biodiversity Action Plan priority species
Perdix perdix	Grey Partridge	bird	1999	RDB Birds - 3 UK Biodiversity Action Plan priority species
Pernis apivorus	European Honey-buzzard	bird	2009	Birds Directive Annex 1 Bonn Convention Appendix 2 EC CITES Annex A RDB Birds - 2 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Philomachus pugnax	Ruff	bird	1984	Birds Directive Annex 1 Bonn Convention Appendix 2 RDB Birds - 2 RDB Birds - 4a Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Picus viridis	Green Woodpecker	bird	1999	Bern Convention Appendix 2
Podiceps auritus	Slavonian Grebe	bird	1980	Bern Convention Appendix 2 Birds Directive Annex 1 Bonn Convention Appendix 2 RDB Birds - 2 RDB Birds - 4a Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Prunella modularis	Hedge Accentor	bird	2003	Bern Convention Appendix 2 UK BAP Non-strict
Pyrrhula pyrrhula	Common Bullfinch	bird	2003	UK BAP Non-strict
Riparia riparia	Sand Martin	bird	1997	Bern Convention Appendix 2
Saxicola rubetra	Whinchat	bird	1996	Bern Convention Appendix 2
Scolopax rusticola	Eurasian Woodcock	bird	2009	Bonn Convention Appendix 2
Strix aluco	Tawny Owl	bird	2004	Bern Convention Appendix 2 EC CITES Annex A
Sturnus vulgaris	Common Starling	bird	2004	UK BAP Non-strict

Scientific name	Common name	Taxonomic group	Year	Designated as
Tringa nebularia	Common Greenshank	bird	1984	Bonn Convention Appendix 2 RDB Birds - 5 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Tringa ochropus	Green Sandpiper	bird	1984	Bern Convention Appendix 2 Bonn Convention Appendix 2 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Turdus iliacus	Redwing	bird	2009	RDB Birds - 2 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Turdus philomelos	Song Thrush	bird	2011	UK BAP Non-strict
Turdus pilaris	Fieldfare	bird	2009	RDB Birds - 2 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Salmo salar	Atlantic Salmon	bony fish (Actinopterygii)	1997	Habitats Directive Annex 5 RDB - Internationally Important The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 4) UK Biodiversity Action Plan priority species
Allium oleraceum	Field Garlic	flowering plant	2003	IUCN (2001) - Vulnerable
Apera spica-venti	Loose Silky-bent	flowering plant	2003	IUCN (2001) - Lower risk - near threatened Nationally scarce
Arenaria serpyllifolia	Thyme-Leaved Sandwort	flowering plant	2009	Bonn Convention Appendix 2
Cyperus longus	Galingale	flowering plant	2009	IUCN (2001) - Lower risk - near threatened Nationally scarce
Dactylorhiza purpurella	Northern Marsh-orchid	flowering plant	2015	UK BAP Non-strict
Fallopia japonica	Japanese Knotweed	flowering plant	2014	Wildlife and Countryside Act 1981 (Schedule 9 Part 2)
Filago vulgaris	Common Cudweed	flowering plant	2003	IUCN (2001) - Lower risk - near threatened
Galanthus nivalis	Snowdrop	flowering plant	2004	Habitats Directive Annex 5
Heracleum mantegazzianum	Giant Hogweed	flowering plant	2009	Wildlife and Countryside Act 1981 (Schedule 9 Part 2)
Hyacinthoides non-scripta	Bluebell	flowering plant	1991	Wildlife and Countryside Act 1981 (Schedule 8)
Lathyrus palustris	Marsh Pea	flowering plant	2003	IUCN (2001) - Lower risk - near threatened Nationally scarce
Oenanthe fistulosa	Tubular Water-dropwort	flowering plant	2008	IUCN (2001) - Vulnerable UK Biodiversity Action Plan priority species
Ophrys apifera	Bee Orchid	flowering plant	2003	EC CITES Annex B
Potamogeton pusillus	Lesser Pondweed	flowering plant	1997	Nationally scarce
Puccinellia rupestris	Stiff Saltmarsh-grass	flowering plant	2006	Nationally scarce
Spergula arvensis	Corn Spurrey	flowering plant	2003	IUCN (2001) - Vulnerable
Stratiotes aloides	Water-soldier	flowering plant	2003	IUCN (2001) - Lower risk - near threatened Nationally rare Nationally scarce
Viola tricolor	Wild Pansy	flowering plant	1992	IUCN (2001) - Lower risk - near threatened
Sialis nigripes	Sialis nigripes	insect - alderfly (Megaloptera)	1999	Nationally Notable
Agabus (Agabus) uliginosus	Agabus (Agabus) uliginosus	insect - beetle (Coleoptera)	1997	IUCN (2001) - Lower risk - near threatened
Amidobia talpa	Amidobia talpa	insect - beetle (Coleoptera)	1997	Nationally Notable
Chrysolina graminis	Tansy Beetle	insect - beetle (Coleoptera)	2004	UK Biodiversity Action Plan priority species
Datomicra nigra	Datomicra nigra	insect - beetle (Coleoptera)	1997	Nationally Notable
Helophorus (Helophorus) longitarsis	Helophorus (Helophorus) longitarsis	insect - beetle (Coleoptera)	2003	Nationally scarce

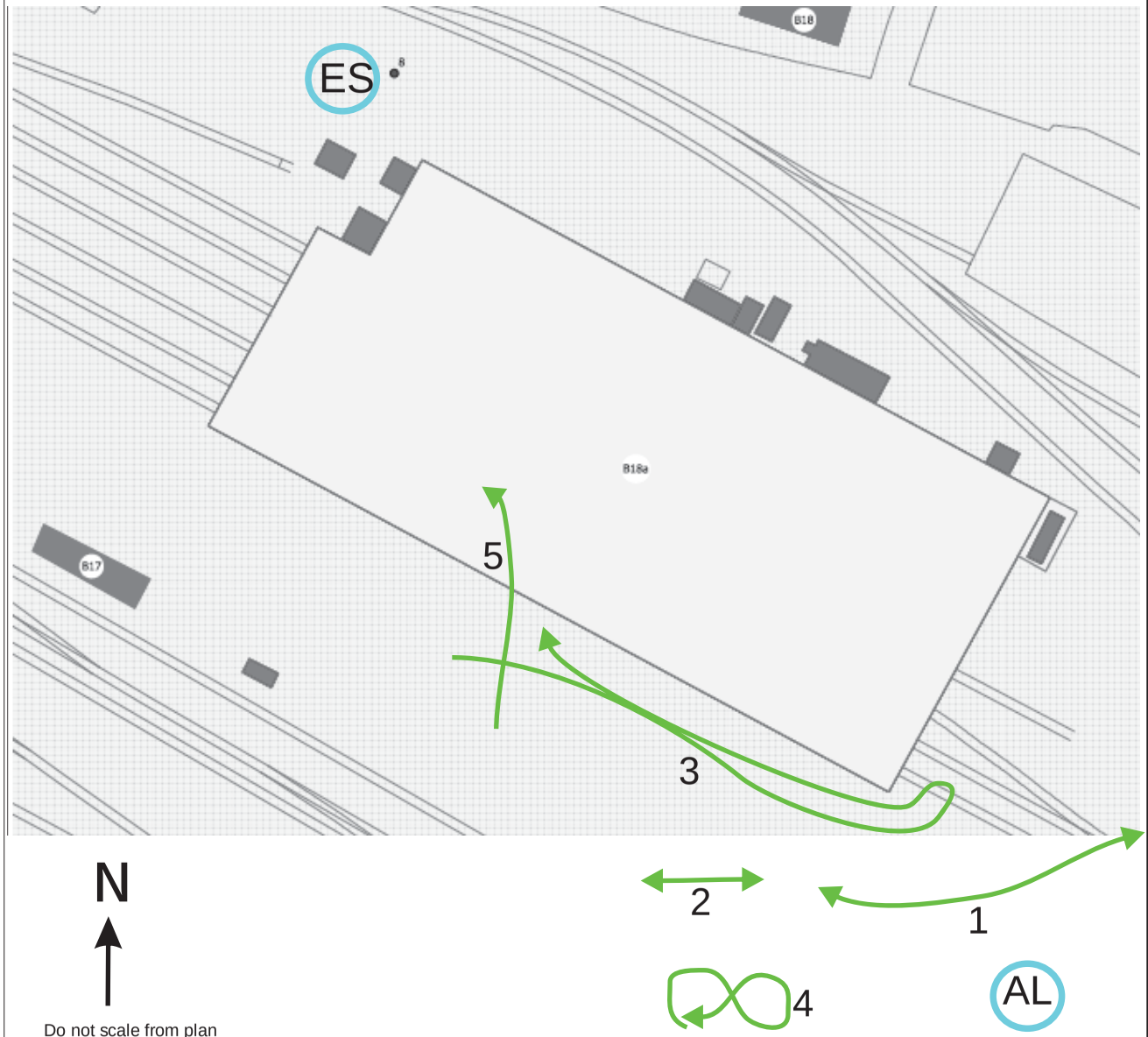
Scientific name	Common name	Taxonomic group	Year	Designated as
Heterocerus marginatus	Heterocerus marginatus	insect - beetle (Coleoptera)	1997	Nationally scarce
Hydroporus neglectus	Hydroporus neglectus	insect - beetle (Coleoptera)	2009	Nationally scarce
Oxypoda exoleta	Oxypoda exoleta	insect - beetle (Coleoptera)	1997	Nationally Notable
Philhygra britteni	Philhygra britteni	insect - beetle (Coleoptera)	1997	Nationally Notable
Platystethus (Craetopycrus) nodifrons	Platystethus (Craetopycrus) nodifrons	insect - beetle (Coleoptera)	1997	Nationally Notable
Psylliodes chrysocephala	Cabbage-stem Flea Beetle	insect - beetle (Coleoptera)	1997	UK Biodiversity Action Plan priority species
Ceraclea senilis	Ceraclea senilis	insect - caddis fly (Trichoptera)	1997	Nationally Notable
Beris clavipes	Beris clavipes	insect - true fly (Diptera)	1995	Nationally Notable
Cheilosia barbata	Cheilosia barbata	insect - true fly (Diptera)	1998	Nationally Notable
Chrysotus gramineus	Chrysotus gramineus	insect - true fly (Diptera)	1998	Nationally Notable
Colobaea punctata	Colobaea punctata	insect - true fly (Diptera)	1995	Nationally Notable
Dolichopus trivialis	Dolichopus trivialis	insect - true fly (Diptera)	1998	Nationally scarce
Drapetis simulans	Drapetis simulans	insect - true fly (Diptera)	1995	Nationally Notable
Fannia rondanii	Fannia rondanii	insect - true fly (Diptera)	1979	Nationally Notable
Melanostoma mellinum	Melanostoma mellinum	insect - true fly (Diptera)	1998	Nationally Notable
Paroxyna absinthii	Paroxyna absinthii	insect - true fly (Diptera)	1995	Nationally Notable
Pherbellia dorsata	Pherbellia dorsata	insect - true fly (Diptera)	1995	Nationally Notable
Pipizella viduata	Pipizella viduata	insect - true fly (Diptera)	1998	Nationally Notable
Platypalpus albicornis	Platypalpus albicornis	insect - true fly (Diptera)	1995	Nationally Notable
Platypalpus cothurnatus	Platypalpus cothurnatus	insect - true fly (Diptera)	1995	Nationally Notable
Platypalpus politus	Platypalpus politus	insect - true fly (Diptera)	1995	Nationally Notable
Platypalpus ruficornis	Platypalpus ruficornis	insect - true fly (Diptera)	1995	Nationally Notable
Lampetra fluviatilis	River Lamprey	jawless fish (Agnatha)	1997	Habitats Directive Annex 5 The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 4) UK Biodiversity Action Plan priority species
Petromyzon marinus	Sea Lamprey	jawless fish (Agnatha)	1997	UK Biodiversity Action Plan priority species
Pseudanodonta complanata	Pseudanodonta complanata	mollusc	2000	UK Biodiversity Action Plan priority species
Natrix natrix	Grass Snake	reptile	1976	UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b)
Meioneta mollis	Meioneta mollis	spider (Araneae)	1995	UK Biodiversity Action Plan priority species

Scientific name	Common name	Taxonomic group	Year	Designated as
Arvicola amphibius	European Water Vole	terrestrial mammal	2003	UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)
Erinaceus europaeus	West European Hedgehog	terrestrial mammal	2015	RDB - Internationally Important UK Biodiversity Action Plan priority species
Lutra lutra	European Otter	terrestrial mammal	2012	Bern Convention Appendix 2 EC CITES Annex A Habitats Directive Annex 4 IUCN (2001) - Lower risk - near threatened RDB - Internationally Important The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)
Meles meles	Eurasian Badger	terrestrial mammal	2008	Protection of Badgers Act (1992) RDB - Internationally Important
Micromys minutus	Harvest Mouse	terrestrial mammal	2003	UK Biodiversity Action Plan priority species
Myotis	Unidentified Bat	terrestrial mammal	2008	Bonn Convention Appendix 2
Myotis daubentonii	Daubenton's Bat	terrestrial mammal	2004	Bern Convention Appendix 2 Bonn Convention Appendix 2 Habitats Directive Annex 4 RDB - Internationally Important The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)
Myotis mystacinus	Whiskered Bat	terrestrial mammal	1973	Bern Convention Appendix 2 Bonn Convention Appendix 2 Habitats Directive Annex 4 The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)

Scientific name	Common name	Taxonomic group	Year	Designated as
Nyctalus noctula	Noctule Bat	terrestrial mammal	2004	Bern Convention Appendix 2 Bonn Convention Appendix 2 Habitats Directive Annex 4 The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)
Pipistrellus	Pipistrellus	terrestrial mammal	2008	Bonn Convention Appendix 2
Pipistrellus pipistrellus	Pipistrellus pipistrellus	terrestrial mammal	2015	Bern Convention Appendix 2 Bonn Convention Appendix 2 Habitats Directive Annex 4 RDB - Internationally Important The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)
Pipistrellus pygmaeus	Soprano Pipistrelle	terrestrial mammal	2014	Bern Convention Appendix 2 Bonn Convention Appendix 2 Habitats Directive Annex 4 RDB - Internationally Important The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) UK Biodiversity Action Plan priority species
Sciurus carolinensis	Eastern Grey Squirrel	terrestrial mammal	2005	Wildlife and Countryside Act 1981 (Schedule 9 Part 1)
Vespertilionidae	Vespertilionidae	terrestrial mammal	2004	Bonn Convention Appendix 2 The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)

Appendix B

Bat Activity Survey Results



N

Do not scale from plan

Date	20.06.17		Survey Type	Bat Return	
Licensed surveyors	Aran Leaf				
Additional surveyors	Ellen Somerwill				
Temp (Celsius)	18	Humidity	55	Cloud Cover %	20
Wind speed (Beaufort)	2	Precipitation	0		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	02:32	-	-	-	-
1	03:08	*Pipistrellus pipistrellus*	1	forage	AL
2	03:19	*Pipistrellus pipistrellus*	1	forage	AL
3	03:40	*Pipistrellus pipistrellus*	1	forage	AL
4	03:58	*Pipistrellus pipistrellus*	1	forage	AL
5	04:25	*Pipistrellus pipistrellus*	1	forage	AL
SUNRISE	04:32	-	-	-	-
FINISH	04:47	-	-	-	-

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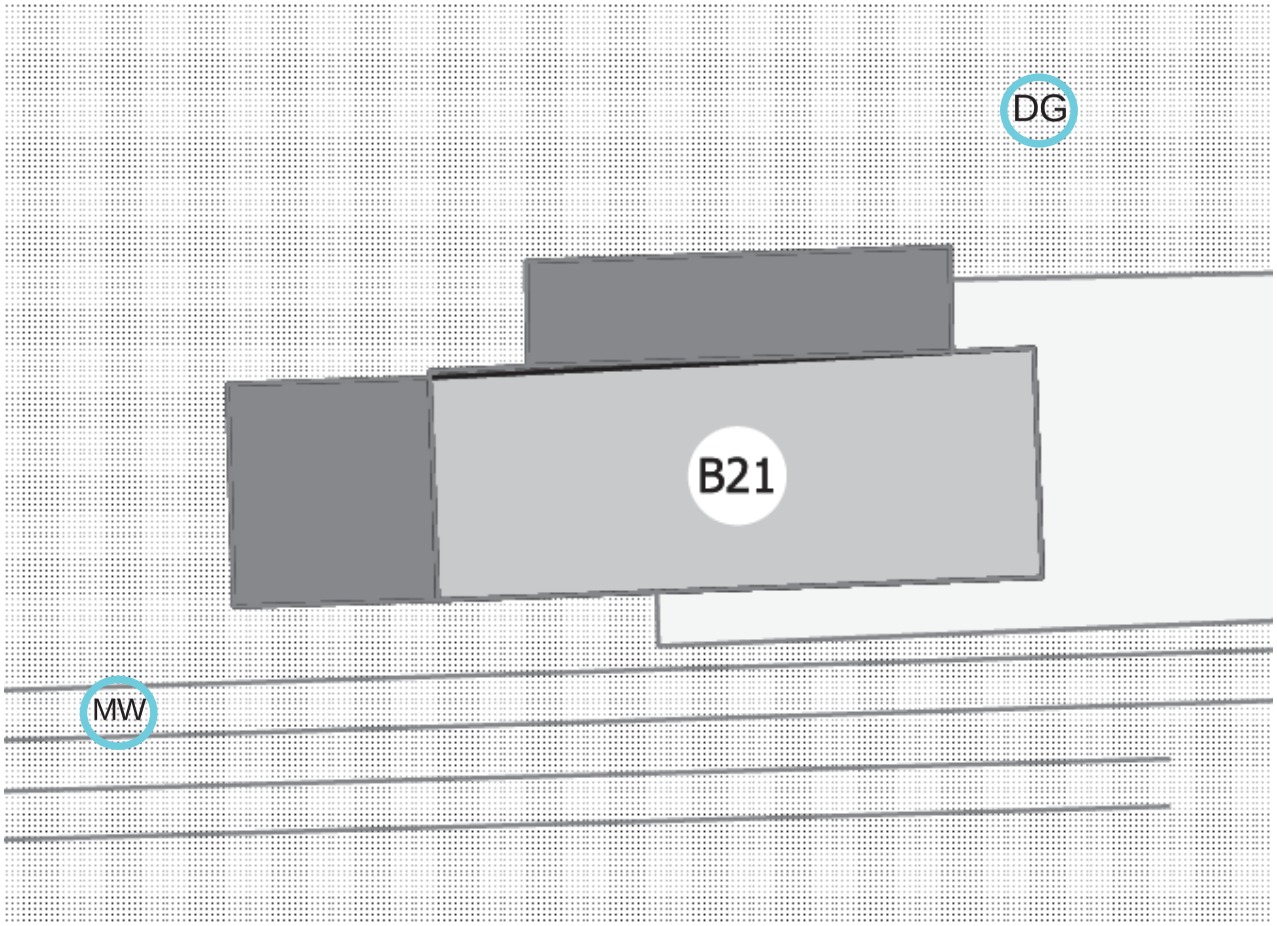
Legend

??	Surveyor Location	Foraging Activity	
??	Roost Location	Commuting Activity	
	Swarming activity	Target note	

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162. York Central
Title	Return Survey Results - 20.06.17
Client	Ove Arup and Partners
Date	June 2017
Ref	1162.CH.18a.2017.06.20



Date	19.06.17		Survey Type	Bat Emergence	
Licensed surveyors	Dave Gash				
Additional surveyors	Miles Watchman				
Temp (Celsius)	24	Humidity	85	Cloud Cover %	5
Wind speed (Beaufort)	2	Precipitation	0		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	21:25	-	-	-	-
SUNSET	21:40	-	-	-	-
		no bats recorded			
FINISH	23:40	-	-	-	-

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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
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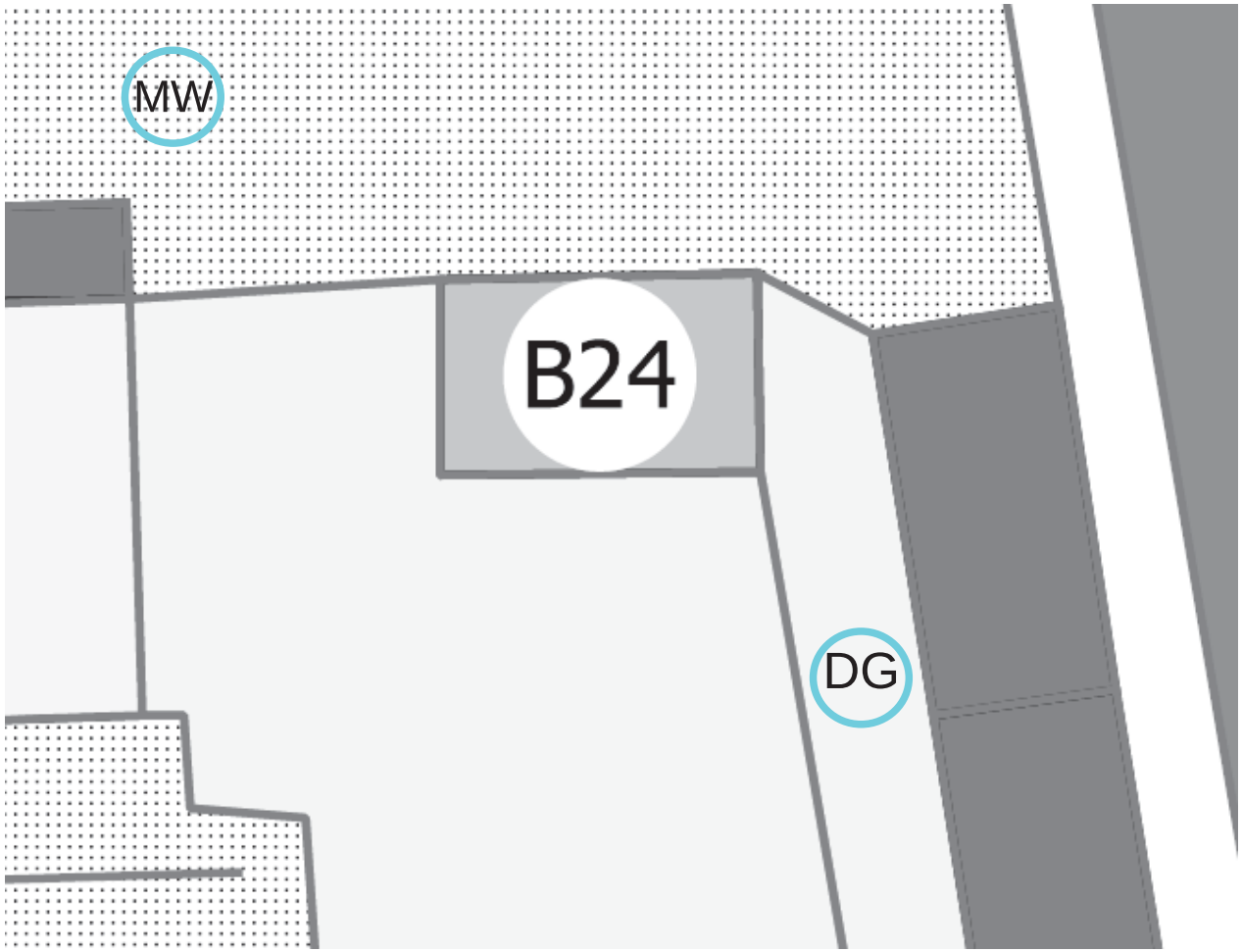
Project	1162. York Central
Title	Emergence Survey Results - 19.06.17
Client	Ove Arup and Partners
Date	June 2017
Ref	1162.CH.survey.B21.2017.06.19



Date	20.06.17		Survey Type	Bat Return	
Licensed surveyors	Dave Gash				
Additional surveyors	Miles Watchman				
Temp (Celsius)	18	Humidity	55	Cloud Cover %	20
Wind speed (Beaufort)	2	Precipitation	0		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	02:32	-	-	-	-
		no bats recorded			
SUNRISE	04:32	-	-	-	-
FINISH	04:47	-	-	-	-

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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
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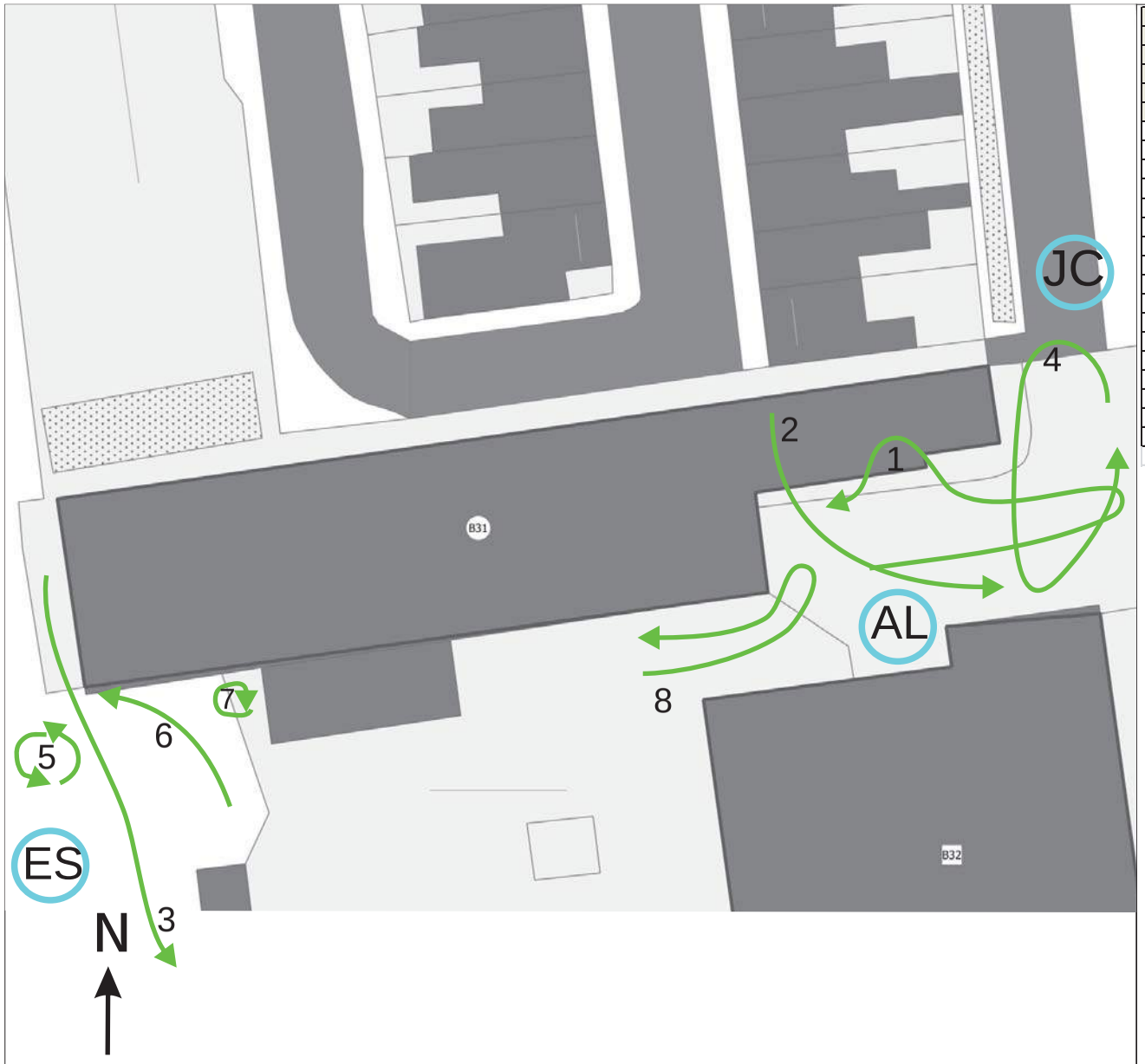
Project	1162. York Central
Title	Return Survey Results - 20.06.17
Client	Ove Arup and Partners
Date	June 2017
Ref	1162.CH.B24.2017.06.20



Date	19.06.17		Survey Type	Bat Emergence	
Licensed surveyors	Aran Leaf				
Additional surveyors	Ellen Somerwill, Jim Clarke				
Temp (Celsius)	24	Humidity	85	Cloud Cover %	5
Wind speed (Beaufort)	2	Precipitation	0		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	21:25	-	-	-	-
SUNSET	21:40	-	-	-	-
1	22:07	*Nyctalus noctula*	1	forage	AL, JC
non visual	22:07	*Pipistrellus pipistrellus*	1	forage	AL
non visual	22:28	*Pipistrellus pipistrellus*	1	forage	JC
2	22:29	*Pipistrellus pipistrellus*	1	forage	AL
3	22:34	*Pipistrellus pipistrellus*	1	forage	ES
4	22:36	*Pipistrellus pipistrellus*	1	forage	AL, JC
5	22:46	*Pipistrellus pipistrellus*	1	forage	ES
6	23:07	*Pipistrellus pipistrellus*	1	forage	ES
non visual	23:16	*Pipistrellus pipistrellus*	1	forage	ES
non visual	23:17	*Pipistrellus pipistrellus*	1	forage	AL, JC
7	23:18	*Pipistrellus pipistrellus*	1	forage	ES
non visual	23:19	*Pipistrellus pipistrellus*	1	forage	JC
8	23:21	*Pipistrellus pipistrellus*	1	forage	AL
non visual	23:21	*Pipistrellus pipistrellus*	1	forage	ES
FINISH	23:40	-	-	-	-

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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
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Project	1162. York Central
Title	Emergence Survey Results - 19.06.17
Client	Ove Arup and Partners
Date	June 2017
Ref	1162.CH.B31.2017.06.19

N

Do not scale from plan

Date	20.06.17		Survey Type	Bat Return	
Licensed surveyors	Louisa Molloy				
Additional surveyors	Catherine Hammond, Jim Clarke				
Temp (Celsius)	18	Humidity	55	Cloud Cover %	20
Wind speed (Beaufort)	2	Precipitation	0		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	02:32	-	-	-	-
non visual	03:00	*Pipistrellus pipistrellus*	1	commute	JC
non visual	03:06	*Pipistrellus pipistrellus*	1	commute	JC
non visual	03:23	*Pipistrellus pipistrellus*	1	commute	JC
non visual	03:40	*Pipistrellus pipistrellus*	1	commute	JC
A	03:43	*Pipistrellus pipistrellus*	1	commute	JC
non visual	03:49	*Pipistrellus pipistrellus*	1	commute	JC
non visual	03:55	*Pipistrellus pipistrellus*	1	commute	JC
SUNRISE	04:32	-	-	-	-
FINISH	04:47	-	-	-	-

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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

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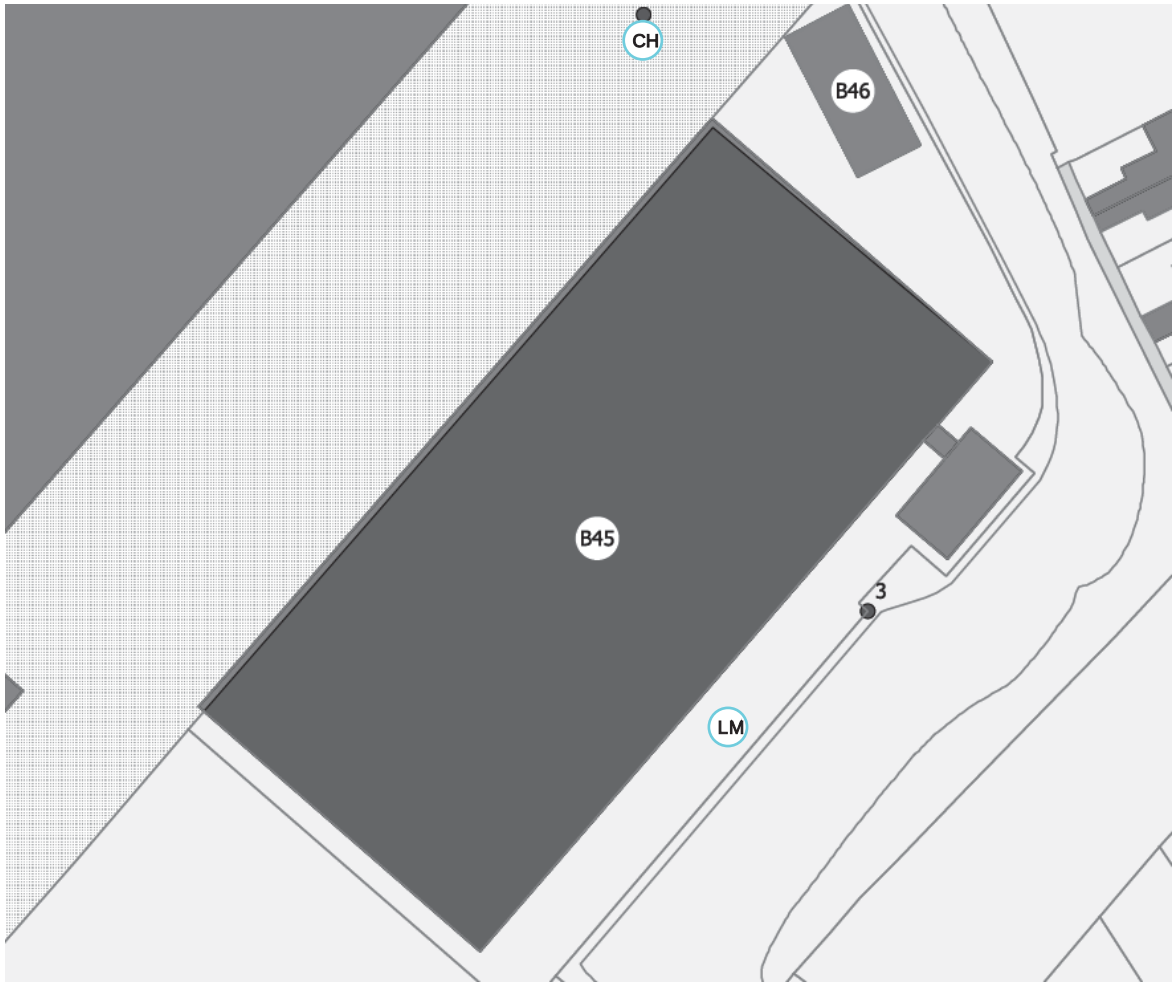
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 York Central
Title	Return Survey Results - 20.06.17
Client	Ove Arup and Partners
Date	June 2017
Ref	1162.CH.B40.2017.06.20



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Do not scale from plan

Date	19.06.17		Survey Type	Bat Emergence	
Licensed surveyors	Louisa Molloy				
Additional surveyors	Catherine Hammond				
Temp (Celsius)	24	Humidity	85	Cloud Cover %	5
Wind speed (Beaufort)	2	Precipitation	0		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	21:25	-	-	-	-
SUNSET	21:40	-	-	-	-
non visual	22:23	*Pipistrellus pipistrellus*	1	commute	LM
non visual	22:41	*Pipistrellus pipistrellus*	1	forage	LM
non visual	22:50	*Pipistrellus pipistrellus*	1	forage	LM
FINISH	21:40	-	-	-	-

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??	Surveyor Location	Foraging Activity	
??	Roost Location	Commuting Activity	
	Swarming activity	Target note	

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
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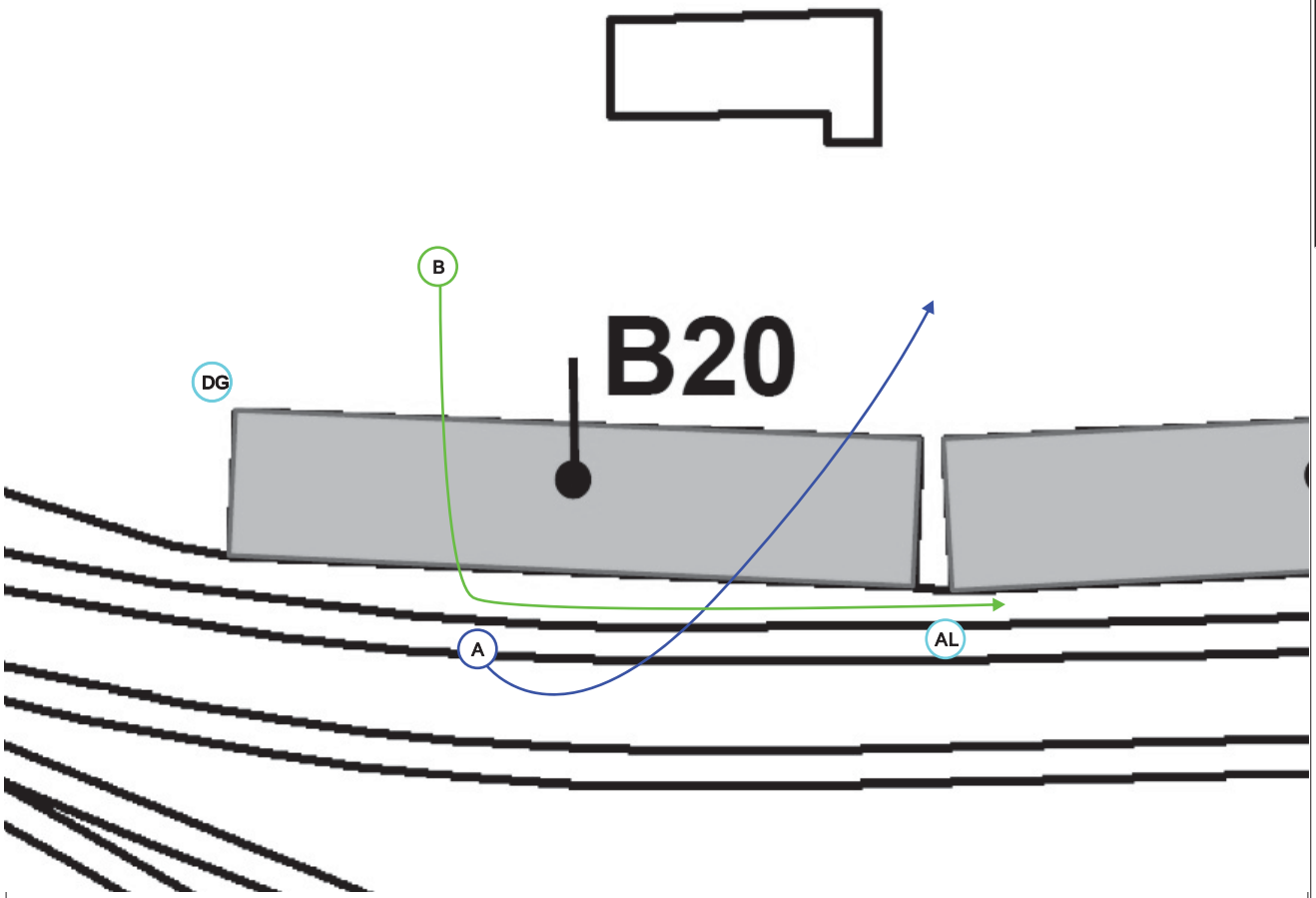
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162. York Central
Title	Emergence Survey Results 19.06.17
Client	Ove Arup and Partners
Date	June 2017
Ref	1162.CH.B45.2017.06.19



Date	6th July 2017		Survey Type	Dusk Emergence Survey	
Licensed surveyors	Aran Leaf				
Additional surveyors	Dave Gash				
Temp (Celsius)	20	Humidity	100	Cloud Cover %	90
Wind speed (Beaufort)	0	Precipitation	0		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	21:22	-	-	-	-
SUNSET	21:37	-	-	-	-
A	22:29	*Pipistrellus pipistrellus*	1	Commuting	AL
B	22:30 to 22:31	*Pipistrellus pipistrellus*	1	Foraging	DG, AL
FINISH	23:07	-	-	-	-

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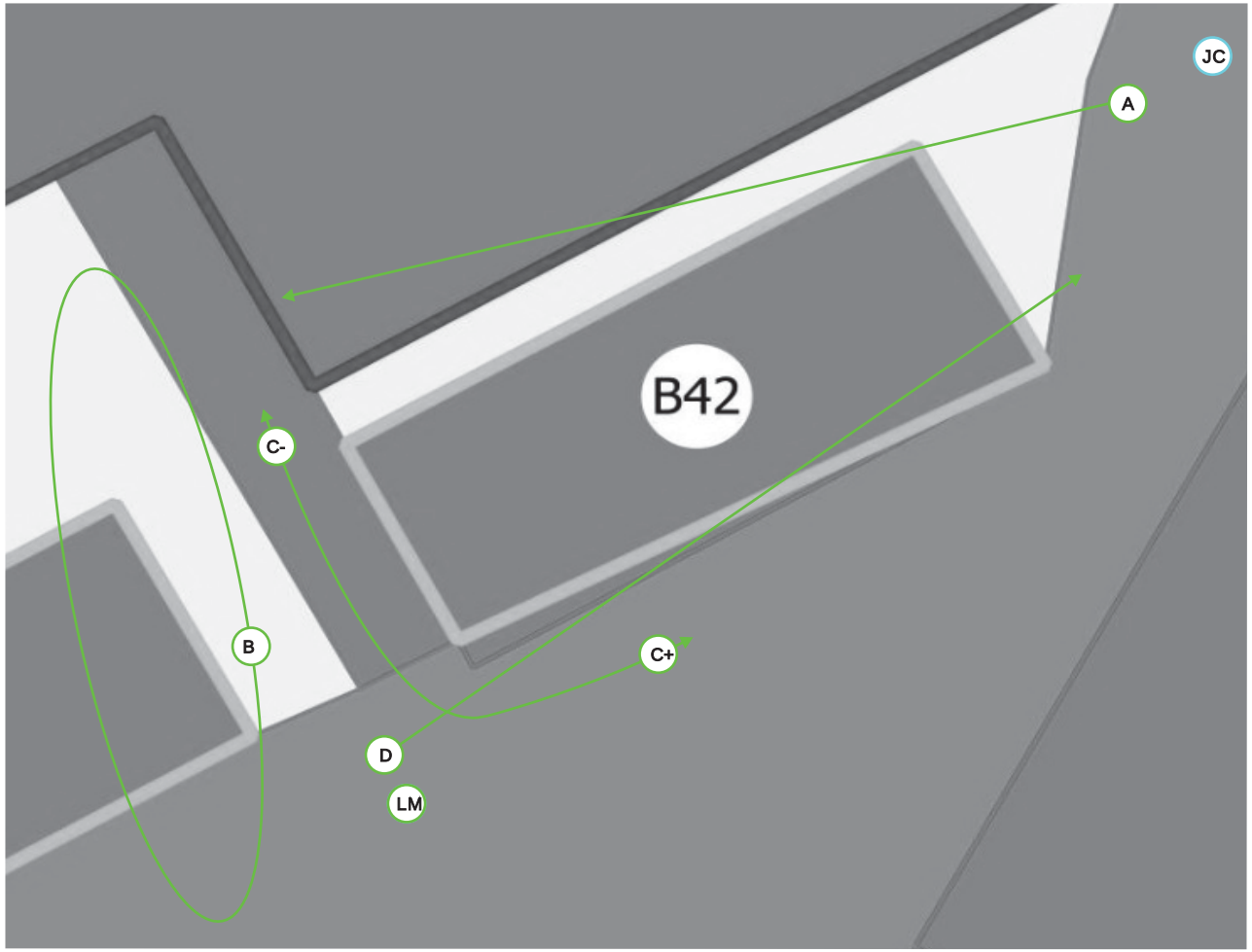
Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 York Central
Title	B20 - Dusk Emergence Survey Results - 6th July 2017
Client	Ove Arup and Partners
Date	6th July 2017
Ref	1162.CH.B20.2017.07.06



Date	6th July 2017		Survey Type	Dusk Emergence Survey	
Licensed surveyors	Louisa Molloy				
Additional surveyors	Jim Clarke				
Temp (Celsius)	20	Humidity	High	Cloud Cover %	90
Wind speed (Beaufort)	0	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	21:22	-	-	-	-
SUNSET	21:37	-	-	-	-
A & B	22:02 to 22:03	*Pipistrellus pipistrellus*	1	Foraging	JC, LM
C+/C-	22:14 to 22:30	*Pipistrellus pipistrellus*	2	Foraging	LM
C	22:27	*Pipistrellus pipistrellus*	1	Foraging	JC
C	22:29	*Pipistrellus pipistrellus*	1	Foraging	JC
D	22:44 to 22:45	*Pipistrellus pipistrellus*	1	Foraging	LM, JC
B	22:45 to 22:47	*Pipistrellus pipistrellus*	1	Foraging	LM
B	22:49 to 22:52	*Pipistrellus pipistrellus*	1	Foraging	LM
B	23:00 to 23:01	*Pipistrellus pipistrellus*	1	Foraging	LM
Non-visual	23:02 to 23:07	*Pipistrellus pipistrellus*	1	Foraging	LM
Non-visual	23:03	*Pipistrellus pipistrellus*	1	Foraging	JC
FINISH	23:07	-	-	-	-

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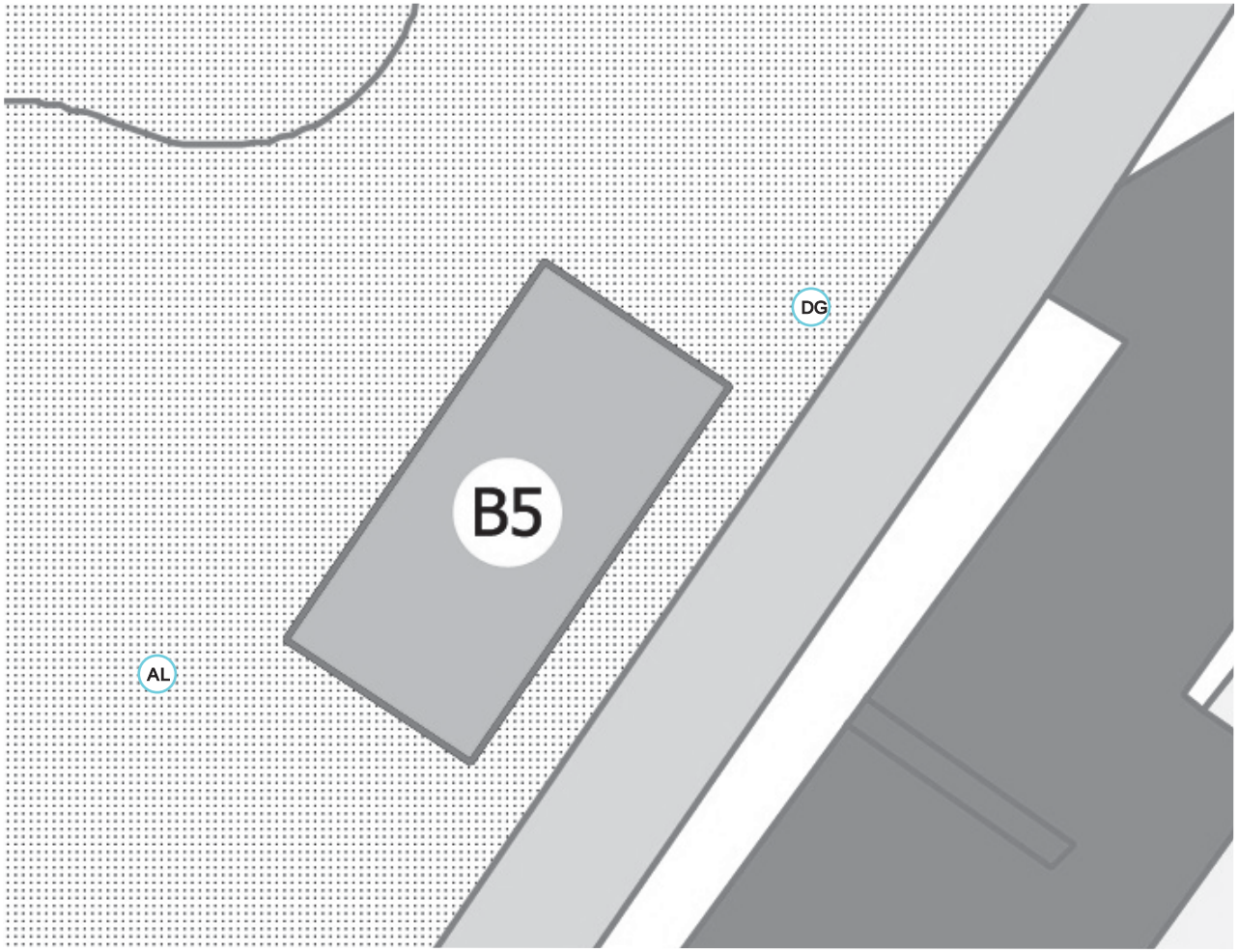
??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 York Central
Title	B40 - Emergence Survey Results - 6th July 2017
Client	Ove Arup and Partners
Date	6th July 2017
Ref	1162.CH.B40.2017.07.06



Date	7th July 2017		Survey Type	Dawn Return Survey	
Licensed surveyors	Aran Leaf				
Additional surveyors	Dave Gash				
Temp (Celsius)	16	Humidity	High	Cloud Cover %	0
Wind speed (Beaufort)	1	Precipitation	0		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	02:42	-	-	-	-
		No bats recorded			
SUNRISE	04:42	-	-	-	-
FINISH	04:42	-	-	-	-

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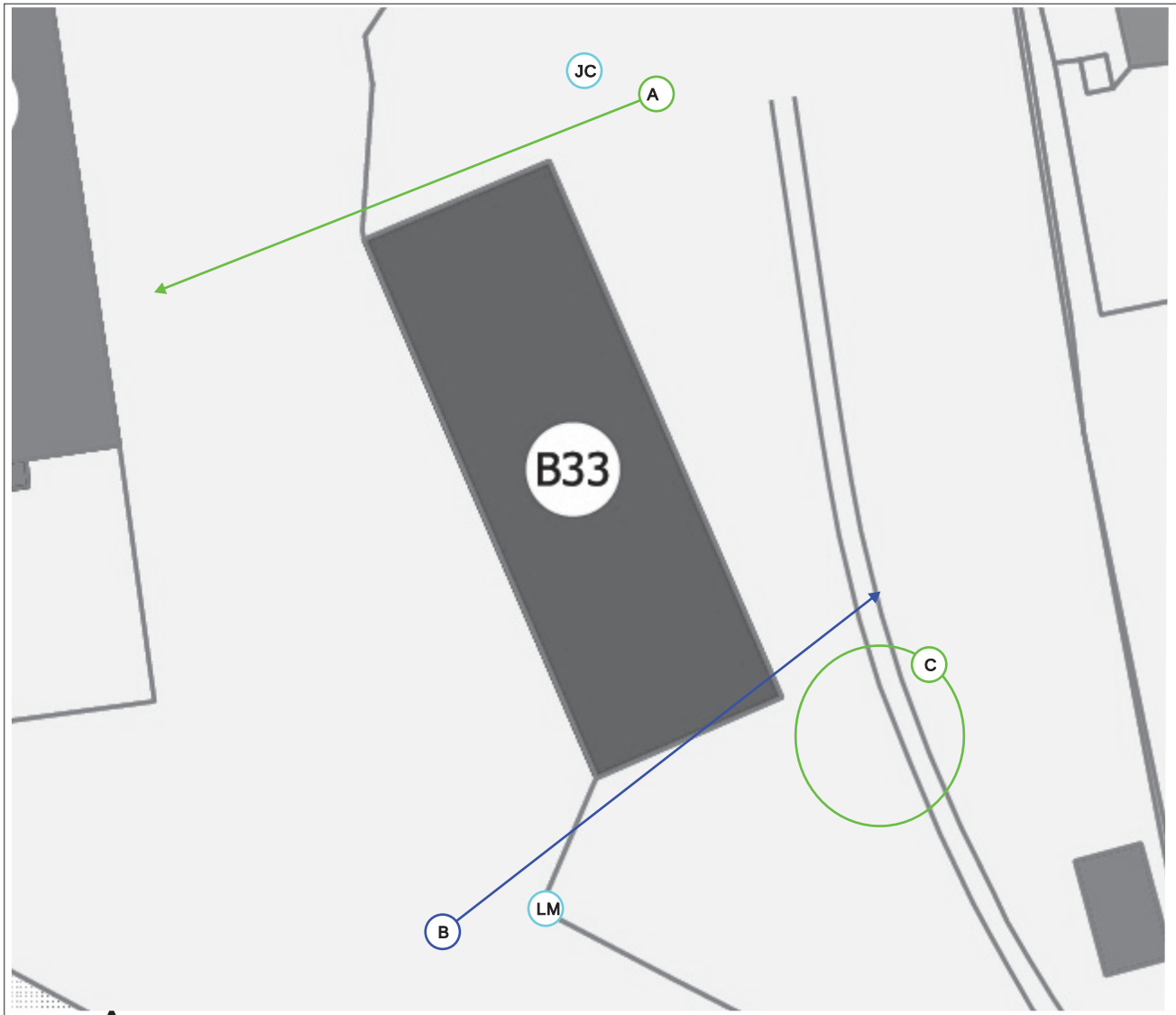
Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 York Central
Title	B5 - Return Survey Results - 7th July 2017
Client	Ove Arup and Partners
Date	7th July 2017
Ref	1162.CH.B5.2017.07.07



Do not scale from plan

Date	7th July 2017		Survey Type	Dawn Return Survey	
Licensed surveyors	Louisa Molloy				
Additional surveyors	Jim Clarke				
Temp (Celsius)	16	Humidity	100	Cloud Cover %	0
Wind speed (Beaufort)	1	Precipitation	0		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	02:42	-	-	-	-
Non-visual	02:57	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	03:26	*Pipistrellus pipistrellus*	1	Foraging	JC
A	03:27	*Pipistrellus pipistrellus*	1	Commuting	LM
B	03:39	*Pipistrellus pipistrellus*	1	Foraging	JC
C	03:58	*Pipistrellus pipistrellus*	1	Foraging	LM
SUNRISE	04:42	-	-	-	-
FINISH	04:42	-	-	-	-

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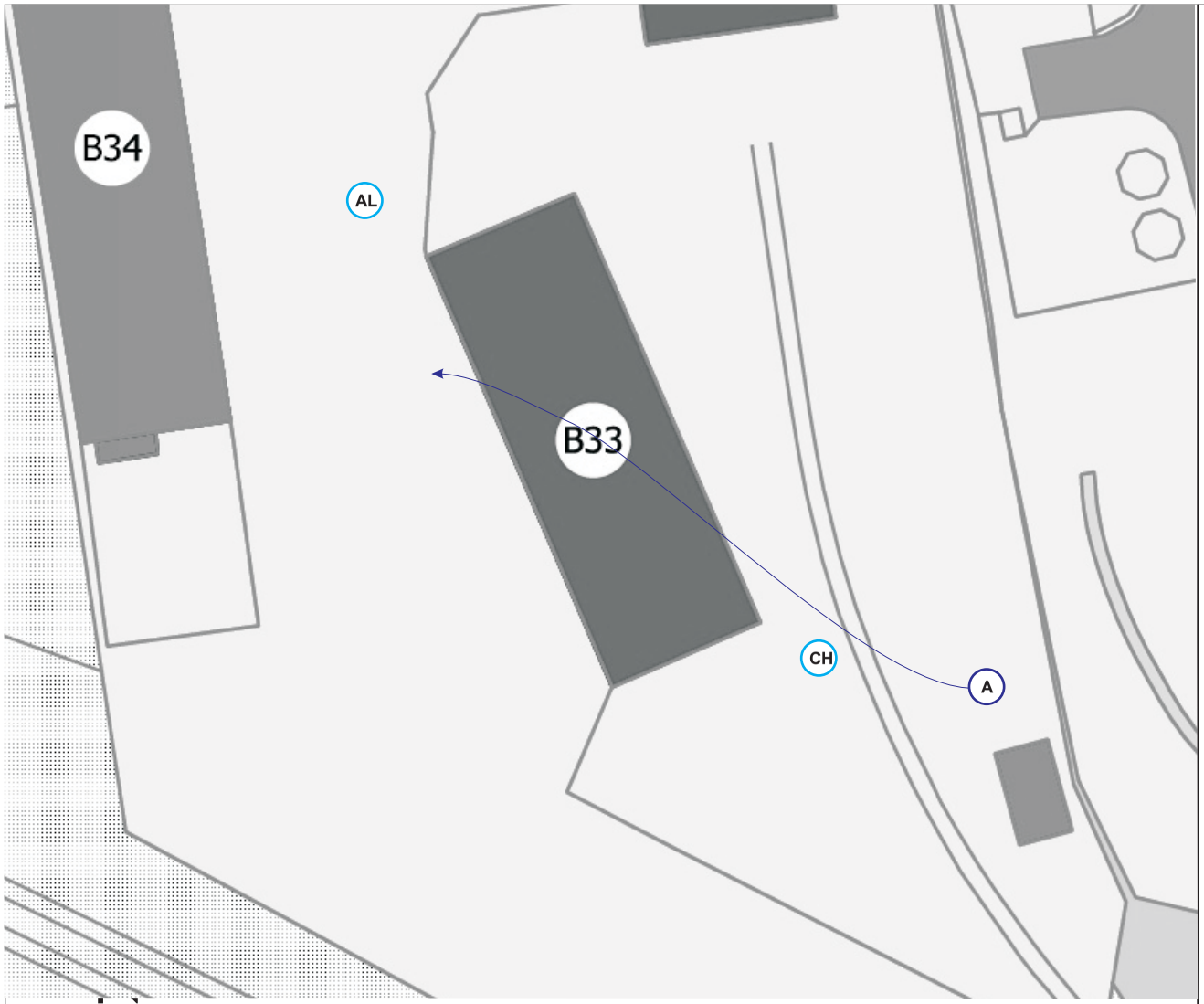
Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 York Central
Title	B33 - Return Survey Results - 7th July 2017
Client	Ove Arup and Partners
Date	7th July 2017
Ref	1162.CH.B30.2017.07.07



Date	19th July 2017		Survey Type	Dusk Emergence Survey	
Licensed surveyors	Aran Leaf				
Additional surveyors	Catherine Hammond				
Temp (Celsius)	21	Humidity	High	Cloud Cover %	100
Wind speed (Beaufort)	2	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	21:09	-	-	-	-
SUNSET	21:24	-	-	-	-
A	22:05	*Pipistrellus pipistrellus*	3	Commuting	CH
FINISH	22:54	-	-	-	-

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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
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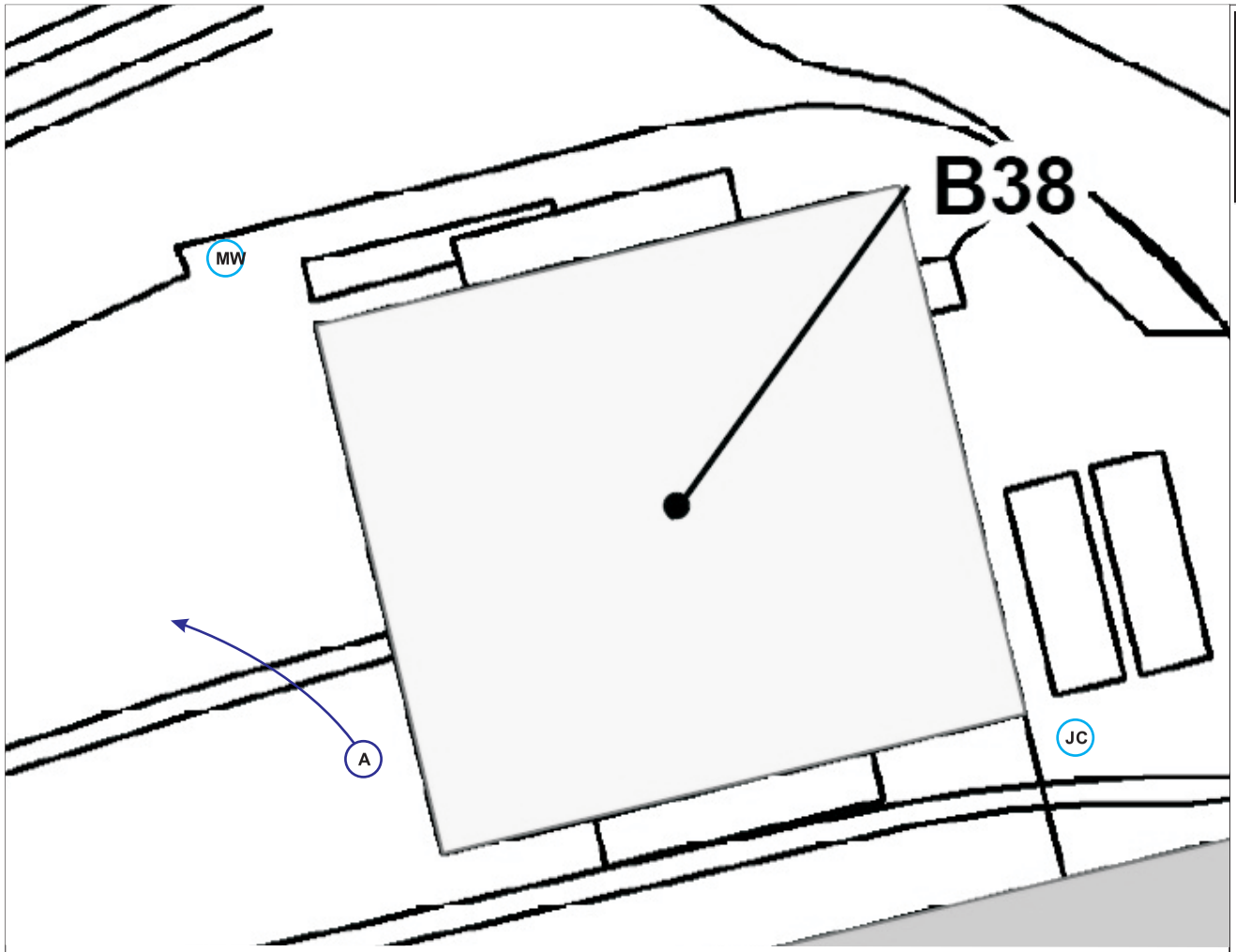
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 - York Central
Title	B33 - Dusk Emergence Survey Results - 19th July 2017
Client	Ove Arup and Partners
Date	19th July 2017
Ref	1162.CH.B33.2017.07.19



Date	19th July 2017		Survey Type	Dusk Emergence Survey	
Licensed surveyors					
Additional surveyors	Miles Watchman, Jim Clarke				
Temp (Celsius)	21	Humidity	Medium	Cloud Cover %	95
Wind speed (Beaufort)	2	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	21:09	-	-	-	-
SUNSET	21:24	*Unidentified bat*	1	Commuting	MW
FINISH	22:54	-	-	-	-

N

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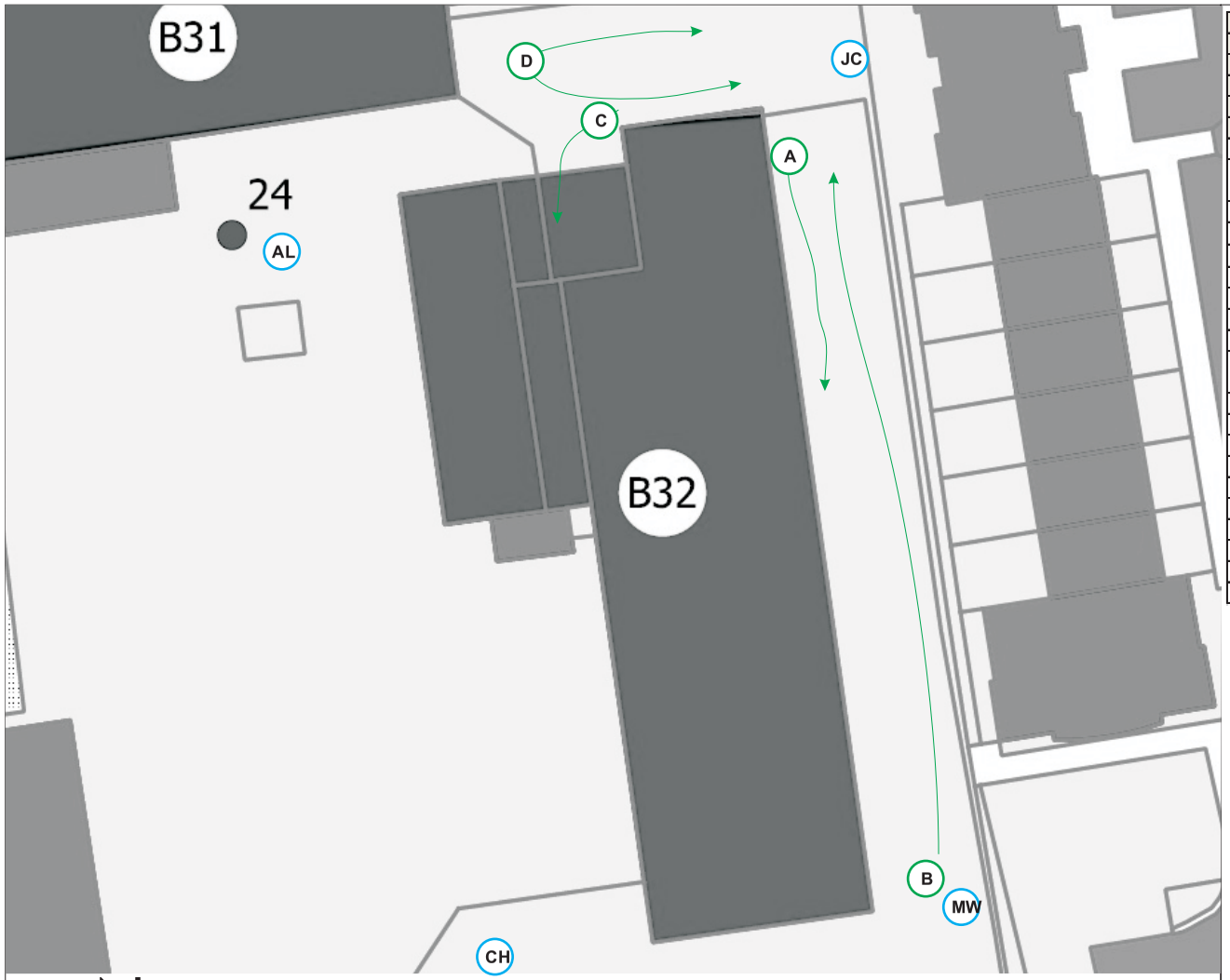
Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 - York Central
Title	B38 - Dusk Emergence Survey Results - 19th July 2017
Client	Ove Arup and Partners
Date	19th July 2017
Ref	1162.CH.B38.2017.07.19



Date	20th July 2017		Survey Type	Dawn Return Survey	
Licensed surveyors	Aran Leaf				
Additional surveyors	Catherine Hammond, Miles Watchman, Jim Clarke				
Temp (Celsius)	18	Humidity	Mdeium	Cloud Cover %	80
Wind speed (Beaufort)	2 to 3	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	02:29	-	-	-	-
Non-visual	03:00 to 03:05	*Pipistrellus pipistrellus*	1	Foraging	AL, JC, MW
Non-visual	03:16	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	03:41	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	03:58	*Pipistrellus pipistrellus*	1	Commuting	MW
A	04:00	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	04:02	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	04:04	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	04:11	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	04:12 to 04:13	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	04:14	*Pipistrellus pipistrellus*	1	Foraging	MW
Non-visual	04:17	*Pipistrellus pipistrellus*	1	Foraging	JC
B	04:18	*Pipistrellus pipistrellus*	1	Commuting	MW
C	04:19	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	04:20	*Pipistrellus pipistrellus*	1	Foraging	JC
D	04:21	*Pipistrellus pipistrellus*	1	Foraging	JC
D	04:22	*Pipistrellus pipistrellus*	1	Foraging	JC
D	04:24	*Pipistrellus pipistrellus*	1	Foraging	JC
SUNRISE	04:58	-	-	-	-
FINISH	05:00	-	-	-	-

N

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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

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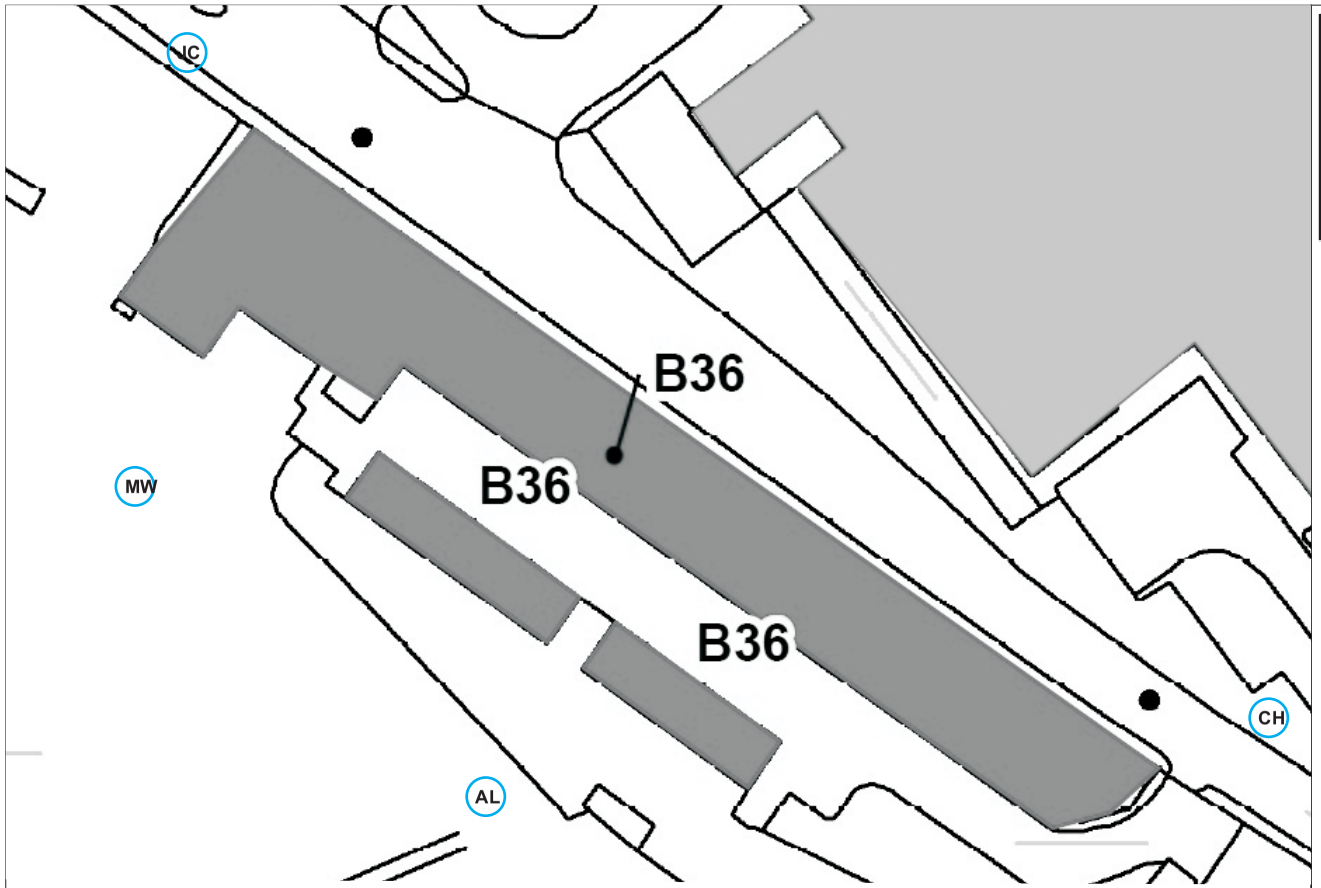
Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 - York Central
Title	B32 - Dawn Return Survey Results - 20th July 2017
Client	Ove Arup and Partners
Date	20th July 2017
Ref	1162.CH.B32.2017.07.20



Date	20th July 2017		Survey Type	Dusk Emergence Survey	
Licensed surveyors	Aran Leaf				
Additional surveyors	Catherine Hammond, Miles Watchman, Jim Clarke				
Temp (Celsius)	15	Humidity	Low	Cloud Cover %	10
Wind speed (Beaufort)	1	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	21:07	-	-	-	-
SUNSET	21:24	-	-	-	-
No Bats Recorded					
FINISH	22:54	-	-	-	-

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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

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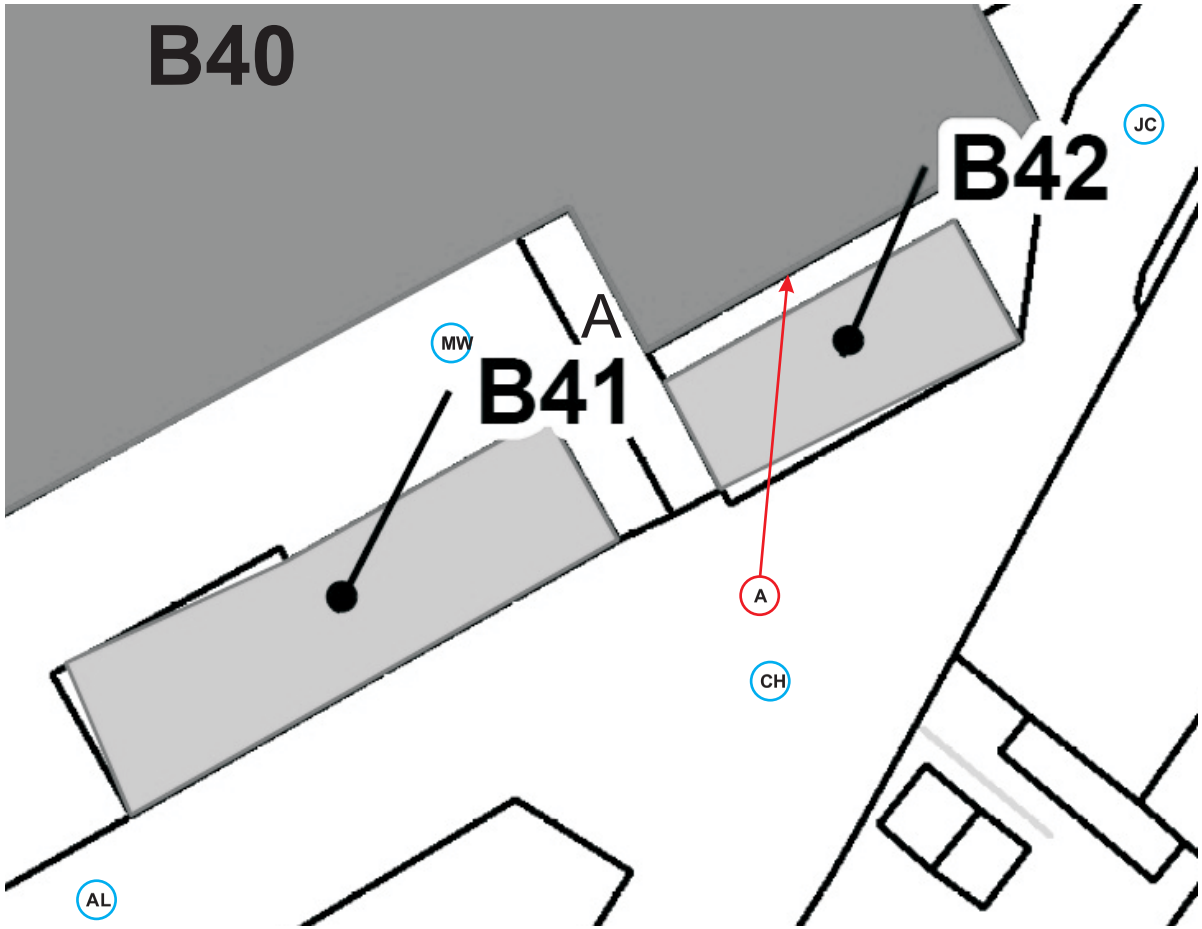
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 - York Central
Title	B36 - Dusk Emergence Survey Results - 20th July 2017
Client	Ove Arup and Partners
Date	20th July 2017
Ref	1162.CH.B36.2017.07.20



N

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Date	21st July 2017		Survey Type	Dawn Return Survey	
Licensed surveyors	Aran Leaf				
Additional surveyors	Miles Watchman, Catherine Hammond, Jim Clarke				
Temp (Celsius)	11	Humidity	High	Cloud Cover %	60
Wind speed (Beaufort)	1 to 2	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	02:57	-	-	-	-
Non-visual	03:00	*Pipistrellus pipistrellus*	1	Commuting	CH
A	04:28	*Pipistrellus pipistrellus*	1	Roost - Building 40 - entered gap in upper brickwork below finishing stone and guttering	CH
SUNRISE	05:00	-	-	-	-
FINISH	05:00	-	-	-	-

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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

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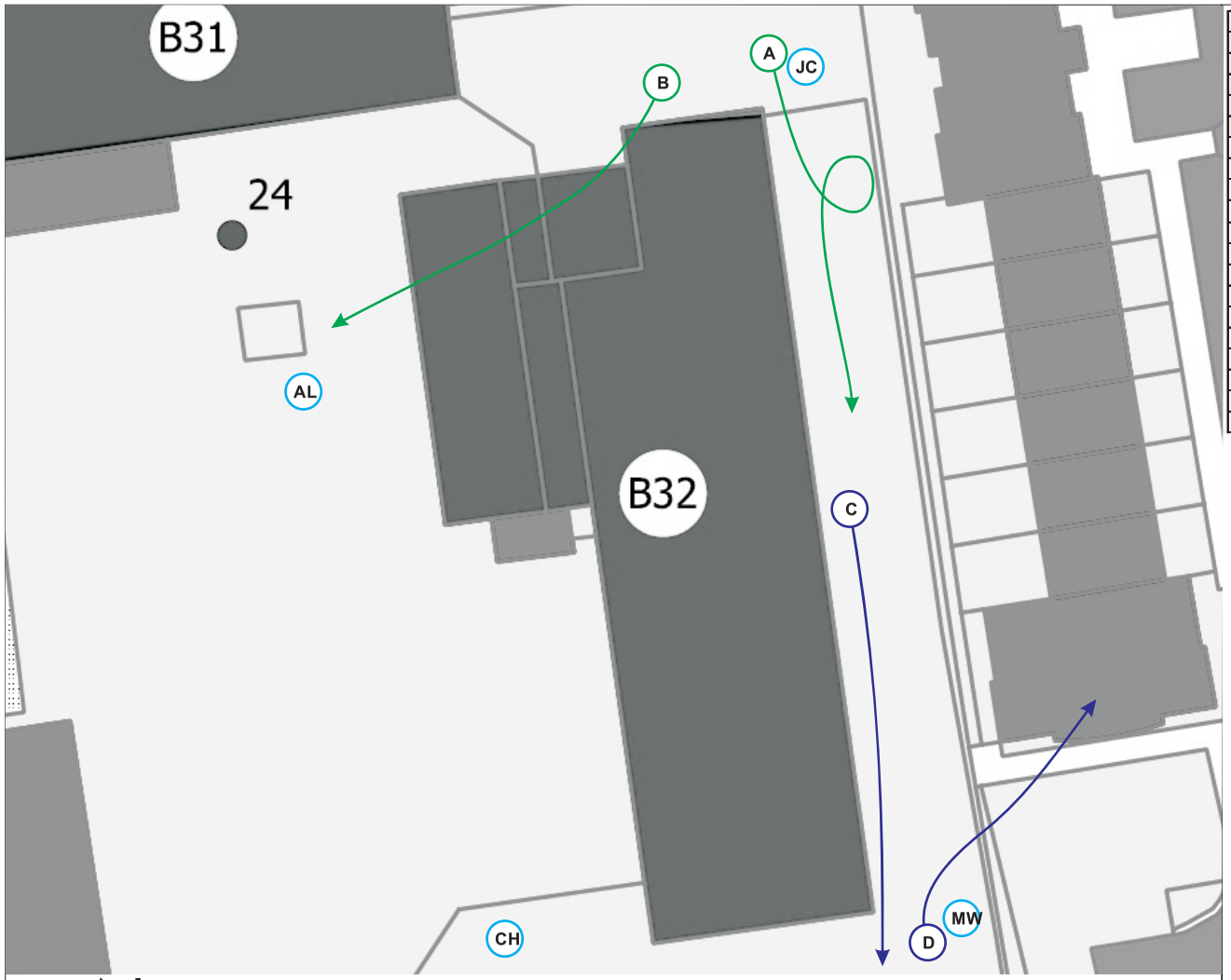
Project	1162 - York Central
Title	B41 and B42 - Dawn Return Survey Results - 21st July 2017
Client	Ove Arup and Partners
Date	21st July 2017
Ref	1162.CH.B40B41.2017.07.21



Date	2nd August 2017		Survey Type	Dusk Emrgence Survey	
Licensed surveyors	Aran Leaf				
Additional surveyors	Catherine Hammond, Miles Watchman, Jim Clarke				
Temp (Celsius)	14	Humidity	Medium	Cloud Cover %	95
Wind speed (Beaufort)	4	Precipitation	Occasional very light showers throughout survey		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	20:31	-	-	-	-
SUNSET	21:01	-	-	-	-
A	21:25	*Pipistrellus pipistrellus*	1	Commuting	JC, MW
B	21:41	*Pipistrellus pipistrellus*	1	Commuting	JC, AL
B	21:44	*Pipistrellus pipistrellus*	1	Foraging	JC
C	21:45	*Pipistrellus pipistrellus*	1	Commuting	MW
Non-visual	21:50	*Nyctalus noctula*	1	Commuting	MW, CH
Non-visual	21:53	*Nyctalus noctula*	1	Commuting	AL
D	22:06	*Pipistrellus pipistrellus*	1	Commuting	MW
Non-visual	22:12	*Pipistrellus pipistrellus*	1	Commuting	MW
Non-visual	22:13	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	22:19	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	22:33	*Pipistrellus pipistrellus*	1	Foraging	JC
FINISH	22:35	-	-	-	-

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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

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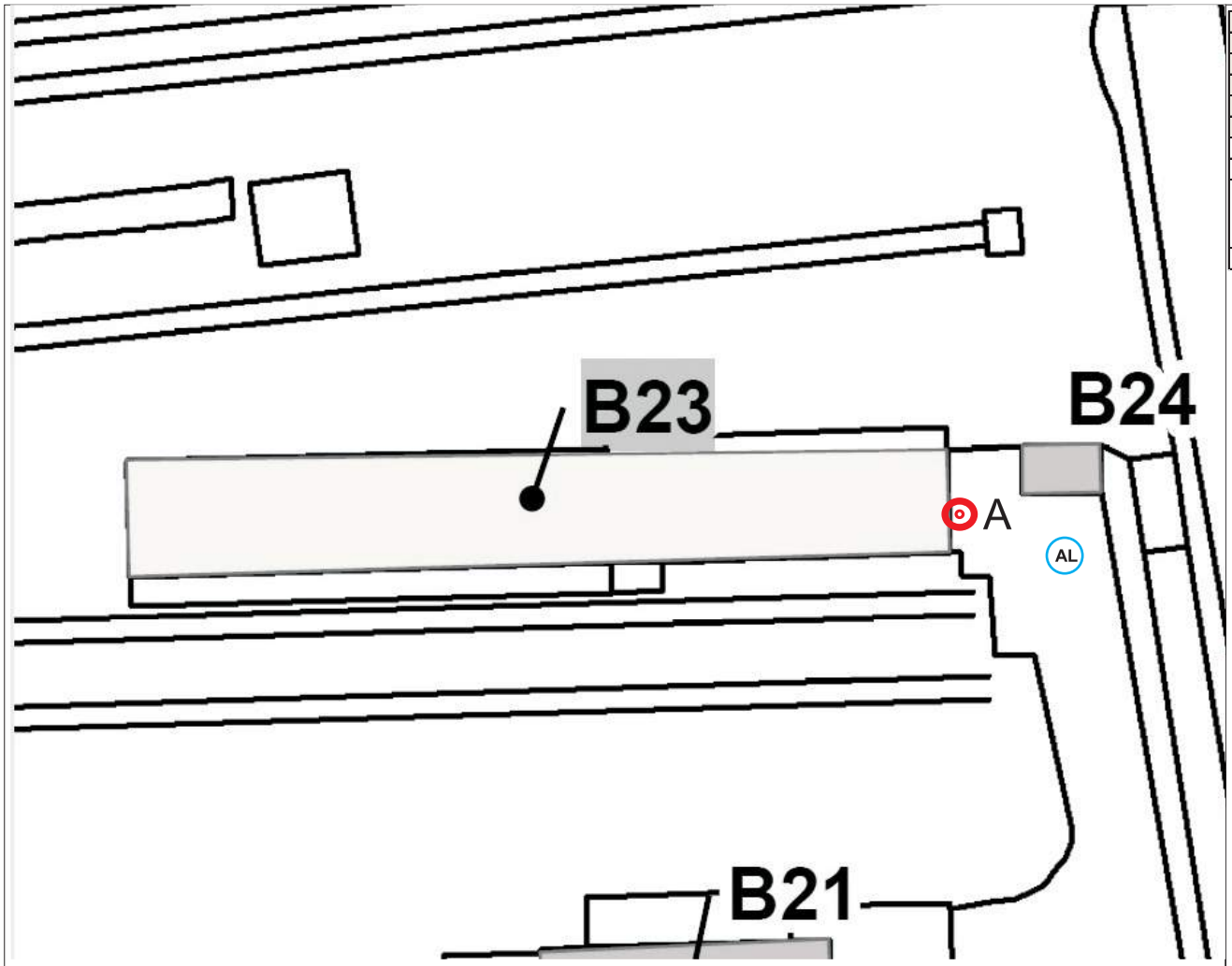
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 - York Central
Title	B32 - Dusk Emergence Survey Results - 2nd August 2017
Client	Ove Arup and Partners
Date	2nd August 2017
Ref	1162.CH.B32.2017.08.02



Date	3rd August 2017		Survey Type	Dusk Emergence Survey	
Licensed surveyors	Aran Leaf				
Additional surveyors	-				
Temp (Celsius)	15	Humidity	Low	Cloud Cover %	85
Wind speed (Beaufort)	3	Precipitation	0		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	20:28	-	-	-	-
SUNSET	20:59	-	-	-	-
A	N/A	*Single bat dropping found on concrete below fascia on eastern elevation*			AL
FINISH	22:28	-	-	-	-

N

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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

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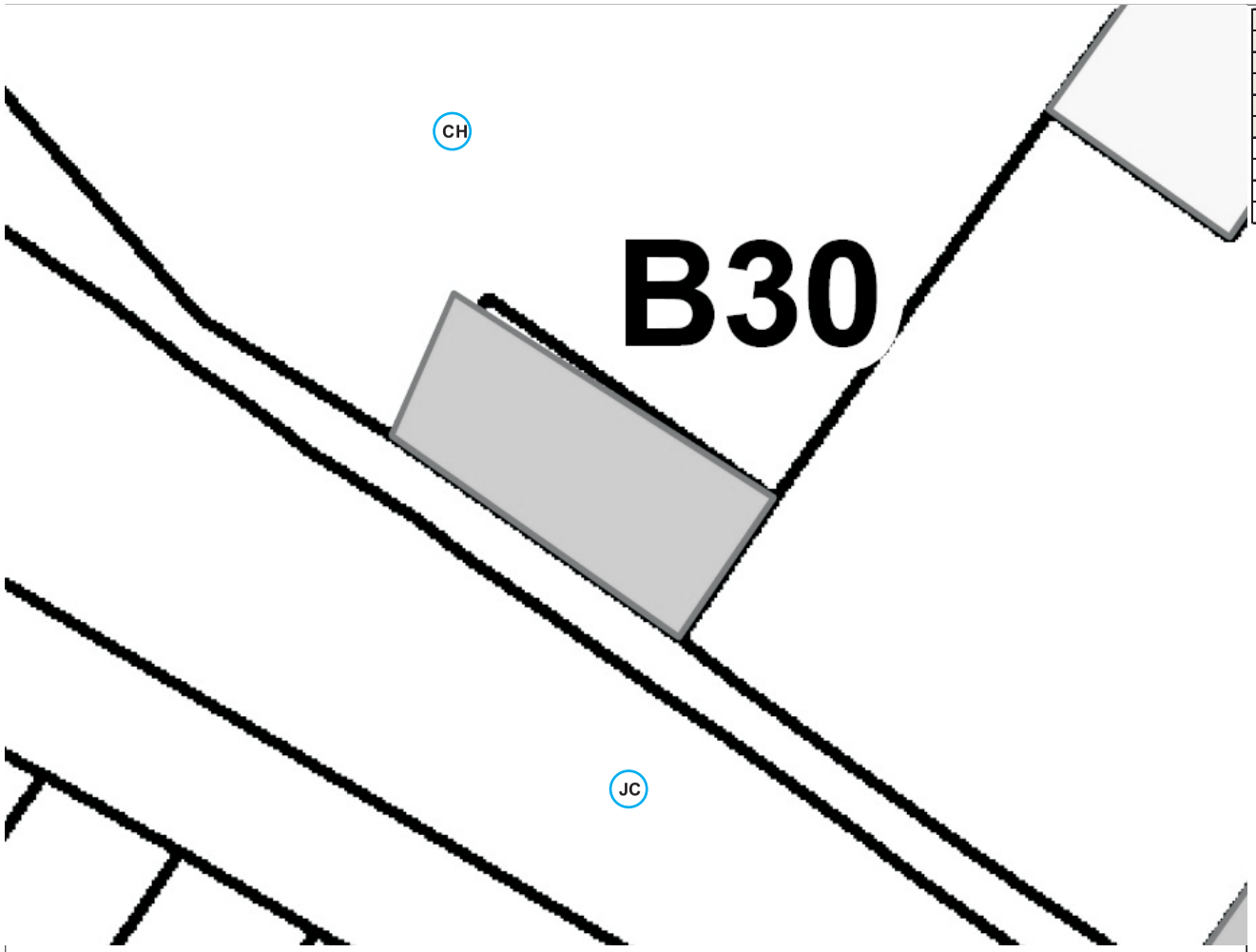
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 - York Central
Title	B23 - Dusk Emergence Survey Results - 3rd August 2017
Client	Ove Arup and Partners
Date	3rd August 2017
Ref	1162..CH.B23.2017.08.03



Date	3rd August 2017		Survey Type	Dusk Emergence Survey	
Licensed surveyors					
Additional surveyors	Jim Clarke, Catherine Hammond				
Temp (Celsius)	15	Humidity	Low	Cloud Cover %	85
Wind speed (Beaufort)	3	Precipitation	0		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	20:24	-	-	-	-
SUNSET	20:59	-	-	-	-
No Bats Recorded					
FINISH	22:28	-	-	-	-

N

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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

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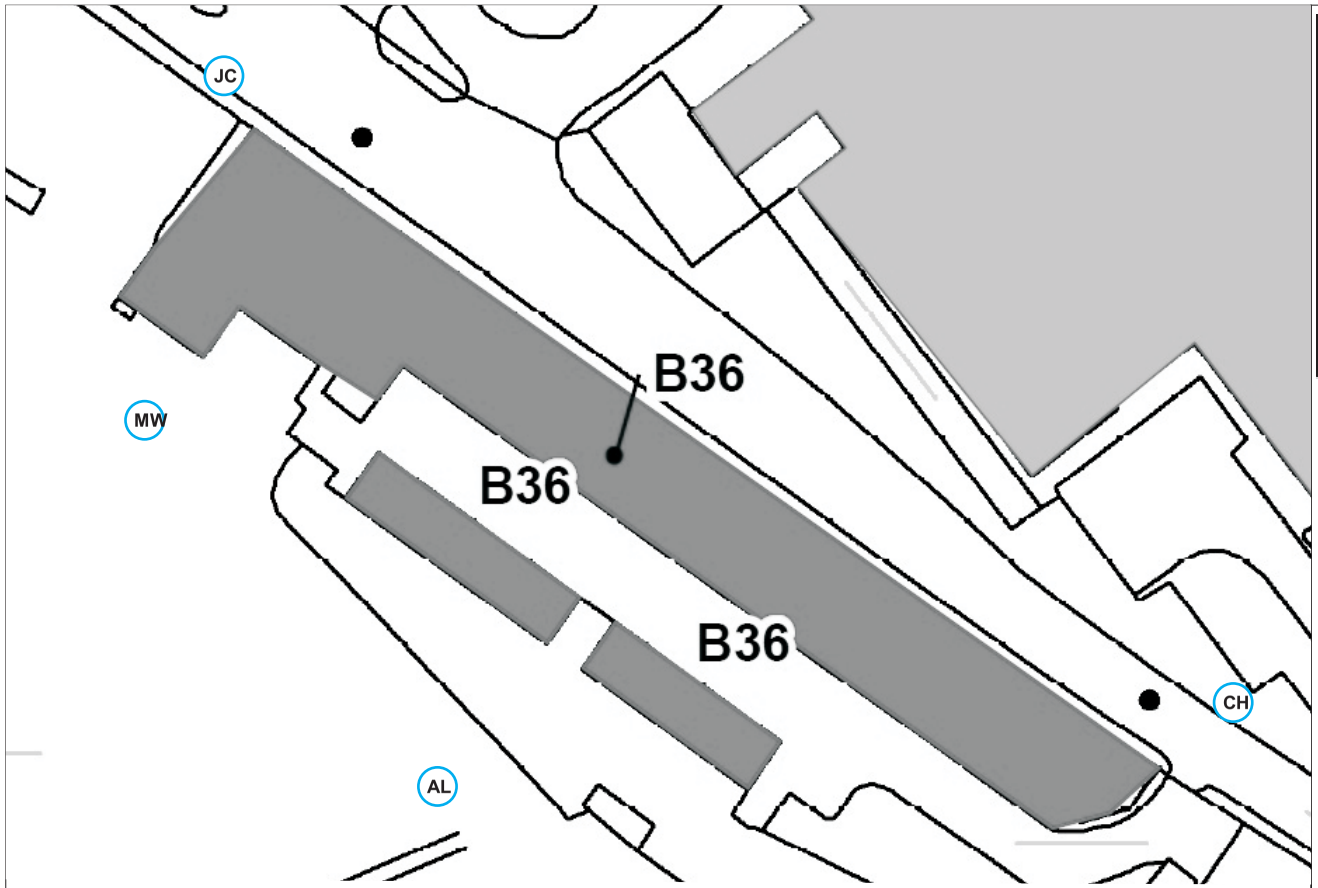
Project	1162 - York Central
Title	B30 - Dusk Emergence Survey Results - 3rd August 2017
Client	Ove Arup and Partners
Date	3rd August 2017
Ref	1162.CH.B30.2017.08.03



Date	3rd August 2017		Survey Type	Dawn Return Survey	
Licensed surveyors	Aran Leaf				
Additional surveyors	Catherine Hammond, Miles Watchman, Jim Clarke				
Temp (Celsius)	14	Humidity	High	Cloud Cover %	0
Wind speed (Beaufort)	1	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	03:21	-	-	-	-
Non-visual	03:26 to 03:28	*Nyctalus noctula*	1	Commuting	JM, MW, AL
Non-visual	03:33	*Pipistrellus pipistrellus*	1	Foraging	CH
Non-visual	03:38	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	03:46	*Pipistrellus pipistrellus*	1	Commuting	Al, JC
Non-visual	03:56	*Nyctalus noctula*	1	Commuting	CH
Non-visual	04:00	*Nyctalus noctula*	1	Commuting	MW
SUNSET	05:21	-	-	-	-
FINISH	05:21	-	-	-	-

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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

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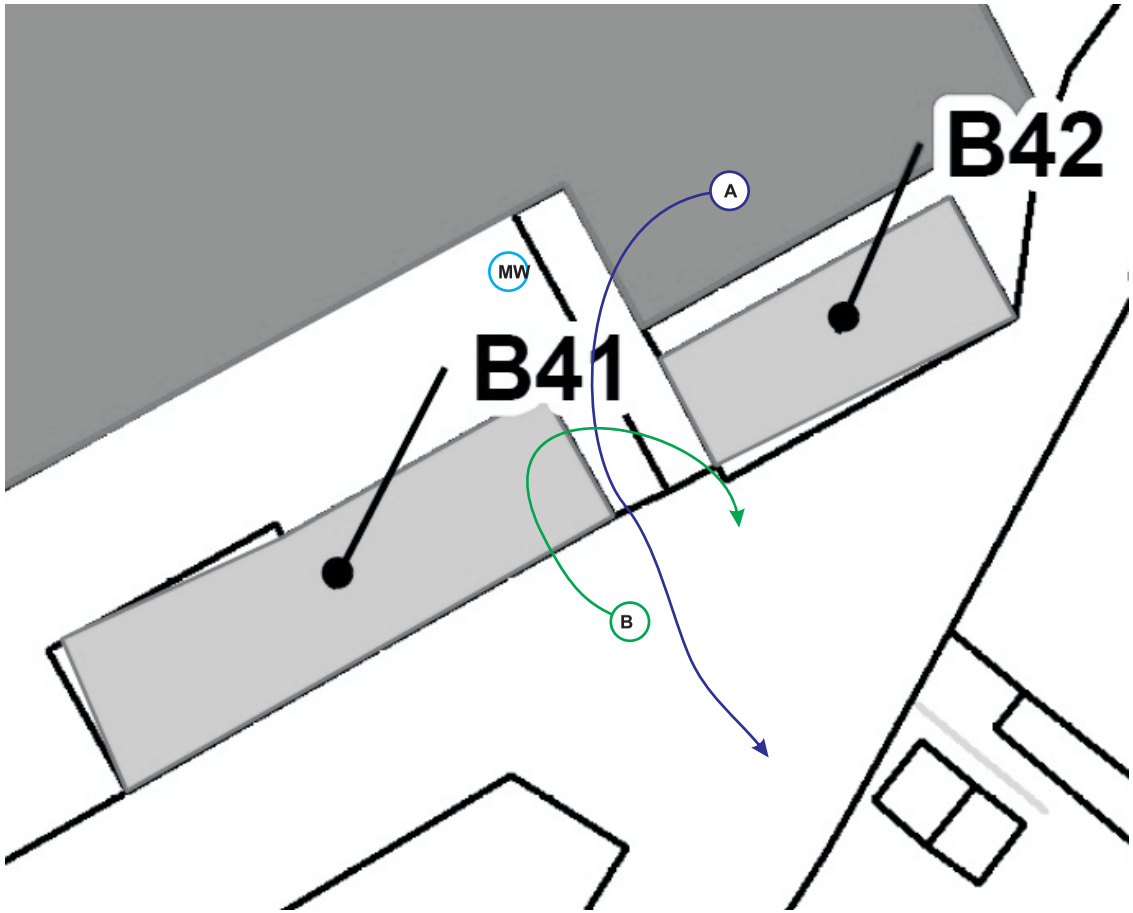
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 - York Central
Title	B36 - Dawn Return Survey Results - 3rd August 2017
Client	Ove Arup and Partners
Date	3rd August 2017
Ref	1162.CH.B36.2017.08.03



Do not scale from plan

Date	3rd August 2017		Survey Type	Dusk Emergence Survey	
Licensed surveyors					
Additional surveyors	Miles Watchman, Dave Gash				
Temp (Celsius)	15	Humidity	Medium	Cloud Cover %	90
Wind speed (Beaufort)	3	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	20:25	-	-	-	-
SUNSET	20:59	-	-	-	-
A	21:16	*Pipistrellus pipistrellus*	1	Commuting - from approximate direction of roost recorded in B40	MW
B	21:32	*Pipistrellus pipistrellus*	1	Foraging	MW
A	21:47	*Pipistrellus pipistrellus*	1	Commuting + social calls	MW
FINISH	22:28	-	-	-	-

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Legend

??	Surveyor Location	Foraging Activity	
??	Roost Location	Commuting Activity	
	Swarming activity	Target note	

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Project	1162 - York Central
Title	B41 - Dusk Emergence Survey Results - 3rd August 2017
Client	Ove Arup and Partners
Date	3rd August 2017
Ref	1162.CH.B41.2017.08.03

Date	4th August 2017	Survey Type	Dawn Return Survey		
Licensed surveyors	Aran Leaf				
Additional surveyors	Dave Gash, Catherine Hammond, Miles Watchman, Jim Clarke				
Temp (Celsius)	15	Humidity	Medium	Cloud Cover %	90
Wind speed (Beaufort)	3	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	03:22	-	-	-	-
No Bats Recorded					
SUNRISE	05:22	-	-	-	-
FINISH	05:22	-	-	-	-

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Legend

?? Surveyor Location		Foraging Activity	
?? Roost Location		Commuting Activity	
Swarming activity		Target note	

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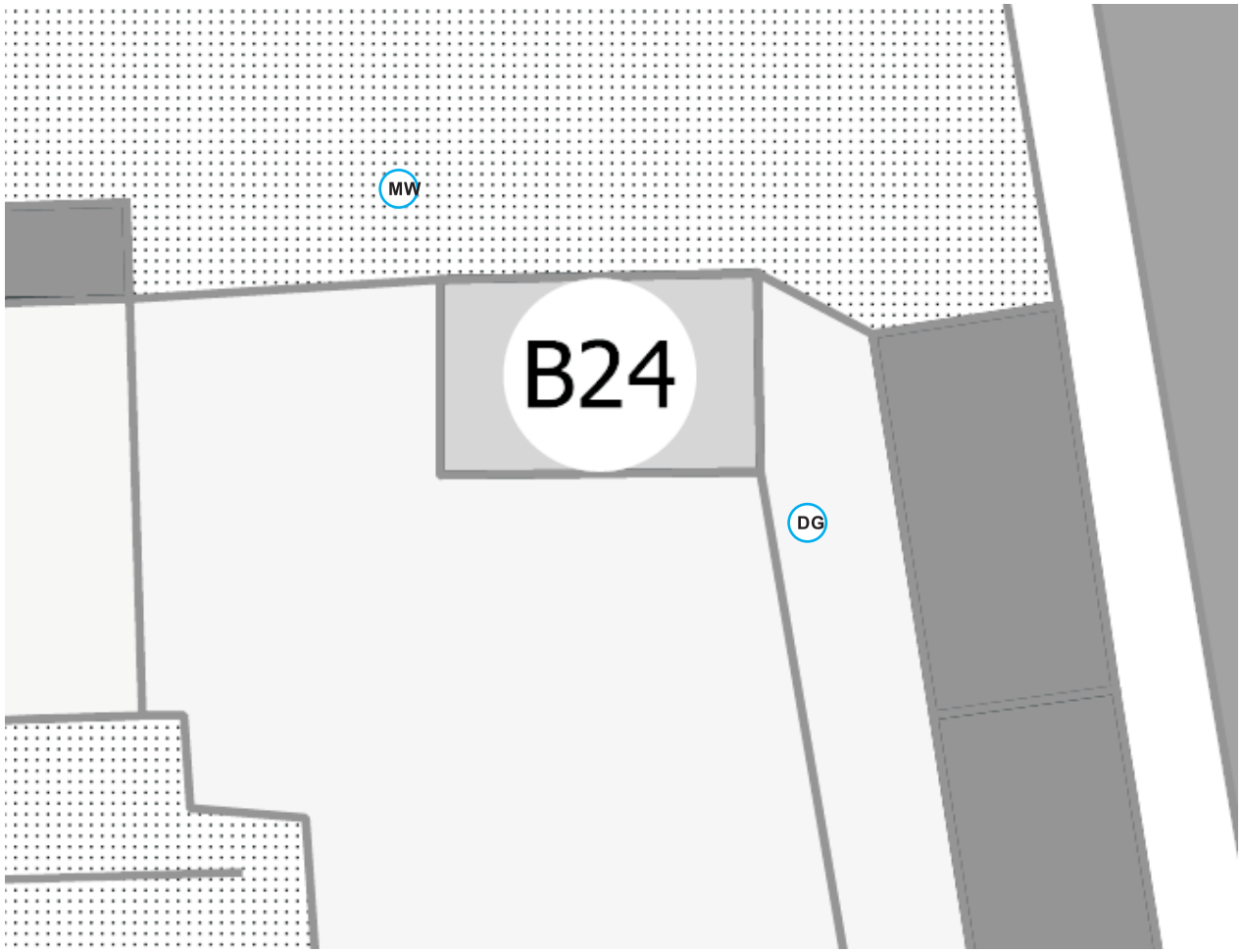
Project	1162 - York Central
Title	B40 - Dawn Return Survey Results - 4th August 2017
Client	Ove Arup and Partners
Date	4th August 2017
Ref	1162.BCH.B40.2017.08.04



Date	10th August 2017		Survey Type	Dusk Emerence Survey	
Licensed surveyors					
Additional surveyors	Dave gash, Miles Watchman				
Temp (Celsius)	14	Humidity	Low	Cloud Cover %	0
Wind speed (Beaufort)	3	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	20:30	-	-	-	-
SUNSET	20:45	-	-	-	-
No Bats Recorded					
FINISH	22:15	-	-	-	-

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Legend

?? Surveyor Location		Foraging Activity	
?? Roost Location		Commuting Activity	
Swarming activity		Target note	

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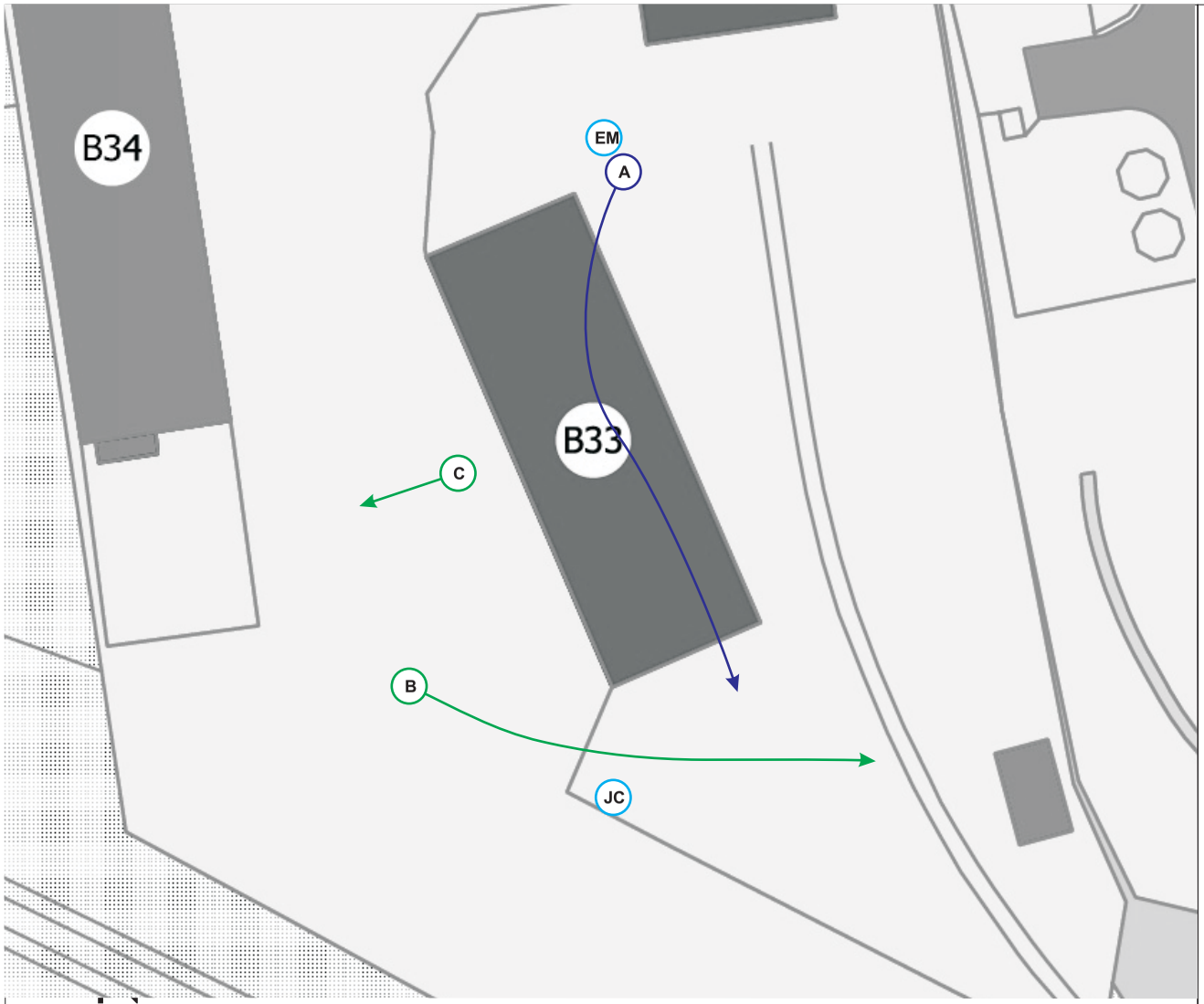
Project	1162. York Central
Title	B24 - Dusk Emergence Survey Results - 10th August 2017
Client	Ove Arup and Partners
Date	10th August 2017
Ref	1162.CH.B24.2017.08.10



Date	10th August 2017		Survey Type	Dusk Emergence Survey	
Licensed surveyors	Elizabeth McBride				
Additional surveyors	Jim Clarke				
Temp (Celsius)	14	Humidity	Low	Cloud Cover %	0
Wind speed (Beaufort)	3	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	20:25	-	-	-	-
SUNSET	20:45	-	-	-	-
A	20:59	*Pipistrellus pipistrellus*	1	Commuting	EM, JC
B	21:07	*Pipistrellus pipistrellus*	1	Foraging	JC
C	21:20	*Pipistrellus pipistrellus*	1	Foraging	JC
B	21:26	*Pipistrellus pipistrellus*	1	Foraging	JC
FINISH	22:15	-	-	-	-

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Legend

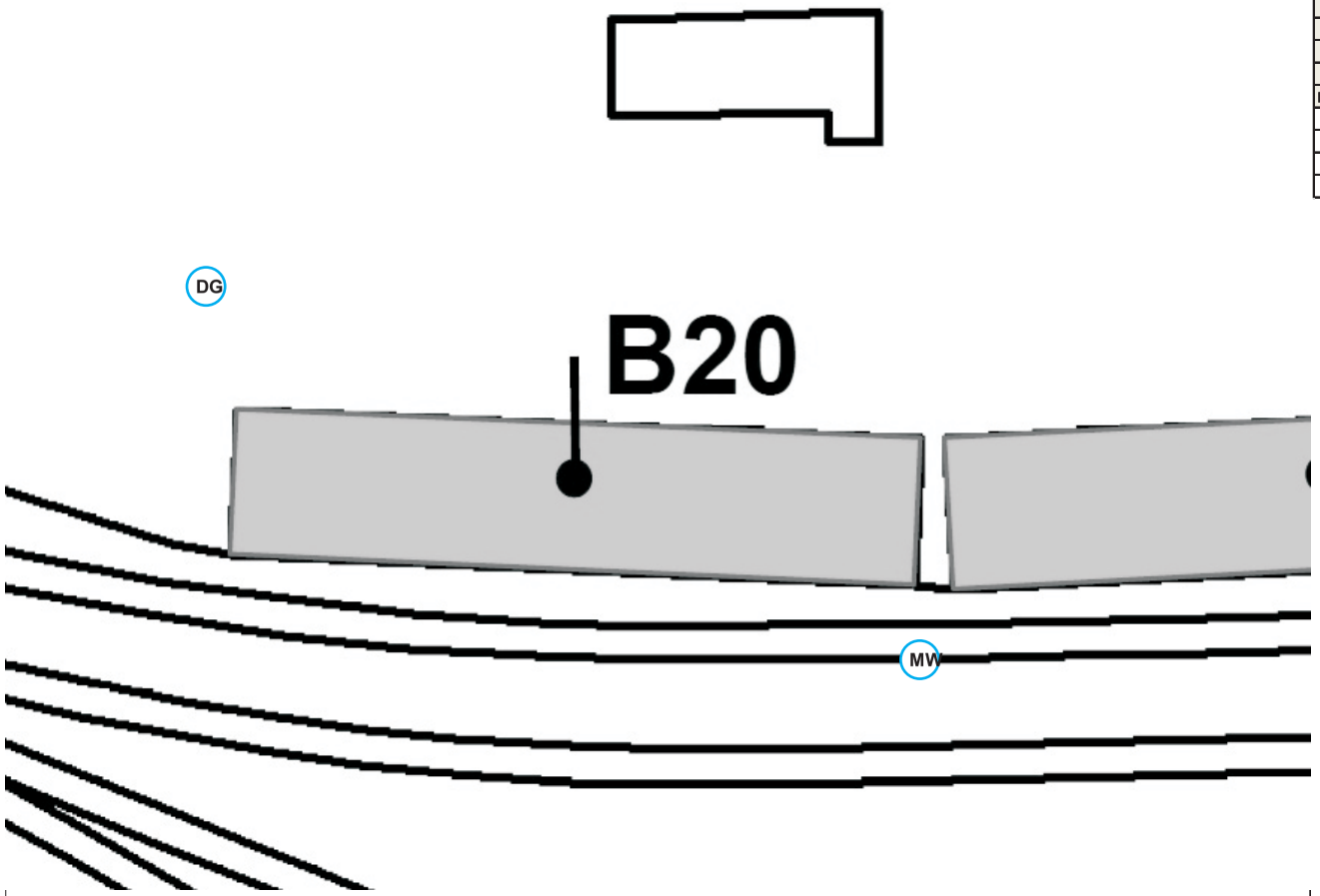
??	Surveyor Location	←	Foraging Activity
??	Roost Location	←	Commuting Activity
⬭	Swarming activity	◎	Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 - York Central
Title	B33 - Dusk Emergence Survey Results - 10th August 2017
Client	Ove Arup and Partners
Date	10th August 2017
Ref	1162.CH.B33.2017.08.10

Date	11th August 2017		Survey Type	Dawn Return Survey	
Licensed surveyors					
Additional surveyors	Dave Gash, Miles Watchman				
Temp (Celsius)	10	Humidity	Low	Cloud Cover %	0
Wind speed (Beaufort)	2	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	03:54	-	-	-	-
Non-visual	04:30	*Nyctalus noctula*	1	Commuting	DG
SUNRISE	05:35	-	-	-	-
FINISH	05:51	-	-	-	-



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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
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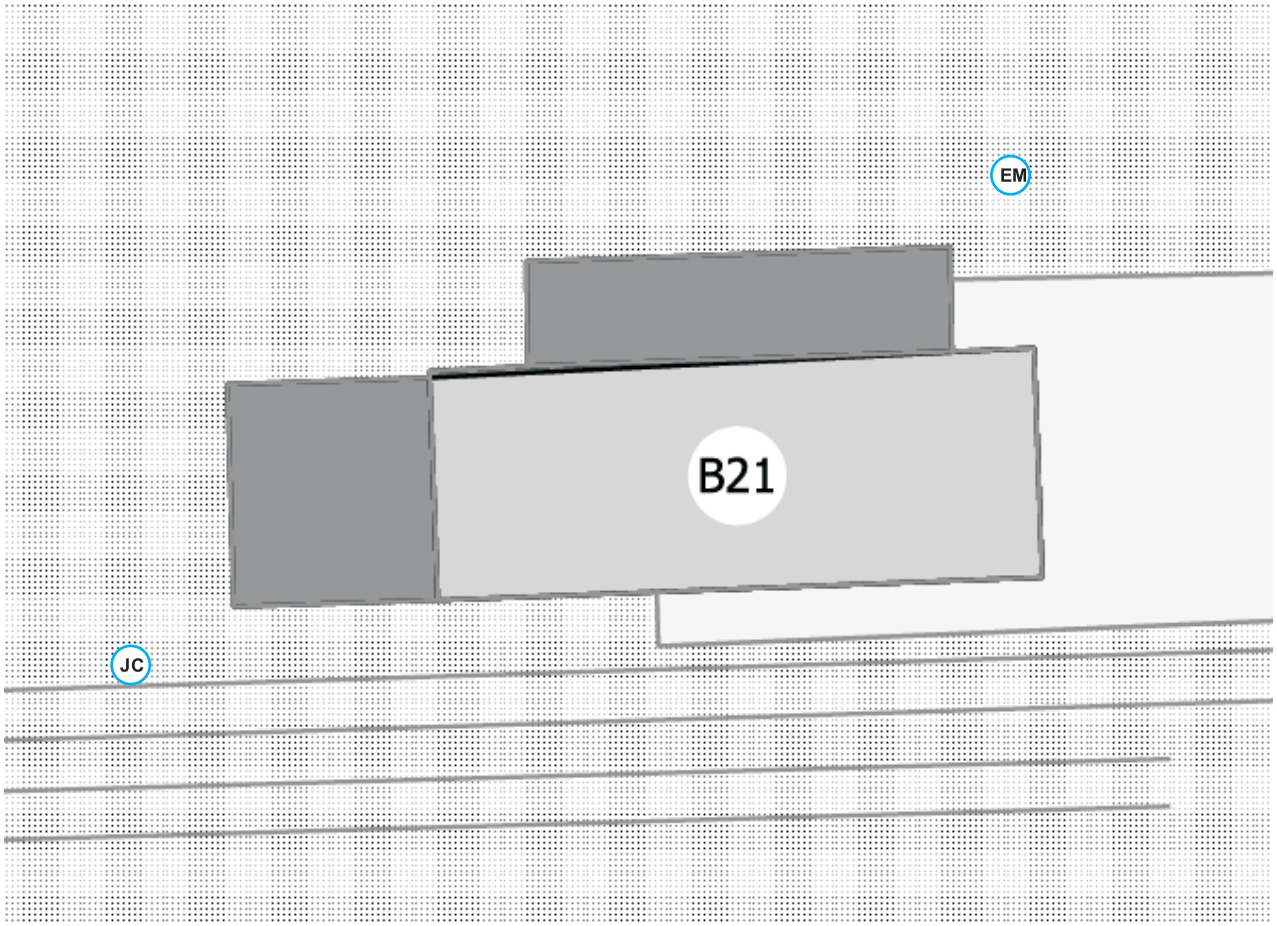
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 York Central
Title	B20 - Dawn Return Survey Results - 11th August 2017
Client	Ove Arup and Partners
Date	11th August 2017
Ref	1162.CH.B20.2017.08.11



Date	11th August 2017		Survey Type	Dawn Return Survey	
Licensed surveyors	Elizabeth McBride				
Additional surveyors	Jim Clarke				
Temp (Celsius)	10	Humidity	Medium	Cloud Cover %	0
Wind speed (Beaufort)	2	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	03:56	-	-	-	-
No Bats Recorded					
SUNRISE	05:35	-	-	-	-
FINISH	05:40	-	-	-	-

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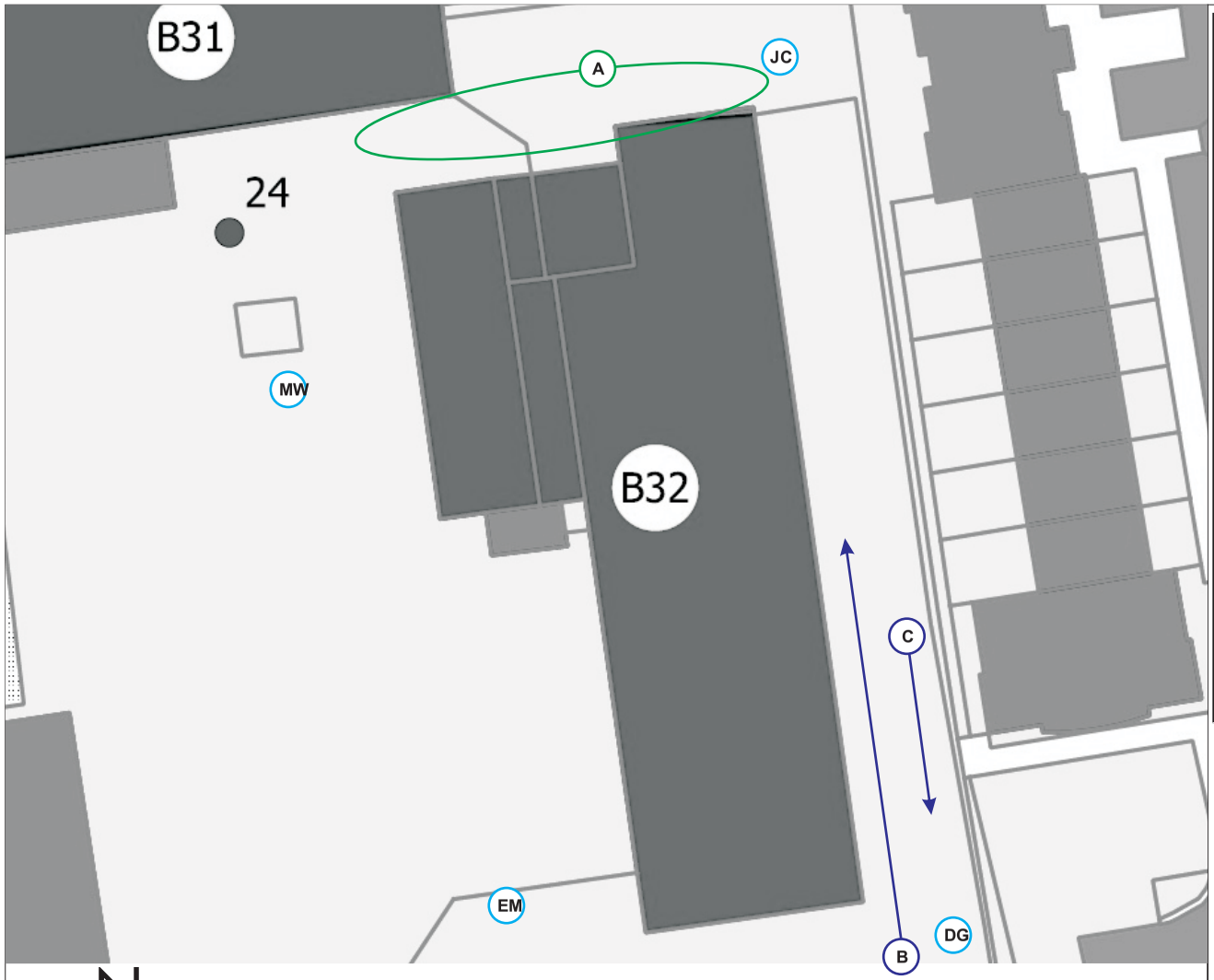
Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162. York Central
Title	B21 - Dawn Return Survey Results - 11th August 2017
Client	Ove Arup and Partners
Date	11th August 2017
Ref	1162.CH.B21.2017.08.11



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Date	17th August 2017	Survey Type	Dusk Emergence Survey
Licensed surveyors	Aran Leaf, Elizabeth McBride		
Additional surveyors	Dave Gash, Miles Watchman, Jim Clarke		
Temp (Celsius)	19	Humidity	Low
Cloud Cover %	60		
Wind speed (Beaufort)	2	Precipitation	None

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	20:10	-	-	-	-
SUNSET	20:29	-	-	-	-
A	20:52 to 20:53	*Pipistrellus pipistrellus*	1	Foraging	JC
B	20:59	*Pipistrellus pipistrellus*	1	Commuting	DG
C	21:01	*Pipistrellus pipistrellus*	1	Commuting	DG
Non-visual	21:02	*Pipistrellus pipistrellus*	1	Commuting	EM
Non-visual	21:05 to 2106	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	21:14	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	21:26	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	21:30	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	21:35	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	21:37	*Pipistrellus pipistrellus*	1	Foraging	JC, MW
Non-visual	21:38	*Nyctalus noctula*	1	Commuting	EM
Non-visual	21:42	*Pipistrellus pipistrellus*	1	Commuting	DG, JC
Non-visual	21:44	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	21:46 to 21:48	*Pipistrellus pipistrellus*	1	Foraging	JC, DG
Non-visual	21:46	*Nyctalus noctula*	1	Commuting	EM, MW
Non-visual	21:47	*Pipistrellus pipistrellus*	1	Commuting	DG, EM
Non-visual	21:48 to 21:49	*Nyctalus noctula*	1	Commuting	DG, EM
Non-visual	21:50 to 21:52	*Pipistrellus pipistrellus*	1	Foraging	JC
Non-visual	21:54	*Pipistrellus pipistrellus*	1	Commuting	DG
Non-visual	21:57	*Unidentified Bat*	1	Commuting	MW
FINISH	22:00	-	-	-	-

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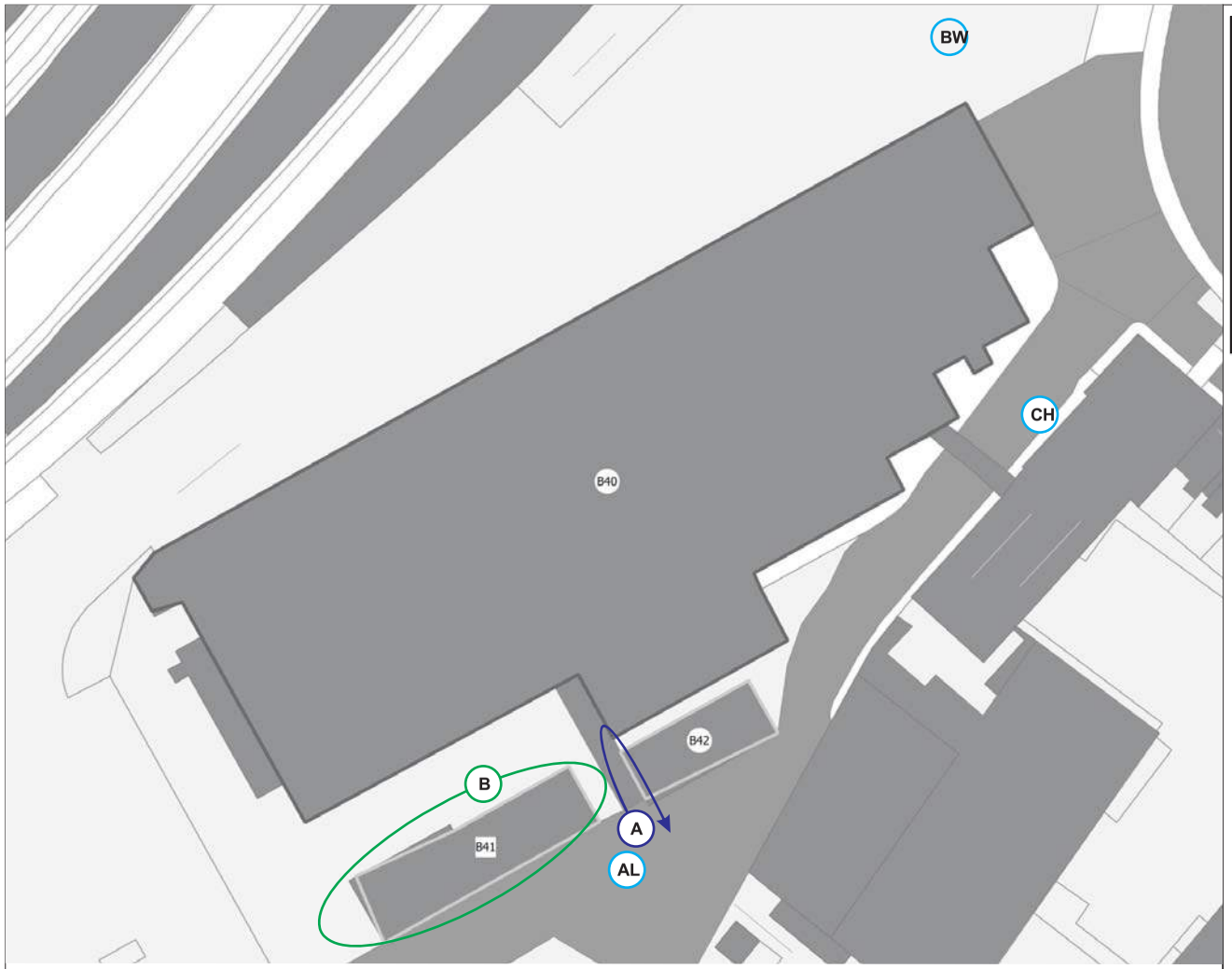
Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 - York Central
Title	B32 - Dusk Emergence Survey Results - 17th August 2017
Client	Ove Arup and Partners
Date	17th August 2017
Ref	1162.CH.B32.2017.08.17



Date	17th August 2017		Survey Type	Dusk Emergence Survey	
Licensed surveyors	Aran Leaf, Belinda Wiggs				
Additional surveyors	Catherine Hammond				
Temp (Celsius)	19	Humidity	Low	Cloud Cover %	60
Wind speed (Beaufort)	2	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	20:15	-	-	-	-
SUNSET	20:30	-	-	-	-
A	21:04	*Pipistrellus pipistrellus*	1	Commuting	AL
A	21:14	*Pipistrellus pipistrellus*	1	Commuting	AL
B	21:16 to 21:27	*Pipistrellus pipistrellus*	3	Foraging	AL
Non-Visual	21:40	*Pipistrellus pipistrellus*	1	Foraging	CH
Non-Visual	21:47	*Pipistrellus pipistrellus*	1	Foraging	CH
Non-Visual	21:50	*Pipistrellus pipistrellus*	1	Foraging	CH
FINISH	22:00	-	-	-	-

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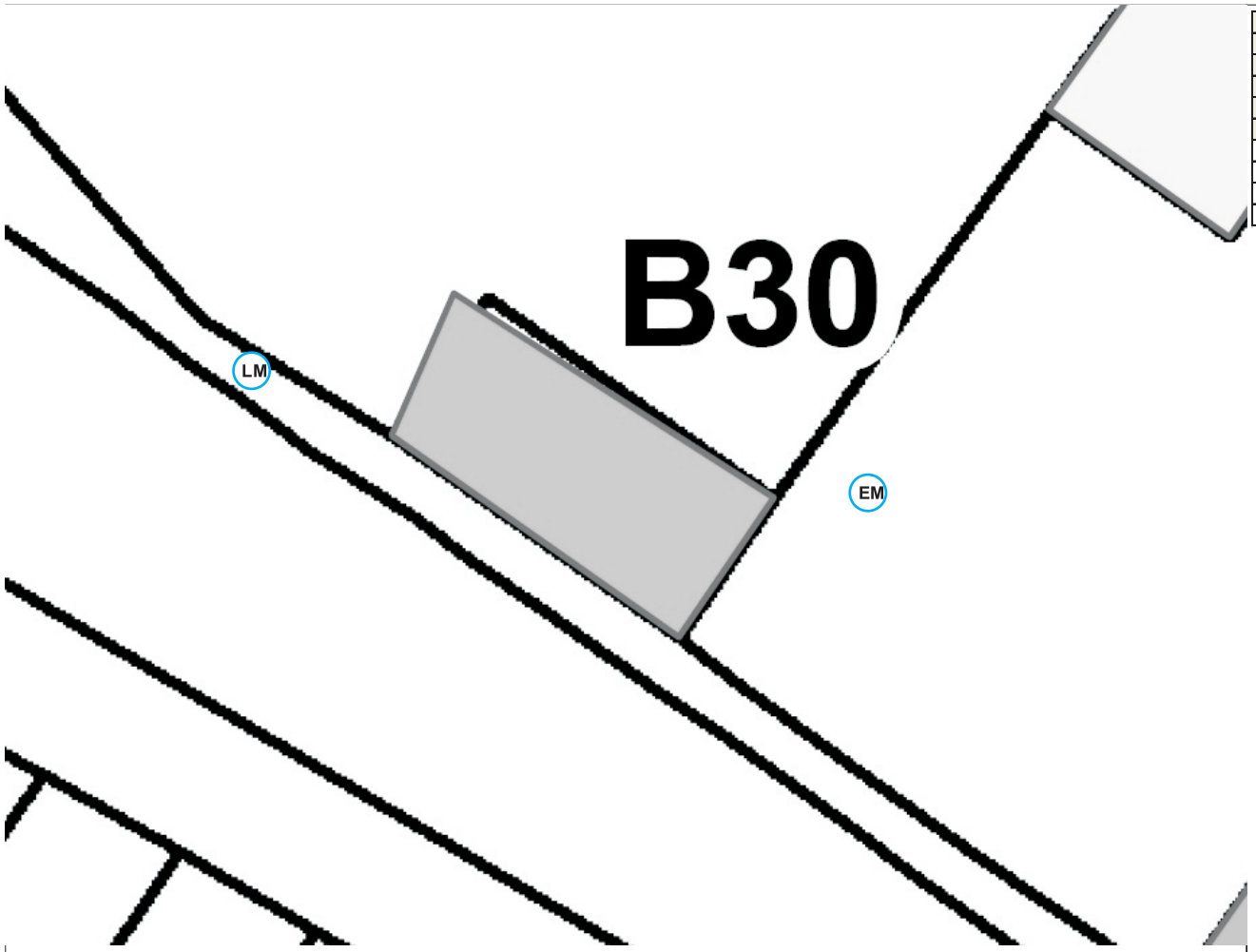
Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 - York Central
Title	B40 - Dusk Emergence Survey Results - 17th August 2017
Client	Ove Arup and Partners
Date	17th August 2017
Ref	1162.CH.B40.2017.08.17



Date	18th August 2017		Survey Type	Dawn Return Survey	
Licensed surveyors	Louisa Molloy, Elizabeth McBride				
Additional surveyors					
Temp (Celsius)	14	Humidity	Medium	Cloud Cover %	20
Wind speed (Beaufort)	2 to 3	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	04:00	-	-	-	-
No Bats Recorded					
SUNRISE	05:48	-	-	-	-
FINISH	05:48	-	-	-	-

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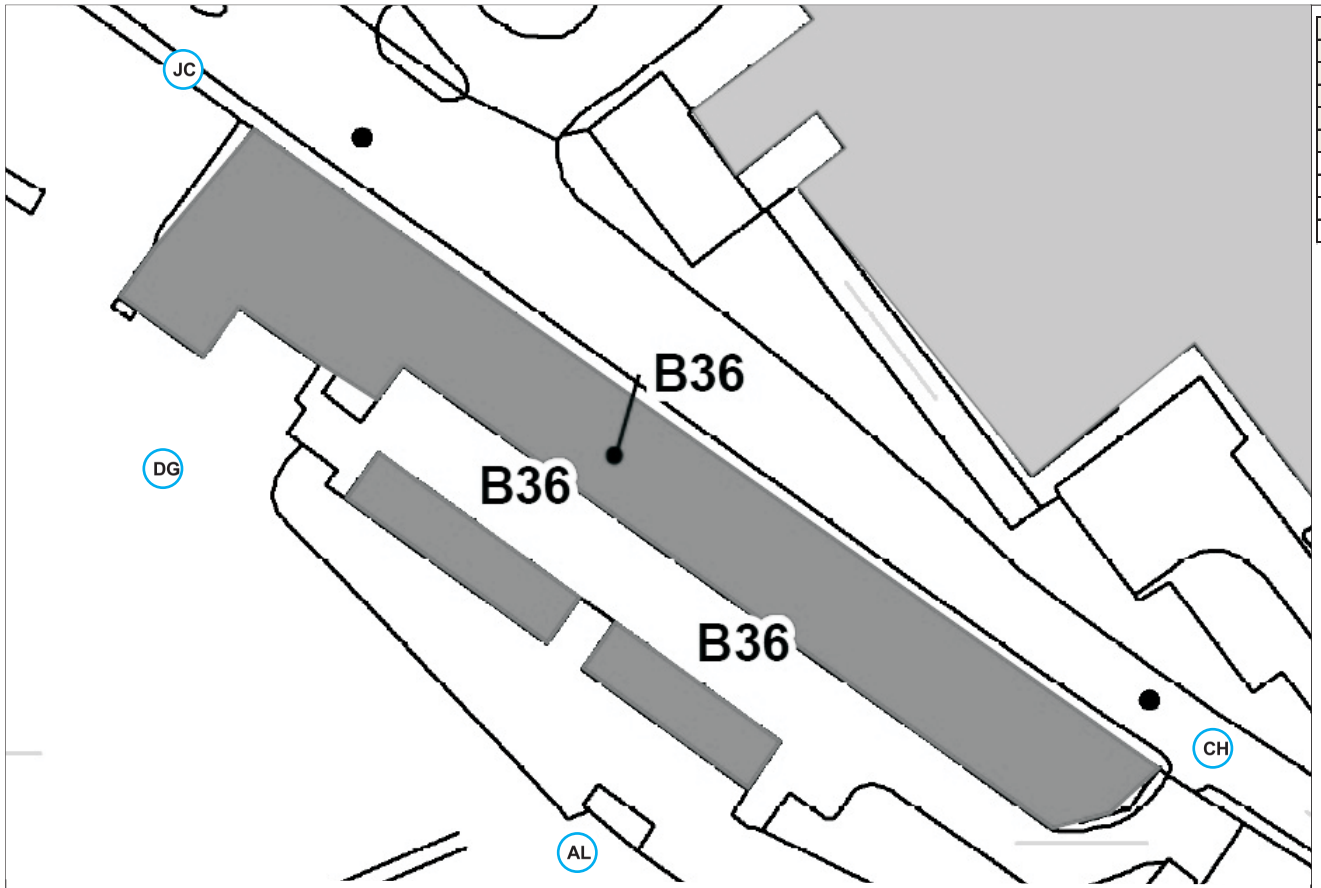
??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 - York Central
Title	B30 - Dawn Return Survey Results - 18th August 2017
Client	Ove Arup and Partners
Date	18th August 2017
Ref	1162.CH.B30.2017.08.18



Date	18th August 2017		Survey Type	Dawn Return Survey	
Licensed surveyors	Aran Leaf				
Additional surveyors	Catherine Hammond, Dave Gash, Jim Clarke				
Temp (Celsius)	14	Humidity	Medium	Cloud Cover %	20
Wind speed (Beaufort)	2	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	03:48	-	-	-	-
No Bats Recorded					
SUNSET	05:48	-	-	-	-
FINISH	05:48	-	-	-	-

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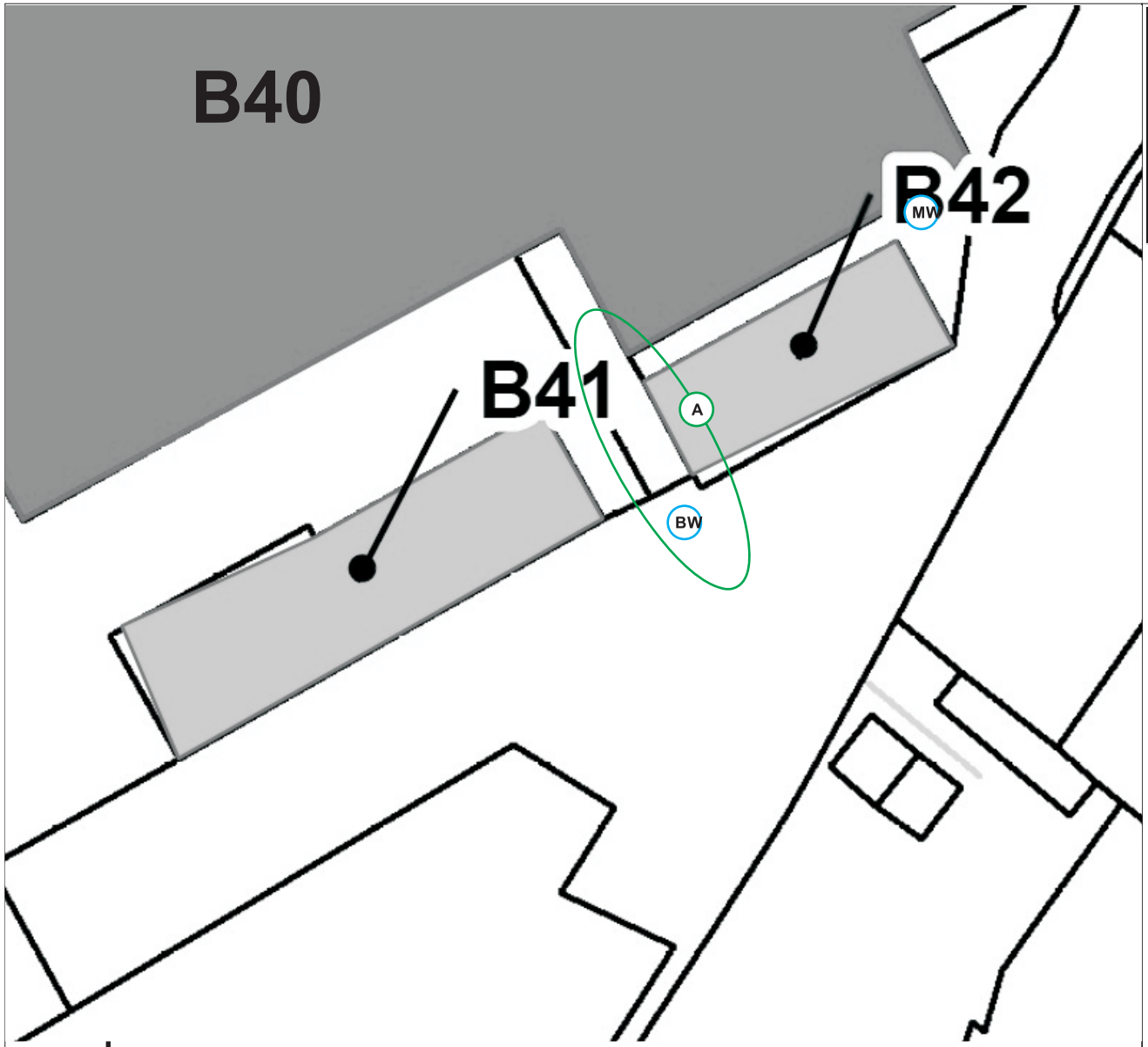
??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.

Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.

On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 - York Central
Title	B36 - Dawn Return Survey Results - 18th August 2017
Client	Ove Arup and Partners
Date	18th August 2017
Ref	1162.CH.B36.2017.08.18



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Date	18th August 2017		Survey Type	Dawn Return Survey	
Licensed surveyors	Belinda Wiggs				
Additional surveyors	Miles Watchman				
Temp (Celsius)	14	Humidity	Low	Cloud Cover %	5
Wind speed (Beaufort)	2	Precipitation	None		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	03:55	-	-	-	-
Non-visual	04:27	*Unidentified Bat*	1	Commuting	BW
A	05:18 to 05:19	*Pipistrellus pipistrellus*	1	Foraging	MW. BW
SUNRISE	05:48	-	-	-	-
FINISH	05:48	-	-	-	-

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Legend

??	Surveyor Location		Foraging Activity
??	Roost Location		Commuting Activity
	Swarming activity		Target note

Please Note: Flight paths are shown as an indication only. The point where routes are shown to start and terminate are where the bats come into, and are lost from the view of the surveyor.
Commuting and Foraging routes shown to start at the building are where bats are seen flying above the roof or around the building unless otherwise indicated.
On routes where more than one type of activity is recorded the following order of priority is observed: Roosting>Swarming>Foraging>Commuting

Project	1162 - York Central
Title	B42 - Dawn Return Survey Results - 18th August 2017
Client	Ove Arup and Partners
Date	18th August 2017
Ref	1162.CH.B42.2017.08.18

Date	21st August 2017		Survey Type	Dusk Emergence Survey	
Licensed surveyors	Louisa Molloy, Belinda Wiggs				
Additional surveyors	Dave Gash, Catherine Hammond				
Temp (Celsius)	17	Humidity	High	Cloud Cover %	100
Wind speed (Beaufort)	0	Precipitation	Light drizzle at start of survey		

Record ID	Time	Species	Num. Bats	Event	Surveyor Initials
START	20:00	-	-	-	-
SUNSET	20:22	-	-	-	-
Non-visual	20:43	*Pipistrellus pipistrellus*	1	Commuting	BW, DG
A	20:44	*Pipistrellus pipistrellus*	1	Commuting - under right archway of bridge	BW, DG
Non-visual	20:45	*Pipistrellus pipistrellus*	1	Commuting	LM, CH
Non-visual	20:48	*Pipistrellus pipistrellus*	1	Commuting	LM, CH
Non-visual	20:50	*Pipistrellus pygmaeus*	1	Commuting	BW, DG
A	20:52	*Pipistrellus pipistrellus*	1	Commuting	BW, DG
B	20:52	*Pipistrellus pipistrellus*	1	Foraging	LM, CH
Non-visual	20:54	*Pipistrellus pipistrellus*	1	Commuting	BW, DG
Non-visual	20:54	*Pipistrellus pipistrellus*	1	Commuting	LM, CH
Non-visual	21:07	*Pipistrellus pipistrellus*	1	Commuting	BW, DG
Non-visual	21:13	*Nyctalus noctula*	1	Commuting	BW, DG
Non-visual	21:16	*Pipistrellus pipistrellus*	1	Commuting	BW, DG
Non-visual	21:17	*Pipistrellus pipistrellus*	1	Commuting	LM, CH
Non-visual	21:17	*Pipistrellus pipistrellus*	1	Commuting	BW, DG
Non-visual	21:27	*Pipistrellus pipistrellus*	1	Commuting	BW, DG
Non-visual	21:33	*Pipistrellus pipistrellus*	1	Commuting	LM, CH
Non-visual	21:34	*Pipistrellus pipistrellus*	1	Commuting	BW, DG
Non-visual	21:40	*Nyctalus noctula*	1	Commuting	BW, DG
FINISH	21:52	-	-	-	-

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Legend

??	Surveyor Location	←	Foraging Activity
??	Roost Location	←	Commuting Activity
⬭	Swarming activity	◎	Target note

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Project	1162. York Central
Title	Bridge - Dusk Emergence Survey Results - 21st August 2017
Client	Ove Arup and Partners
Date	21st August 2017
Ref	1162.LM.BRIDGE.2017.08.21

Appendix 11F
Preliminary Ecological Appraisal

York Central

Preliminary Ecological Appraisal

Issue 4 | 10 July 2018

Job number 251869-00

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ARUP

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Drawings

Appendices

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Desk Study

Appendix B

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Appendix C

Habitat Suitability Index - Great Crested Newts

Executive Summary

This report details the results of the Preliminary Ecological Appraisal (PEA) undertaken at York Central. The report also includes an Ecological Constraints and Opportunities Plan (ECOP) in line with BS42020.

The key results are as follows:

No statutory nature conservation designated sites were identified within the Site boundary or adjacent to the Site. However, the Site is located within the impact buffers from Clifton Ings Site of Special Scientific Interest. The Local Authority should consult Natural England on whether the proposed Development may have an impact on this designated site. Additionally, three non-statutory sites (Sites of Importance for Nature Conservation and Sites of Local Interest: Millennium Green, York Central and Holgate Park Drive) were identified within and adjacent to the Site. A review of the current status of York Central Site of Local Interest is recommended regarding potential impacts from proposed works.

The Site is dominated by buildings, hardstanding and ephemeral vegetation which is subject to sporadic scrub encroachment. There are pockets of woodland, semi-improved grassland and amenity vegetation throughout the Site, predominantly adjacent to housing estates.

Japanese knotweed *Fallopia japonica* and giant hogweed *Heracleum mantegazzianum*, were identified on the Site. Further surveys identifying the extent of these species is recommended. Additionally, Himalayan balsam *Impatiens glandulifera*, was identified adjacent to Holgate Beck. An update survey and method statement/ management plan will be required in order to avoid the spread of invasive species off-site.

Internal and external surveys of buildings identified to have bat roost suitability are required. This is a prerequisite for formal bat activity surveys in line with current guidelines. This includes the bridge on Water Lane. Automatic bat recorders are to be installed to monitor the bat activity in the local area.

A field survey to identify the presence or absence of badger *Meles meles*, along the sidings is required.

Holgate Beck was identified to have suitable habitat for water vole *Arvicola amphibius*. Therefore, a water vole survey of this beck is recommended.

Suitable habitat for nesting birds was identified on the Site. A survey to characterise the habitat is recommended. If vegetation clearance of suitable habitat is to occur within the nesting bird season, a nesting bird survey is to be carried out by a qualified ornithologist immediately prior to the vegetation clearance taking place. Additionally, further consultation with the County Ecologist regarding the scope of survey required for black redstart is recommended.

Suitable habitat for reptiles was identified on the Site. A reptile survey is recommended to determine presence/likely absence across the Site.

Habitat within the Site was observed to have a moderate level of botanical diversity. Additionally, records identified tansy beetle *Chrysolina graminis*, to be

present on the Site. Therefore an invertebrate survey is recommended to determine species/assemblage on the Site.

1 Introduction

Ove Arup and Partners Ltd. (Arup) were commissioned by York Central Partnership to undertake a Preliminary Ecological Appraisal (PEA) (Phase 1 Habitat survey and protected species scoping study) of the York Central (SE590519) Site. For the purpose of this appraisal, the Site comprises the Proposed Red Line Boundary, which was updated in July 2018 to include an additional parcel of land within Millennium Green (Drawing 1). The PEA encompasses both a Phase 1 Habitat survey and protected species scoping study in line with CIEEM guidance.[1] The PEA also conforms to the British Standard BS42020:2013 Biodiversity Code of Practice for Planning & Development.

1.1 Site and Scheme Description

The Site is located to the west of York City Centre predominantly to the west of York Railway Station on an area of railway sidings. There is a parcel of land comprising the Millennium Green Land on the north-east of the York Central Site. The remainder of the Site includes amenity parklands, car parking and allotments. The dominant land use surrounding the Site is residential with smaller areas of land occupied by commercial businesses and greenspace.

Holgate Beck, a tributary of the River Ouse, runs north westwards across the Site, entering a culvert close to Holgate Road on the southern corner of the Site and re-emerging at surface in Millennium Green

It is proposed that the Site is redeveloped to be of mixed-use to provide an improved infrastructure within a close proximity to York Railway Station. The proposed Development would allow for the potential redevelopment of the National Railway Museum and provide space for commercial and residential properties. This will also include the incorporation of open public/greenspace through the Site.

1.2 Report Objectives

The report objectives are to identify the habitats within the Site (Proposed Red Line Boundary, Drawing 1), assess the potential for, or presence of, any protected or notable species, potential ecological impacts, further survey requirements and to outline mitigation and potential enhancement options, as appropriate. In addition the report includes an Ecological Constraints and Opportunities Plan (ECOP) in line with BS42020.

1.3 Report Structure

The report includes:

[1] CIEEM (2013), Guidelines for Preliminary Ecological Appraisal. http://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/GPEA/GPEA_April_2013.pdf

- Section 2: Legal and Policy Context.
- Section 3: Methodology.
- Section 4: Results.
- Section 5: Discussion and Recommendations.
- Section 6: Conclusions.

2 Legal and Policy Context

There is a comprehensive system of legislation, both domestic and international, which aims to protect biodiversity at the landscape, habitat and species level. Much of the legislation pertaining to biodiversity exists within, and also independently of, the planning process.

2.1 Wildlife and Countryside Act 1981 (WCA) (as amended)

This is the primary legislation covering endangered species in England and sets out the framework for the designation of Sites of Special Scientific Interest (SSSIs). It confers differing levels of protection on species themselves, their habitats, or both, depending on their conservation status. Species offered protection by the Act are listed in a series of schedules. These Schedules are subject to a rolling review on a five-yearly basis. Protected species are listed under Section 1 (birds), Schedule 5 (animals other than birds and invertebrates) and Schedule 8 (plants).

2.2 Countryside and Rights of Way Act 2000

This Act affords a greater level of protection to Sites of Special Scientific Interest (SSSIs), provides enhanced management arrangements for Areas of Outstanding Natural Beauty (AONBs), and strengthens wildlife enforcement legislation. This Act has amended the Wildlife and Countryside Act by the addition of the term 'recklessly' to Section 1(5) and Section 9 (4) which has resulted in additional obligations with respect to protected species. As such, it is now an offence to intentionally or recklessly disturb protected species listed on the relevant Schedules of the WCA.

2.3 Natural Environment and Rural Communities Act 2006

The Natural Environment and Rural Communities (NERC) Act 2006, is designed to help achieve a rich and diverse natural environment and thriving rural communities. Under Section 40 there is a Duty to conserve biodiversity; specifically, Subsection (1) states *"Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity."*

Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under Section 40.

2.4 The Protection of Badgers Act 1992

This Act brings together all the legislation that is specific to badgers *Meles meles*, with the exception of their inclusion on Schedule 6 of the Wildlife and Countryside Act 1981, (which prohibits certain methods of taking or capture). The Act makes it an offence to intentionally kill or ill-treat a badger, and destroy, disturb or obstruct a sett. Specifically, it imposes restrictions on works carried out within certain distances of badger setts. Any works that will directly impact on an existing sett are only permitted subject to approval through the issue of a licence from Natural England.

2.5 EC Directive Conservation of Natural Habitats & Flora (92/43/EEC)

The Conservation of Habitats and Species Regulations 2010 (as amended) are the British response to the Habitats & Species Directive 1992 issued by the European Community (EC) (which is now the European Union (EU)). They offer protection to a number of plant and animal species throughout the EC via the designation of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). In the United Kingdom these regulations are implemented through the Wildlife and Countryside Act 1981 (as amended).

The Regulations for the protection of European Protected Species (EPS) have been amended and consolidated with key changes including the removal of most of the defences from regulation 40 and regulation 43 including the removal of the 'incidental result of an otherwise lawful operation' defence, and the increase in the threshold for the offence of deliberately disturbing an EPS. Proposals that will affect European Protected Species may require a licence from Natural England to allow an otherwise unlawful act. In 2009 a new offence of 'breaching condition of an EPS licence' was added to the regulations. The licensing process is separate from the planning process. European protected species include all species of bats, great crested newt *Triturus cristatus*, and European otter *Lutra lutra*.

2.6 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in March 2012 and is a material consideration in all planning decisions. NPPF refers to the responsibilities of the local authorities to conserve the natural environment with respect to the use of the 'Circular 6/2005: Biodiversity and Geological Conservation – Statutory Obligation and their Impact within the Planning System' as guidance in this process. All public bodies including local planning authorities are to consider habitats and species of Principal Importance listed in Section 41 of the NERC Act and Priority Species / Habitats within Biodiversity Action Plans when considering a planning application.

2.7 Non-Statutory Local Sites

Non-statutory local sites are referred to as Sites of Importance for Nature Conservation (SINC) within the region. These sites are of county importance for

their wildlife value. They have no statutory protection but are recognised by Local Authorities and statutory agencies and their presence is fully considered when determining planning applications. Additionally, Sites of Local Interest are referred to, which are not designated as SINCs. Although these sites are not considered when determining planning applications, it is best practice to consult with the County Ecologist if there are potential impacts from the proposed Development.

3 Methodology

3.1 Desk Study

Protected species records and non-statutory designated sites information within a 2km radius surrounding the Site were obtained from the local records centre (North and East Yorkshire Ecological Data Centre (NEYEDC)).

The Multi-Agency Geographic Information for the Countryside (MAGIC) website www.magic.gov.uk was consulted for statutory designated site information within 2km of the Site.

Ordnance Survey maps were examined for the presence of mapped waterbodies on and within a 250m radius of the Site.

The following historical report provided information regarding birds on the Site:

- Arup (2008) Phase 1 Habitat Survey and Protected Species Constraints Report. [Issued to Network Rail].

Additionally, York Ornithological Club website[2] was consulted regarding sightings of black redstart *Phoenicurus ochruros*.

3.2 Field Survey

3.2.1 Phase 1 Habitat Survey

A field survey of the original Site boundary was carried out in June 2016. An additional area of land to the north-west was surveyed in May 2017 and an extension to the Proposed Red Line Boundary, incorporating land within Millennium Green, was surveyed in July 2018. Habitats were identified using the standard Phase 1 Habitat survey methodology (JNCC, 2010[3]). As part of the field survey, the potential for the Site to support any legally protected or notable faunal species was also assessed. Unless otherwise specified, detailed faunal surveys were not undertaken at this stage; rather the potential for the Site to support each species or species group was assessed based on the known range of each species or species group, and the suitability of the habitats within the Site. Field signs or sightings of such species were recorded as observed.

3.2.2 Bat Roost Suitability Assessment

An external bat roost suitability assessment of all buildings, trees and a bridge within the Site was undertaken in June 2016, May 2017 and July 2018 to determine their suitability for supporting bat roosts. The survey was conducted from the ground using binoculars and high powered torches, where necessary. The survey follows standard methodology detailed within the Bat Conservation Trust

[2] www.tka.co.uk/yoc/local-sightings.htm
[3] Joint Nature Conservation Committee (JNCC) (2010) '*Handbook for Phase 1 Habitat Survey. A technique for environmental audit*'. Revised re-print. JNCC: Peterborough.

Bat Surveys Guidelines (Collins, 2016[4]). Each building and tree on the Site was inspected for signs of bat presence including:

- bat droppings,
- scratch and grease marks,
- live or dead bats, and
- noises of bats calling from within the roost.

In addition, features searched for on buildings included:

- cracked, missing or lifted roof tiles,
- missing mortar in walls,
- gaps in soffits, fascia or barge boards,
- presence of a cavity wall,
- any cracks or gaps at least 10mm in size.

Features searched for on trees included:

- cavities or splits in trunks/branches,
- woodpecker holes,
- loose bark, and
- dense ivy covering (may be covering up potential roosting opportunities).

Each tree and building was then awarded a level of suitability to support roosting bats at different times of the year. The assessment categories used are explained in Table 3.1.

Table 3.1: Bat roost suitability categories.

Roosting Habitat Value (adapted from Collins (2016)[2] Table 4.1 classification)	**Roosting habitats**	**Commuting and foraging habitats**
High suitability	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions (temp, humidity, height above ground level, light levels or levels of disturbance) and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree lined watercourses and grazed parkland. Site is close to and connected to known roosts.
Moderate suitability	A structure or tree with one or more potential roost sites that could be used	Continuous habitat connected to the wider landscape that could be used by bats for

[4] Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust, London.

Roosting Habitat Value (adapted from Collins (2016)[2] Table 4.1 classification)	Roosting habitats	Commuting and foraging habitats
	by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
Low suitability	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting suitability.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Negligible suitability	Negligible habitat features on the Site likely to be used by roosting bats.	Negligible habitat features on the Site likely to be used by commuting or foraging bats.

3.2.3 Habitat Suitability Index (HSI)

In compliance with current guidance (English Nature, 2001[5]) suitable waterbodies within a 250m radius of the proposed works area (approximate redline boundary; Drawing 1) (where access was available) were assessed as to their potential to support a breeding population of great crested newts. This assessment was undertaken using the Habitat Suitability Index (HSI) developed by Oldham *et al.* (2000)[6] which considers several habitat / ecological parameters. Habitat variables measured include location, desiccation, water quality, macrophyte cover, terrestrial habitat quality, etc. A value is recorded for each parameter and combined to determine an index of breeding suitability for great crested newts. The HSI is represented by a value from 0 to 1, the higher the value the more likely it is that the waterbody may support breeding great crested newt.

3.2.4 Great Crested Newt Environmental DNA Survey

An environmental DNA (eDNA) survey for great crested newts (GCN) was carried out in June 2016, on five waterbodies located either on the Site or within

[5] English Nature (now Natural England), 2001, Great Crested Newt Mitigation Guidelines. English Nature. Peterborough.
[6] Oldham, R.S., Keeble, J., Swan, M.J., and Jeffcote, M., (2000) 'Evaluating the suitability of habitats for great crested newt (*Triturus cristatus*)' Herpetological Journal 10: 143-15.

250m of the Site. Samples were taken from each waterbody in accordance with recommended guidelines (Biggs *et al.* 2014[7]). The samples were subsequent sent to an approved laboratory for analysis to determine whether the samples contained GCN eDNA.

3.2.5 Invasive Species

The list of invasive plant species included on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) is extensive and these plants are found in a range of different habitats, including aquatic habitats. The survey checked, in particular, for the presence of Japanese knotweed *Fallopia japonica*, giant knotweed *Fallopia sachalinensis*, *Fallopia japonica* x *Fallopia sachalinensis* (a hybrid knotweed) giant hogweed *Heracleum mantegazzianum* and Himalayan balsam *Impatiens glandulifera*.

3.3 Survey Limitations

Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. Therefore, the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, professional judgement allows for the likely presence of these species to be predicted with sufficient certainty so as to not significantly limit the validity of these findings.

Any grid references provided within this report are approximate (obtained through handheld GPS devices) and are to be used as a guide only. If precise grid references are required it is recommended that a detailed topographical survey is undertaken.

[7] Biggs, J., Ewald, N., Valentini, A., Gaboriaud, C., Griffiths, R.A., Foster, J., Wilkinson, J., Arnett, A., Williams, P. and Dunn, F. (2014) *Analytical and methodological development for improved surveillance of the Great Crested Newt. Defra Project WC1067.* Freshwater Habitats Trust: Oxford.

4 Results

4.1 Desk Study

Full results from the NEYEDC data search are detailed in Appendix A; a summary is provided below.

4.1.1 Statutory Designations

No statutory designations were identified within the Site boundary or adjacent to the Site. Five statutory sites were recorded within the 2km search buffer surrounding the Site (Table 4.1).

Table 4.1: Statutory designated sites recorded within a 2km buffer of the Site.

Name	Location	Reason for designation
Clifton Ings and Rawcliffe Meadows Site of Special Scientific Interest (SSSI)	330m north	Clifton Ings and Rawcliffe Meadows SSSI is a nationally important site for its species-rich neutral grassland. The Site also supports tansy beetle *Chrysolina graminis*, an iridescent green leaf beetle with a highly restricted range. Thought to support the only remaining populations in the British Isles.
Hob Moor Local Nature Reserve (LNR)	680m south-west	Unimproved pasture managed to provide habitat for skylark *Alauda arvensis* and meadow pipit *Anthus pratensis*.
St Nicholas Fields LNR	1.3km east	This is an ex-landfill site which has recovering biodiversity with various habitats including young woodland, scrub, meadow, rough grassland, coppice and a stream. The stream is known to support water vole.
Fulford Ings SSSI	1.3km south-east	Fulford Ings is an important example of flood plain mire.
Clifton Backies LNR	1.7km north-east	Species rich meadow and scrub.

The website MAGIC (www.magic.gov.uk) includes information detailing the SSSI Impact Risk Zones, which have been developed to guide planners on whether a development would impact on a SSSI/SAC/SPA/Ramsar site.

The website illustrates that impact buffers extend onto the Site from the two SSSI listed (Table 4.1) and from Askham Bog SSSI located 3km south-west of the Site. However based on the associated guidance, it was identified that the proposed Development, is not included within the list of development types, for which consultation is required between the Local Authority and Natural England, for Fulford Ing SSSI and Askham Bog SSSI (e.g. Aviation or pig and poultry units).

However, the Site is located within impact buffers from Clifton Ings SSSI, which indicate that the Local Authority should consult with Natural England in relation to large scale residential developments (100 units or more).

4.1.2 Non-statutory Designations

Two non-statutory designated sites, Sites of Local Interest (SLI), were identified within and adjacent to the Site boundary. York Central SLI is located within the Site and Holgate Park Drive SLI is located adjacent to the Site.
Nineteen Sites of Importance for Nature Conservation (SINC) were identified within the 2km search radius surrounding the Site (Table 4.2).

Table 4.2: Non-statutory sites located within 2km radius.

Name and site code	Location	Reason for designation
York Central – Site of Local Interest	On the Site	Remnant old meadow containing long established ant hills
Holgate Park Drive – Site of Local Interest	Adjacent to Site	Re-establishing grassland with areas of scrub
Holgate Millennium Green (103) - SINC	Adjacent to Site	Urban greenspace managed for Nature Conservation under Criteria Gr1, the presence of Mg4 grassland
Severus Hill Reservoir Basin (35) – SINC	Approx. 0.4km South-west of the Site	The outer slopes of the reservoir are very steep and dominated by dense thorn scrub, mainly hawthorn (*Crataegus monogyna*) with some blackthorn (*Prunus spinosa*), ash (*Fraxinus excelsior*) and sycamore (*Acer pseudoplatanus*). The calcicolous grassland within the basin appears to be much more diverse. The grassland is mostly an open and quite flower-rich type of false oat-grass (*Arrhenatherum elatius*) sward but with locally-frequent upright brome (*Bromopsis erecta*)
Clifton Bridge (13) – SINC	Approx. 0.5km north of the Site	Clifton Bridge houses important nursery colonies of Noctule, Daubenton's and Pipistrelle Bats which occupy cavities between the pillars and the underside of the bridge. This site is designated for its mammal interest under Criteria M1b and M1c
Clifton Ings (14) – SINC	Approx. 0.6km north of the Site.	Clifton Ings is designated as a Site of Importance for Nature Conservation as an example of species-rich flood meadow grassland under Criteria Gr1, Gr4, and Sw1
Rawcliffe Meadows (31) – SINC	Approx. 0.6km north of the Site	Most of the site is floodplain hay meadow, with the richest grassland occurring towards the southern end. Great burnet (*Sanguisorba officinalis*), meadowsweet (*Filipendula ulmaria*), meadow vetchling (*Lathyrus pratensis*), meadow buttercup (*Ranunculus acris*) and common sorrel (*Rumex acetosa*) are at least locally-frequent with grasses including meadow foxtail (*Alopecurus pratensis*), Yorkshire fog (*Holcus lanatus*), meadow fescue (*Festuca pratensis*) and, in small amounts, meadow barley (*Hordeum secalinum*). However, there are also species-poor stands dominated by creeping bent (*Agrostis stolonifera*) and creeping buttercup (*Ranunculus repens*)
Extn to Hob Moor Community School (198) – SINC	Approx. 0.9km south of the Site.	Hob moor is designated as a Site of Importance for Nature Conservation as an example of old permanent pasture habitat with areas of MG5 grassland, semi-natural acidic grassland and scrub

Name and site code	Location	Reason for designation
Hob Moor (20) – SINC	Approx. 0.9km south of the Site	The land is unimproved pasture which is traditionally grazed over the summer. This has ensured that a special floristic habitat thrives and provides valuable breeding habitat for skylark and meadow pipit, both of which are endangered species in the United Kingdom
R. Ouse (63) – SINC	Approx. 1km south-east of the Site.	The River Ouse is designated as a Site of Importance for Nature Conservation under Criteria F2 for migratory fish species
Poppleton Glassworks (5-30) (202) – SINC	Approx. 1km north-west of the Site.	No information available.
Fishpond Wood (104) – SINC	Approx. 1.2km west of the Site.	Fishponds Wood is designated as a Site of Importance for Nature Conservation primarily for its invertebrate interest under Guideline H2 for the presence of a rare species in Yorkshire. However, the spring communities present are also of interest. Such communities have become increasingly scarce as a result of extensive habitat loss through intensification of farming and forestry and urban development
Danebury Crt (106) – SINC	Approx. 1.2km west of the Site.	The site is designated as a Site of Importance for Nature Conservation under Guideline Gr1, the presence of MG5 grassland over 0.1ha
British Sugar Sidings (203) – SINC	Approx. 1.3km north-west of the Site.	No information available
Bachelor Hill (4) – SINC	Approx. 1.8km west of the Site	Grassy slopes and a hill top of pine trees supporting a large diversity of invertebrates
Poppleton Ings South – Ditch (217) – SINC	Approx. 1.8km north-east of the Site.	No information available
Cherry Lane (264) – SINC	Approx. 1.9km south of the Site.	Cherry Lane hedgerows are designated as a Site of Interest for Nature Conservation under Guideline Gr7a (Species rich hedgerows)
Clifton Backies (12) – SINC	Approx. 2km north-east of the Site	In recent memory the site was part of the former Clifton Airfield but after its last use in the Berlin Airlift in the late 1940's, it was allowed to return to nature. Contains established grasslands
Knavesmire Stables Meadow (23) – SINC	Approx. 2km south of the Site	The reserve supports a flora characteristic of species-rich neutral grassland. Great burnet (*Sanguisora officinalis*). Pignut (*Conopodium majus*), betony (*Stachys officinalis*), common birdsfoot trefoil (*Lotus corniculatus*) common sorrel (*Rumex acetosa*), meadow buttercup (*Ranunculus acris*) and bulbous buttercup (*Rumex bulbosus*) are abundant, with a variety of fine-leaved grasses. Associated insects include butterflies such as the Common Blue and abundant burnet moths
Rawcliffe Ings Dyke (32) – SINC	Approx. 2km north-west of the Site	The hedgerow extending north along the Ings Dyke is very species-rich, containing purging buckthorn (*Rhamnus catharticus*), hazel (*Corylus avellana*), guelder rose (*Viburnum opulus*) and red currant (*Ribes rubrum*) amongst more common trees and shrubs. Plants associated with ditch banks include tansy (*Tanacetum vulgare*), teasel (*Dipsacus fullonum*), creeping jenny (*Lysimachia nummularia*) and field garlic (*Allium oleraceum*)

Name and site code	Location	Reason for designation
Rawcliffe Lake and Grasslands (261) – SINC	Approx. 2km north of the Site.	The Rawcliffe Lake and grasslands is designated as a Site of Importance for Nature Conservation for its sps rich grassland sward under Guideline Gr1 and Gr4 and as an area of standing water with a reasonably diverse emergent flora under Guideline Mh1 for mosaic habitats

4.1.3 Species Records

Records of six protected / notable or invasive species were identified by the local records centre as being within and or adjacent to the proposed Development (Table 4.3).

Table 4.3: Protected / notable / invasive species recorded within the proposed Development.

Species name/group	Species recorded
Bats	Common Pipistrelle *Pipistrellus pipistrellus*
	Soprano pipistrelle *Pipistrellus pygmaeus*
Invertebrate	Tansy Beetle *Chrysolina graminis*
Flora	Japanese Knotweed *Fallopia japonica*
	Giant Hogweed *Heracleum mantegazzianum*
	Galingale *Cyperus longus*

Table 4.4 details the protected species identified within the 2km search radius surrounding the Site.

Table 4.4: Protected / notable / invasive species identified within a 2km search radius.

Species name/group	Species Recorded	Closest Record Direction from Site	Closest records approximate distance from Site	Number of records within 2km
Amphibians	Common toad *Bufo bufo*	North	0.8km	5
	Smooth Newt *Lissotriton vulgaris*	North	1.3km	4
	Common frog *Rana temporaria*	North	1.3km	6
	Great crested newt *Triturus cristatus*	West	1.8km	2
Bats	Daubenton's Bat Myotis daubentonii	North	0.2km	6
	Unidentified Myotis bat	East	1.5km	2
	Whiskered Bat Myotis mystacinus	Unknown	Unknown	1
	Noctule Bat Nyctalus noctula	North	0.2km	28

Species name/group	Species Recorded	Closest Record Direction from Site	Closest records approximate distance from Site	Number of records within 2km
	Unidentified Pipistrelle bat	West	0.06km	17
	Common Pipistrelle *Pipistrellus pipistrellus*	Within the Site	Within the Site	113
	Soprano pipistrelle *Pipistrellus pygmaeus*	Within the Site	Within the Site	4
	Unidentified Vespertilionidae	West	0.4km	11
Bird	Northern Goshawk *Accipiter gentilis*	Unknown	Unknown	3
	Eurasian Sparrowhawk *Accipiter nisus*	West	1.2km	4
	Sky Lark *Alauda arvensis*	South	0.6km	10
	Common Kingfisher *Alcedo atthis*	North	0.6km	19
	Northern Shoveler *Anas clypeata*	North	0.8km	1
	Eurasian Teal *Anas crecca*	North	1.3km	1
	Greylag Goose *Anser anser*	North-east	1.2km	1
	Meadow Pipit *Anthus pratensis*	North	0.6km	5
	Short-eared Owl *Asio flammeus*	Unknown[8]	Unknown	5
	Common Pochard *Aythya ferina*	North	0.8 km	1
	Tufted Duck *Aythya fuligula*	North	0.9km	1
	Great Bittern *Botaurus stellaris*	Unknown	Unknown	1
	Greater Canada Goose *Branta canadensis*	North west	1.2km	2
	European Nightjar *Caprimulgus europaeus*	Unknown	Unknown	1
	Common Linnet *Carduelis cannabina*	North	1.3km	3
	European Goldfinch *Carduelis carduelis*	North	0.8km	6
	European Greenfinch *Carduelis chloris*	North	0.8km	3
	Twite *Carduelis flavirostris*	Unknown	Unknown	2
	Hen Harrier *Circus cyaneus*	Unknown	Unknown	2

[8] Grid references given to only four figures or less were not used.

Species name/group	Species Recorded	Closest Record Direction from Site	Closest records approximate distance from Site	Number of records within 2km
	Corn Crake *Crex crex*	Unknown	Unknown	1
	Common Cuckoo *Cuculus canorus*	North	1.3km	1
	Blue tit *Cyanistes caeruleus*	North-east	2km	3
	Great Spotted Woodpecker *Dendrocopos major*	North	1.2km	3
	Little Egret *Egretta garzetta*	North-west	1.2km	1
	Corn Bunting *Emberiza calandra*	North-west	1.1km	5
	Yellowhammer *Emberiza citrinella*	North	1.3km	3
	Reed Bunting *Emberiza schoeniclus*	North	0.6km	10
	Merlin *Falco columbarius*	South	0.9km	7
	Peregrine Falcon *Falco peregrinus*	Unknown	Unknown	1
	European Robin *Erithacus rubecula*	East	0.2km	6
	Eurasian Hobby *Falco subbuteo*	North-west	1.2km	1
	Common Kestrel *Falco tinnunculus*	North-west	1.3km	2
	Common Snipe *Gallinago gallinago*	North-west	1.2km	6
	Common Moorhen *Gallinula chloropus*	Unknown	Unknown	5
	Black-throated Diver *Gavia arctica*	Unknown	Unknown	1
	Red-throated Diver *Gavia stellata*	Unknown	Unknown	1
	Common Crane *Grus grus*	East	0.9km	1
	Jack Snipe *Lymnocryptes minimus*	North	1.1km	7
	Red Kite *Milvus milvus*	North	1.2km	1
	Yellow Wagtail *Motacilla flava subsp. flavissima*	North	0.8km	3
	Spotted Flycatcher *Muscicapa striata*	North	0.85km	3
	Northern Wheatear *Oenanthe oenanthe*	South	0.9km	1

Species name/group	Species Recorded	Closest Record Direction from Site	Closest records approximate distance from Site	Number of records within 2km
	Great Tit *Parus major*	East	0.2km	3
	House Sparrow *Passer domesticus*	East	0.2km	8
	Eurasian Tree Sparrow *Passer montanus*	North	0.8km	10
	Grey Partridge *Perdix perdix*	North	1.3km	1
	European Honey-buzzard *Pernis apivorus*	North-east	1.2km	1
	Ruff *Philomachus pugnax*	North	0.8km	1
	Green Woodpecker *Picus viridis*	North	1.3km	1
	Slavonian Grebe *Podiceps auritus*	Unknown	Unknown	1
	Hedge Accentor *Prunella modularis*	North	1.9km	1
	Common Bullfinch *Pyrrhula pyrrhula*	South	0.9km	4
	Sand Martin *Riparia riparia*	East	1.1km	1
	Whinchat *Saxicola rubetra*	South	0.9km	1
	Eurasian Woodcock *Scolopax rusticola*	North	1.9km	1
	Tawny Owl *Strix aluco*	East	1.7km	5
	Common Starling *Sturnus vulgaris*	North	0.9km	5
	Common Greenshank *Tringa nebularia*	North	0.8km	1
	Green Sandpiper *Tringa ochropus*	North	0.8km	1
	Redwing *Turdus iliacus*	North	1.2km	2
	Song Thrush *Turdus philomelos*	East	0.9km	6
	Fieldfare *Turdus pilaris*	North	1.2km	2
Reptile	Grass Snake *Natrix natrix*	East	0.5km	1
Invertebrates	*Sialis nigripes*	East	0.1km	5
	Agabus (Agabus) uliginosus	North	1.7km	3
	Amidobia talpa	North	0.8km	5
	Tansy Beetle *Chrysolina graminis*	Within the Site	Within the Site	365

Species name/group	Species Recorded	Closest Record Direction from Site	Closest records approximate distance from Site	Number of records within 2km
	Datomicra nigra	North	0.8km	2
	Helophorus (Helophorus) longitarsis	North	1.2km	3
	Heterocerus marginatus	North	0.8km	1
	Hydroporus neglectus	North	1.2km	1
	Oxypoda exoleta	North	0.8km	1
	Philhygra britteni	North	1.2km	1
	Platystethus (Craetopycrus) nodifrons	North	1.7km	2
	Ceraclea senilis	North-west	1.1km	1
	Beris clavipes	North-west	1.1km	2
	Cheilosia barbata	North	1.3km	1
	Chrysotus gramineus	North	1.3km	3
	Colobaea punctata	North	1.1km	2
	Dolichopus trivialis	North	1.3km	3
	Drapetis simulans	North	1.1km	2
	Fannia rondanii	Unknown	Unknown	1
	Melanostoma mellinum	North	1.1km	4
	Paroxyna absinthii	North	1.3km	1
	Pherbellia dorsata	North	1.1km	2
	Pipizella viduata	North	1.3km	2
	Platypalpus albicornis	North	1.1km	2
	Platypalpus cothurnatus	North	1.1km	2
	Platypalpus politus	North	1.1km	2
	Platypalpus ruficornis	North	1.1km	2
	Pseudanodonta complanata	East	0.1km	12
	Meioneta mollis	North	0.8km	1
Fish and molluscs	Sea Lamprey *Petromyzon marinus*	North	1.1km	1
	River Lamprey *Lampetra fluviatilis*	North	1.1km	1
	Pseudanodonta complanata	East	0.1km	12
	Atlantic Salmon *Salmo salar*	North	1.1km	1

Species name/group	Species Recorded	Closest Record Direction from Site	Closest records approximate distance from Site	Number of records within 2km
Terrestrial Mammal	European Water vole *Arvicola amphibious*	North	0.7km	11
	European Otter *Lutra lutra*	East	1.1km	17
	Eurasian Badger *Meles meles*	North-west	2km	1
Flora	Field garlic *Allium oleraceum*	North	0.8km	6
	Loose Silky-bent *Apera spica-venti*	North	1.9km	1
	Thyme-Leaved Sandwort *Arenaria serpyllifolia*	South	0.9km	4
	Japanese Knotweed *Fallopia japonica*	Within the Site	North-west corner	4
	Common Cudweed *Filago vulgaris*	North	1.9km	1
	Snowdrop *Galanthus nivalis*	East	0.9km	5
	Giant Hogweed *Heracleum mantegazzianum*	Within the Site	North-west corner	2
	Bluebell *Hyacinthoides non-scripta*	North	1.3km	1
	Marsh Pea *Lathyrus palustris*	North	0.9km	2
	Tubular Water-dropwort *Oenanthe fistulosa*	North	0.6km	4
	Bee Orchid *Ophrys apifera*	East	0.3km	1
	Lesser Pondweed *Potamogeton pusillus*	North	0.8km	3
	Stiff Saltmarsh-grass *Puccinellia rupestris*	East	1.3km	1
	Corn Spurrey *Spergula arvensis*	North	1.9km	1
	Water-soldier *Stratiotes aloides*	North	1.1km	2
	Galingale *Cyperus longus*	Within the Site	North-west corner	1
	Northern Marsh-orchid *Dactylorhiza purpurella*	North-west	1.6km	2

Records of black redstart were recorded in 2014 by York Ornithological Group members.[2] This included sightings in York City Centre and the wider area. Their potential presence has previously been raised by the York City Council's Conservation Officer (Arup 2008[9]).

[9] Arup (2008) Phase 1 Habitat Survey and Protected Species Constraints Report. [Issued to Network Rail].

4.2 Field Survey

The results of the field surveys undertaken within the Site are described below.

4.2.1 Habitats

The Phase 1 Habitat map is detailed in Drawing 1. This graphically represents the habitats recorded within the Site. The following habitat types were identified within the Site:

- Hardstanding and Buildings
- Ephemeral.
- Scrub (dense and scattered).
- Semi natural broadleaved woodland and scattered trees.
- Amenity grassland.
- Semi improved grassland.
- Introduced shrub.
- Standing water and running water.

4.2.2 Hardstanding, Buildings and Ephemeral

The Site is dominated by hardstanding, buildings and ephemeral vegetation.

The level of use of individual tracks within the sidings varies and this affects the type of vegetation present. The predominant habitat type is ephemeral. Species present included; red fescue *Festuca rubra*, Yorkshire fog *Holcus lanatus*, creeping bent *Agrostis stolonifera*, cock's foot *Dactylis glomerata*, perennial ryegrass *Lolium perenne*, selfheal *Prunella vulgaris*, perforate St. John's wort *Hypericum perforatum*, curled dock *Rumex crispus*, creeping thistle *Cirsium arvense*, Carline thistle *Carlina aucalis*, daisy *Bellis perennis*, common ragwort *Senecio jacobea*, white clover *Trifolium repens*, ribwort plantain *Plantago lanceolata*, dandelion *Tarraxacum officinale* agg., buddleja *Buddleja davidii*, black medic *Medicago lupulina*, barren brome *Anisantha sterilis*, herb Robert *Geranium robertianum*, greater willowherb *Epilobium hirsutum*, false oat grass *Arrhenatherum elatius*, common vetch *Vicia sativa*, oxeye daisy *Leucanthemum vulgare*, fox and cub *Pilosella aurantiaca*, sycamore saplings *Acer pseudoplatanus*, silver birch sapling *Betula pendula*, dogwood *Cornus sanguinea*, rowan sapling *Sorbus aucuparia*, black nightshade *Solanum nigrum*, *cotoneaster sp.*, hawthorn *Crataegus monogyna*, common century *Centaurium erythraea*, lesser trefoil *Trifolium dubium*, mouse-ear hawkweed *Hieracium pilosella*, mugwort *Artemisia vulgaris*, willow sp. *Salix* sp., rosebay willowherb *Chamerian angustifolium*, soft brome *Bromus hordeaceus*, wood avens *Geum urbanum*, purple toad flax *Linaria purpurea*, catsear *Hypochaeris radicata*, birds foot trefoil *Lotus corniculatus*, hedge woundwort *Stachys sylvatica*, white campion *Silene latifolia*, goatsbeard *Tragopogon pratensis*, haresfoot clover *Trifolium arvense*, golden melilot *Melilotus altissima* and bramble *Rubus fruticosus* agg.

4.2.3 Scrub

The south-west sidings were observed to not be in use and in these areas the ephemeral vegetation was dominated by buddleia scrub. Scattered elder *Sambucus nigra*, willow *Salix* sp. and hawthorn scrub is present within the areas of ruderal vegetation in Millennium Green.

4.2.4 Semi Natural Broadleaved Woodland and Scattered Trees

There are six areas of semi natural broad leaved woodland and trees on the Site. This includes the woodland to the west of Bishopfields Drive, which is dominated by ash *Fraxinus excelsior*, elder and silver birch, with scattered buddleja and *cotoneaster* sp. along its margins.

A stand of trees surrounds building 36 off Leeman Road and mature trees line the rail line and extend along the boundary of Holgate Facility. These areas included ash, sycamore, poplar sp. *Populus* sp. and rowan.

A line of trees adjacent to the Fox Inn on Holgate/Poppleton Road, included cypress sp. *Cupressus* sp., ash, sycamore and horse chestnut *Aesculus hippocastanum*.

Trees also surround the allotments located at the northern end of the Site which included cypress sp., silver birch, whitebeam sp. *Sorbus* sp, dogwood, laurel *Prunus laurocerasus* and holly *Ilex aquifolium*.

Millennium Green includes pockets of mixed broadleaved woodland which included elder, hazel, alder, silver birch, horse chestnut, ash, field maple, willow *Salix sp*., rowan, sycamore, cherry *Prunus* sp., pedunculate oak *Quercus robur* and poplar. Semi-mature scattered broadleaved trees including hornbeam *Carpinus betula* and lime *Tilia* sp., are present within areas of amenity grassland.

4.2.5 Semi-improved, Amenity Grassland, Introduced Shrub and Tall Ruderal

There are four areas of managed public space (parks) within the Site. Three of these are dominated by amenity grassland, while the fourth is located towards the A59 (Millennium Green) and was being managed as a meadow therefore species diversity was observed to be higher. Species present included perennial ryegrass, crested dog's tail *Cynosurus cristatus*, Yorkshire fog, bird's foot trefoil *Lotus coniculatus*, red clover *Trifolium pratense*, brown bent *Agrostis capilaris*, soft brome, selfheal, daisy, oxeye daisy, curled dock, common knapweed *Centaurea nigra*, perennial ryegrass, common ragwort, white clover, Spanish bluebell *Hyacinthoides hispanica*, timothy *Phleum pratense*, barren brome *Anisantha sterilis*, lesser celandine *Ranunculus ficaria*, lords and ladies *Arum maculatum*, cow parsley *Anthriscus sylvestris*, common vetch *Vicia sativa*, silverweed *Potentilla anserine*, common sorrel *Rumex acetosa*, rough meadow grass *Poa trivialis*, ribwort plantain *Plantago lanceolata*, meadowsweet *Filipendula ulmaria*, great burnet Sanguisorba officinalis, soft rush *Juncus effuses*, yellow iris

*Iris pseudacor*us, comfrey *Symphytum officinale* and meadow cranesbill *Geranium pratense*.

Additionally, tall ruderal vegetation lines the banks and edges of Holgate Beck which is dominated by nettle, cleavers *Galium aparine*, common hogweed *Heracleum sphondylium*, bramble *Rubus fructicosus* agg. and Himalayan balsam.

Small areas of amenity grassland were also present within the grounds of the National Railway Museum.

Pockets of semi-improved grassland were present within the York Central SLI along the margins of the main lines and within the abandoned allotments. Species present within the SLI included false oat grass, red fescue, Yorkshire fog, cock's foot, ribwort plantain, mugwort, perforate St. John's wort, purple toadflax, field horsetail *Equisetum arvense*, wild mignonette *Reseda lutea*, common evening primrose *Oenothera biennis*, common hogweed, oxeye daisy, hawkweed sp. *Hieracium* sp., fox and cubs and foxglove *Digitalis purpurea*. The grassland is being encroached by bramble and buddleia scrub.

Species present within the allotments included false oat grass, Yorkshire fog, cock's foot, couch *Elytrigia repens*, creeping thistle, teasel *Dipsacus fullonum*, oxeye daisy, red clover, rosebay willowherb, broad leaved dock *Rumex obtusifolius*, scentless mayweed *Tripleurospermum inodorum*, spear thistle *Cirsium vulgare*, field horsetail and garden lupin *Lupinus polyphyllus*. The grassland is being encroached by bramble scrub.

A stand of Japanese knotweed *Fallopia japonica*, was present within the disused allotments (approximate grid reference SE584522, Drawing 1; TN1). Giant hogweed *Heracleum mantegazzianum*, was recorded within the disused allotments and Millennium Green (approximate grid reference SE588513, Drawing 1; TN2 and TN4) and adjacent to waterbody 4 (Drawing 1; TN3). Himalayan balsam was identified on both sides of Holgate Beck (Drawing 1; TN5). Due to the density of scrub in some areas of the sidings there is the potential for invasive weeds to have been obscured during the field survey.

4.2.6 Standing Water and Running Water

There are two waterbodies located within Site (Drawing 1; WB 1 and 3). This includes a small ornamental waterbody in the grounds of the National Railway Museum adjacent to the model railway (approximate grid reference SE591518, Drawing 1; WB3) and a small ornamental waterbody within the park adjacent to Station Avenue (approximate grid reference SE597518, Drawing 1; WB1).

Holgate Beck runs south to north through Millennium Green. The watercourse is culverted beneath the remainder of the Site, entering a culvert south of Holgate Road (A59) and emerging at the southern end of Millennium Green.

4.2.7 Fauna

During the Phase 1 Habitat survey signs of protected fauna were recorded if observed. In addition, the habitats were assessed as to their potential to support protected species. The protected species groups sought/assessed included:

- Mammals.
- Birds.
- Herpetofauna (amphibians and reptiles).
- Invertebrates.

Bats

The 56 buildings on the Site were assessed as to their bat roost suitability, through an external assessment only. It was determined that 32 of the buildings on the Site had bat roost suitability. Additionally, the bridge on Water Lane was identified to have bat roost suitability. This included:

- Low bat roost suitability – 12 buildings and bridge on Water Lane
- Moderate bat roost suitability - 13 buildings
- High bat roost suitability - 7 buildings

A description of each of the buildings and the features that could provide bats an access point to a roosting Site is detailed in Appendix B. The location of the buildings is illustrated in Drawing 2 and the location of the bridge on Drawing 1; TN10.

Five trees within Millennium Green were identified to have bat roost suitability (Table 4.5).

Table 4.5: Bat roost suitability of trees within Millennium Green.

Description	Bat roost suitability	Target note on Drawing 1
Heavily cut Salix sp. With immature ivy surrounding the stump. Unable to see bark on the tree	Low	TN6
Salix sp. Bat roost suitability feature north facing and low down on the tree. Holes provide access inside the tree and the tree sounds hollow inside	Moderate	TN7
Salix sp. Stump with rot hole facing beck. Could possibly undertake inspection with an endoscope to see if bats have been present	Low	TN8
Two adjacent lime trees with dense ivy cover in small woodland block. Unable to see bark on the trees.	Low	TN9

The Site includes a range of habitats, (i.e. ephemeral vegetation, woodland, scrub, semi-improved grassland and waterbodies), which will support a range of invertebrates. Consequently this is likely to constitute an important foraging resource for bats. In addition the Site is located adjacent to the River Ouse, which will provide connectivity to alternative high quality foraging habitat off-site.

Badger

No badger setts were observed during the Phase 1 Habitat survey. However, there are areas of the Site where access was not available at the time of the survey, e.g. including stands of dense woodland located along the main line, adjacent to York Central Site of Local Interest and adjacent to building 36. In addition, there are two mounds within the sidings that are covered in buddleja scrub and an area of sidings in the management of Freighliner that is covered in buddleja scrub which could provide badger with suitable habitat for sett construction.

Badger foraging is restricted to marginal vegetation surrounding the sidings.

Water Vole

Holgate Beck within Millennium Green was identified to contain suitable habitat for water vole. The banks were steep in places allowing the opportunity for burrow excavation and suitable vegetation covered the sides which provides foraging opportunities and shelter for water vole.

Birds

The scrub, introduced shrub and broadleaved woodland and trees on the Site will provide suitable nesting habitat for a range of common bird species. Additionally areas of scrub and bare-ground may provide foraging opportunities to black redstart, however a full assessment to characterise the habitat for this species was beyond the scope of this survey.

The following birds were observed on the Site during the survey; blackbird *Turdus merula*, great tit *Parus major*, house sparrow *Passer domesticus* and goldfinch *Spinus tristis*.

Amphibians

Five waterbodies were identified within the Site. The waterbodies were assessed using the HSI assessment. A summary of the assessment is provided within Table 4.6with full calculations provided in Appendix C.

Table 4.6: Results of HSI assessment of waterbodies within the Site.

Waterbody	Grid Reference	Description	HSI Result
WB1	SE59795186	Ornamental pond within a managed park. Sticklebacks were observed. Good macrophyte cover provided by parrots feather and white lily. No wildfowl	0.2624 – Poor suitability
WB2	SE59735184	Ornamental pond within a managed park	0.5095 – Below average suitability
WB3	SE59215184	Ornamental pond adjacent to an area of scrub but also adjacent to an area of sidings dominated by ephemeral vegetation. Macrophyte	0.4896 – Poor suitability

Waterbody	Grid Reference	Description	HSI Result
		cover limited to 5%, shade 10%, no wildfowl, goldfish present	
WB4	SE50886146	Ornamental pond with no macrophyte vegetation. Waterbody has raised concrete margins and is surrounded by hardstanding. Poor water quality	0.6620 – Average suitability
WB5	SE58475220	Ornamental pond within a residential area. Waterbody has raised concrete margins and is surrounded by hardstanding	0.2461 – Poor suitability

Great Crested Newt Environmental DNA

Results from the eDNA survey carried out on the five waterbody located on the Site and within 250m of the Site tested negative for the species. Consequently great crested newts are unlikely to be present within the Site and are not considered further within the PEA.

Reptiles

The ephemeral vegetation, semi-improved grassland and scrub which are present across the sidings and the allotments will provide common reptiles with optimal opportunities for basking, foraging and shelter.

The remainder of the Site is dominated by hardstandings and intensively managed which is largely inimical for reptiles.

Invertebrates

The areas of ephemeral vegetation, semi-improved grassland and scrub which are present across the sidings and the allotments were observed to have a moderate level of botanical diversity. Consequently it is likely that these habitats may support an interesting assemblage of invertebrates. Periodically Network Rail will control the vegetation on the sidings through the application of herbicide. This may have a limiting effect on the diversity of invertebrates that are present.

Records from the desktop study recorded tansy beetle *Chrysolina graminis*, to be present on the Site. This species is a Biodiversity Action Plan UK List of Priority Species and is nationally scarce.

York Central SLI was classified for its remnant old meadow containing long established ant hills. However, during the Phase 1 Habitat survey it was observed that the grassland has been encroached by scrub and the anthills appear to have been excavated by mammals, potentially badger. It is unknown as to whether these colonies have survived this disturbance.

5 Discussion and Recommendations

5.1 Designations

Five statutory nature conservation designations are located within 2km of the Site, including two SSSIs and three LNRs.

On review of Natural England's SSSI impact zones on magic it was identified that that impact zones extended from three SSSI (one located more than 2km from the Site). However, on review of the supporting information for two of the sites (Fulford Ing SSSI and Askham Bog SSSI) it was identified that consultation with Natural England was only required for developments such as aviation or pig and poultry facilities, not residential or commercial developments.

However, the Site is located within impact buffers from Clifton Ings SSSI, which indicate that the Local Authority should consult with Natural England in relation to large scale residential developments (100 units or more).

It is considered that due to the distance of the LNR's from the proposed Development sites, that there will be an absence of any impact pathways.

Millennium Green SINC abuts the proposed access road on the north-west of the Site area. Millennium Green is designated for the floral composition of its grassland. Land take of this non-statutory designated site may be required during construction. It is recommended consultation with the County Ecologist is undertaken to ensure impact on this site is minimal and appropriate mitigation is implemented. This may involve enhancement or mitigation in areas that are not affected by the development. It is recommended that herras type fencing is erected around the construction area to ensure unnecessary encroachment onto the non-statutory site is controlled.

York Central SLI is located within the Site boundary. This has been designated as it is an ancient meadow with anthills.

It is recommended that a review of the status of York Central SLI is undertaken due to the degraded condition of this feature, including encroachment by scrub and trees and damage to the anthills by mammals. This will entail consultation with the County Ecologist.

5.2 Habitats

The Site is dominated by buildings, hardstanding and ephemeral vegetation and encroaching buddleja scrub. In addition, there are small sporadic pockets of woodland, semi-improved grassland and amenity vegetation.

None of the habitats on the Site or adjacent to the Site have been identified as Section 41 Habitat of Principle Importance. However, a small section of the Site is adjacent to the River Ouse. In addition, a small parcel of grassland on the Site has been identified as a Site of Local Interest, as indicated above in Section 5.1.

While the habitats are not of high botanical interest there is the potential for notable species such as the York groundsel *Senecio eboracensis,* to be present on the Site. Therefore, it is recommended that a targeted botanical survey of the Site is completed between July – August 2016.

It is considered that while the habitats on the Site do not have high botanical diversity they do provide important habitats within a dense urban setting. This includes forming an important part of wider a habitat network and the provision of associated ecosystem services.

Due to the scale of the proposed Development, it is recommended a strategic approach is adopted to ensure the Site feeds into York's wider Green Infrastructure resource. Any future strategy should consider the phasing and how individual development zones may be taken forward in isolation. It is recommended that such an approach is formulated prior to development.

If the loss of any trees or scrub is required, for example due to access requirements, it is recommended that this habitat type is replaced. This should include the planting of native species in keeping with the surrounding habitats. It is recommended that the species planted are of local provenance, replacing all trees lost on a 2:1 ratio. It is also recommended that mitigation for other habitats, such as bare-ground and semi-improved grassland, is also fully considered.

5.2.1 Invasive Species

A stand of Japanese knotweed was recorded within the disused allotments (approximate grid reference SE584522). Giant hogweed was also recorded adjacent to the A59 (approximate grid reference SE588513) (Drawing 1; TN2) and one single plant was observed adjacent to waterbody 4 (Drawing 1; TN3). These species are listed in Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

An update survey and method statement/management plan will be required at this Site in order to avoid the spread of these species off-site, which would be considered an offence under the Wildlife and Countryside Act 1981 (as amended).

5.3 Fauna

5.3.1 Bats

It is recommended that a detailed internal and external assessment of the 32 buildings assessed to have bat roost suitability during the PEA is undertaken. In addition, it will be necessary to undertake bat activity surveys based on the level of roosting potential determined for each building and the bridge on Water Lane, in line with current guidance.

- Low roost suitability (Drawing 2; Yellow) – One survey visit. This can be a dusk emergence or a dawn re-entry survey.
- Moderate roost suitability (Drawing 2; Orange) – Two separate survey visits. One dusk emergence and a separate dawn re-entry survey.

- High roost suitability (Drawing 2; Red) – Three separate survey visits. At least one dusk emergence and a separate dawn re-entry survey. The third visit can be either dusk or dawn.

Dusk emergence surveys commence 15 minutes before sunset and continue for 1.5 to 2 hours after sunset. Dawn re-entry surveys commence 1.5 to 2 hours before sunrise and continue until 15 minutes after sunrise or until all bats have entered their roosts. Survey visits must be spread throughout the activity season (May to September) in order to cover the maternity season.

Transect line surveys are used to characterise usage of a Site by bats. However, taking account of the predominant use of the Site (rail sidings), it is recommended that bat activity in the local area is monitored through the use of automatic bat recorders. These can be installed during the day and then left in place for five nights to continually record. The recorders will be fixed at a number of locations (minimum 2) each month from May-September.

British bat species are fully protected through their inclusion in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and in Schedule 2 of The Conservation of Habitats and Species Regulations 2010 (as amended). Under the legislation, it is an offence to intentionally kill, injure or take a bat as well as intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a bat or disturb an animal while it is occupying a structure or place which it uses for that purpose.

If a bat roost is identified and will be disturbed by the proposed works, then a bat mitigation licence will be required from Natural England prior to the commencement of works. Natural England take a minimum of 30 working days to process a licence application. In order to obtain a bat licence, appropriate mitigation would need to be developed and implemented; works may also be seasonally restricted.

The current proposed works do not affect the trees identified to have bat roost suitability within Millennium Green (Drawing 1: TN6, TN7, TN8, TN9). However, if works are to impact directly on these trees or within 15m, it is recommended that bat activity surveys are undertaken to identify whether bats are using these trees to roost. If a bat roost is identified and will be disturbed mitigation outlined above will need to be followed.

5.3.2 Badger

Badger setts were not recorded on the Site during the PEA, but the vegetation in some areas of the sidings is dense. In addition, there are historical records of setts to the north of Holgate Facility, to the south-west of the main line and potential snuffle holes were recorded in York Central SLI. It is recommended that a field survey is undertaken within the sidings to confirm the absence of badger setts.

5.3.3 Water Vole

The habitat within Holgate Beck was identified to have suitable foraging and burrowing opportunities for water vole. Additionally, historical records of water

vole presence have been recorded in Rawcliffe Meadows and Clifton Ings approximately 0.6km north. Holgate Beck is connected to the River Ouse via a culvert, which is adjacent to Clifton Ings.

The water vole is fully protected under Section 9 of Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Protection was extended by the Countryside and Rights of Way Act 2000. Under this legislation, it is an offence to intentionally kill, injure or take (capture) a water vole or possess or control a live or dead water vole, or any part of a water vole. It is also an offence to intentionally or recklessly damage, destroy or obstruct access to any structure or place which water voles use for shelter or protection, or to intentionally or recklessly disturb water voles while they are using such a place. It is an offence to sell, offer for sale or advertise for live or dead water voles. The water vole is also included as a Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

It is recommended that a water vole survey is undertaken within the Site. The suitability of habitat for water voles may change markedly over the course of the breeding season affecting the distribution and apparent population size. In line with current guidance two survey visits are required.[10] One visit is undertaken in the first half of the survey season (mid-April to the end of June) and one in the second half of the season (July to September inclusive).

If water voles are found to be utilising watercourses on the Site and they are to be affected by the proposed Development works, mitigation and a licence from Natural England may be required.

5.3.4 Breeding Birds

The scrub, introduced shrub and broadleaved woodland and trees on the Site will provide suitable nesting opportunities for a range of common bird species. If works are to occur within these habitats during the breeding season (March – August inclusive), breeding bird surveys are required prior to works commencing.

The scrub and bare-ground on the Site may provide foraging opportunities for black redstart. Surveys for breeding birds require five visits undertaken between late March and early July. Species specific black redstart surveys require five fortnightly visits undertaken from mid-April to the end of June. The bulk of the season for these surveys has therefore passed. However, it is recommended that a single survey visit is undertaken in July/August to characterise the habitats. Consultation with the York Ornithological Club is recommended to advise on the exact locations of recent sightings, as well as further consultation with the County Ecologist to determine the scope of survey required.

Wild birds are protected under Part 1 Section 1 of the Wildlife and Countryside Act 1981 (as amended); they are protected from being killed, injured or captured, while their nests and eggs are protected from being damaged, destroyed or taken.

[10] Dean, M., Strachen, R., Gow, D. and Andrews, R. (2016). The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series). Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

Any works which are likely to damage a breeding bird nest, for example vegetation clearance or building demolition, should be carried out outside of the bird nesting season (March – August). If works during bird nesting season are unavoidable then areas of suitable habitat must be surveyed by a qualified ornithologist immediately prior to the clearance taking place. If the survey confirms the absence of nesting birds in the working area then works can proceed, providing it is done within three days of the survey. If an active birds' nest is discovered then a 5m exclusion zone will be erected until the young have fledged the nest. As indicated in Section 6.2, any loss of trees or scrub should be replaced after works are complete as part of the Site mitigation.

5.3.5 Reptiles

Suitable habitats for reptiles were identified on the Site, e.g. ephemeral vegetation, semi-improved grassland and scrub which are present across the sidings and the allotments. Therefore a targeted reptile survey of these areas is recommended.

Common reptile species such as adder *Vipera berus*, common lizard *Zootoca vivipara*, grass snake *Natrix natrix* and slow worm *Anguis fragilis*, are partially protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). This means it is an offence to intentionally or recklessly kill, injure or take one of these species.

The reptile survey methodology is based on 'tinning' (using artificial refuges) as described by HGBI (Herpetofauna Groups of Britain and Ireland, 1998)[11]; to determine presence or likely absence of reptiles within the development site. Surveys are undertaken between March and October with the optimal months being late March, April, May and September.

Appropriate artificial refugia can be either light (weight) gauge corrugated iron (tins) or roofing felt that is dark in colour. The refugia are positioned in suitable locations around the Site and are initially left for two weeks to permit a maturation phase to occur. This period allows animals to habituate to the refugia and ensures vegetation partially re-grows. Seven survey visits are the undertaken between ~0800 – ~1100hrs or between ~1600 – ~1900hrs in appropriate weather conditions. HGBI define appropriate weather conditions as being when the air temperature ranges from 9 – 18°C with sunshine or light cloud but surveys should avoid days with strong winds or rainfall.

To ascertain the relative size of a reptile population, survey results are interpreted using the Key Reptile Site Register scoring (Froglife 1999).[12] The results of which determine any subsequent trapping/mitigation effort.

[11] Herpetofauna Groups of Britain and Ireland (1998). Evaluating local mitigation/translocation programmes: Maintaining Best Practice and Lawful Standards.
[12] Froglife. (1999). Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Froglife: Halesworth.

5.3.6 Invertebrates

Based on the presence of early successional and bare-ground 'type' habitats within the Site, it is highly probable that the Site will support a diverse assemblage of invertebrates. Additionally, historical records of tansy beetle have been recorded on the Site. Therefore, an assessment of the invertebrate assemblage on the Site is recommended.

Survey methodology and protocol will adhere to current guidance.[13] This includes the following methods: sweep sampling; spot sampling; beating and suction sampling.

The survey will be undertaken in four visits from July to September. The Site will be assessed and placed into geographical context depending on the survey results.

[13] Natural England (2007). Surveying terrestrial and freshwater invertebrates for conservation evaluation.

6 Conclusions

Based on the current understanding of the proposed Development and survey results, the recommendations are:

- Designations: Consultation with Natural England should be undertaken regarding potential impacts the proposed Development may have on Clifton Ings SSSI. Additionally, the County Ecologist should be consulted regarding potential impact and land take of Millennium Green and appropriate mitigation if required and the current status of York Central Site of Local Interest.
- Habitats (including invasive species): A botanical survey for York groundsel should be undertaken in July-August. A strategic approach should be adopted to ensure the Site feeds into York's wider Green Infrastructure resource. Any future strategy should consider the phasing and how individual development zones may be taken forward in isolation. This should be formulated prior to development. Any loss of trees or scrub should be replaced on a 2:1 ratio. Mitigation for the loss of bare-ground and semi-improved grassland should also be considered. Additionally, an update survey and method statement/management plan will be required at this Site in order to avoid the spread of invasive plant species off-site.
- Bats: A detailed internal and external assessment of the 32 identified buildings with bat roost suitability is a prerequisite to formal bat surveys. This should be undertaken in Spring to allow sufficient time for bat activity surveys. Bat activity surveys are required for each building and the bridge on Water Lane. Automatic bat recorders will be placed around the Site to monitor bat activity in the local area. If works are to impact on the identified trees with bat roost suitability within Millennium Green, bat activity surveys will also be required for these trees.
- Badgers: A field survey is recommended within the sidings to determine the presence or likely absence of badger.
- Water vole: A water vole survey is recommended within Holgate Beck to determine the presence or likely absence of water vole. Two surveys are recommended, the first between mid-April to the end of June and the second between July and September inclusive.
- Breeding birds: One survey in July/August is recommended to characterise the habitat and determine if further surveys are required during the breeding season). Vegetation clearance should be programmed to occur outside of the bird nesting season which extends from March – August. If this is not possible then pre-start checks for nesting birds in suitable habitat should occur prior to any works taking place. Consultation with the County Ecologist is recommended regarding black redstart which may lead to breeding bird surveys.
- Reptiles: A reptile survey of areas of suitable habitat on the Site is recommended. Surveys can be undertaken between March and September, but optimal period is April-May and September.

- Invertebrates: It is recommended that an assessment of invertebrates across the Site is undertaken in four visits between July and September.

This report is the result of survey work undertaken in June 2016, May 2017 and July 2018. This report refers, within the limitations stated, to the condition or proposed Development of the Site at the time of the inspections. Changes in legislation, guidance, best practice, etc. may necessitate a re-assessment/survey. It is also advised that if there is a delay of over a year in undertaking the works, a re-survey may be required. No warranty is given as to the possibility of future changes in the condition of the Site.

This report is produced solely for the benefit of York Central Partnership and no liability is accepted for any reliance placed on it by any other party. This report is prepared for the proposed uses stated in the report and should not be used in a different context.

Drawings

Drawing 1: Phase 1 Habitat Plan.

Drawing 2: Bat Roost Suitability Assessment of Buildings.

Drawing 3: Ecological Constraints and Opportunities Plan (ECOP)

A3

Legend

- Redline boundary
- Target note
- A2.2- Scattered scrub
- A3.1- Broadleaved parkland/scattered trees
- J2.1.2- Intact species-poor hedgerow
- J2.4 - Fence
- J2.5 - Wall
- Waterbody
- A1.1.1- Broadleaved woodland - semi-natural
- A1.1.2- Broadleaved woodland plantation
- A1.2.2 - Coniferous woodland plantation
- B2.2- Semi-improved grassland
- C3.1- Tall ruderal herbs
- J1.2- Amenity improved grassland
- J1.3- Cultivated/disturbed land - ephemeral/short perennial
- J2.5 - Wall
- J3.6- Buildings
- J4- Bareground
- Buildings and hardstanding

Issue	Date	By	Chkd	Appd
P1	16-7-18	YL	RC	RC

Metres
0 75 150 300

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 20 7636 1531 Fax +44 20 7580 3924
www.arup.com

Client
York Central Partnership

Job Title
York Central

Drawing 1 - Phase 1 Habitat Plan

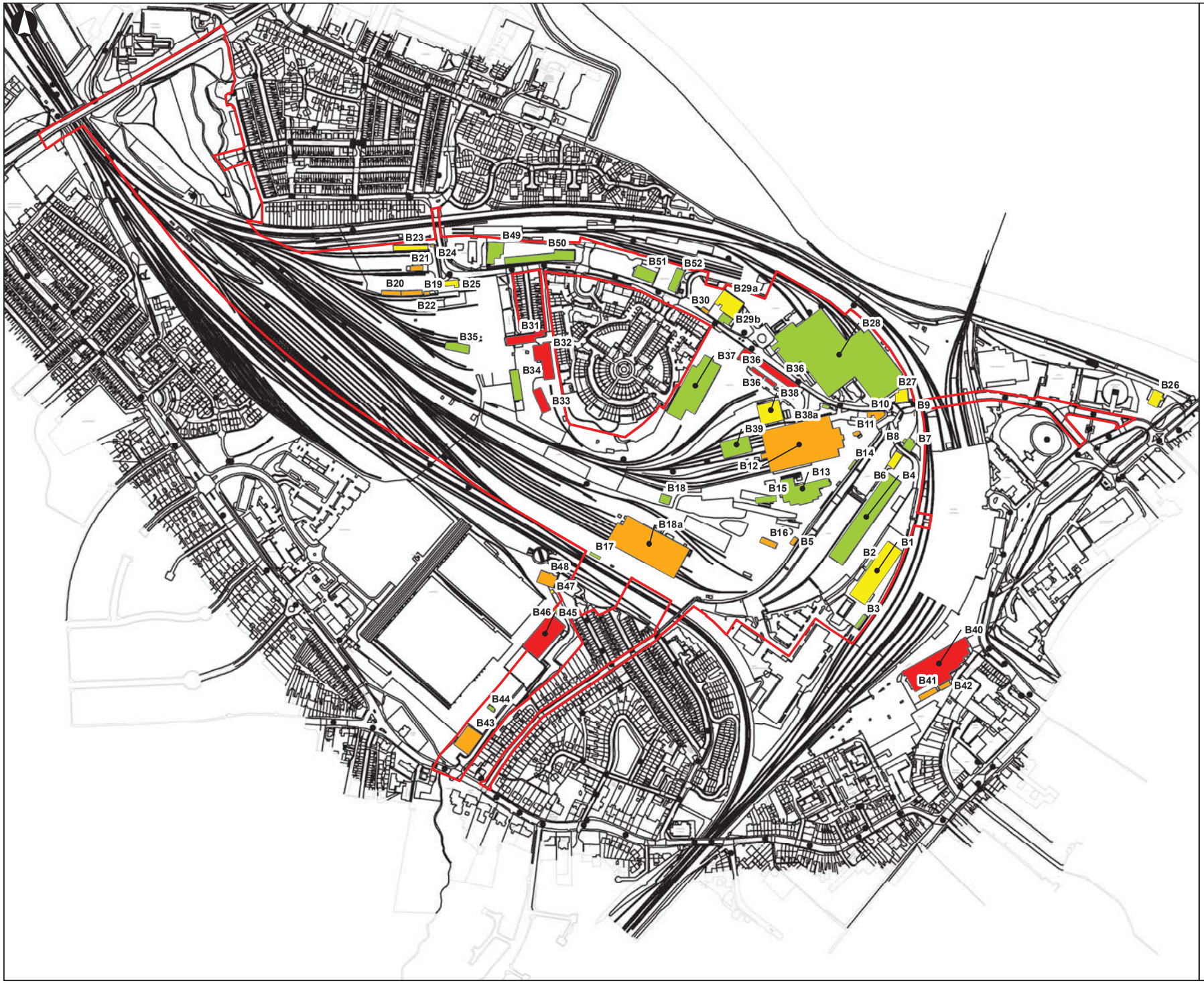
Scale at A3
1:5,500

Job No	Drawing Status
251869-00	Draft

Drawing No	Issue
251869/PEA/1	Rev 1.0

MXD Location

A3



Legend

- Proposed Redline boundary
- High
- Mod
- Low
- Neg

Issue	Date	By	Chkd	Appd
P1	25-06-18	YL	RC	RC

Metres
0 75 150 300

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Client
York Central Partnership

Job Title
York Central

Drawing 2 -
Bat Roost Suitability
Assessment of Buildings

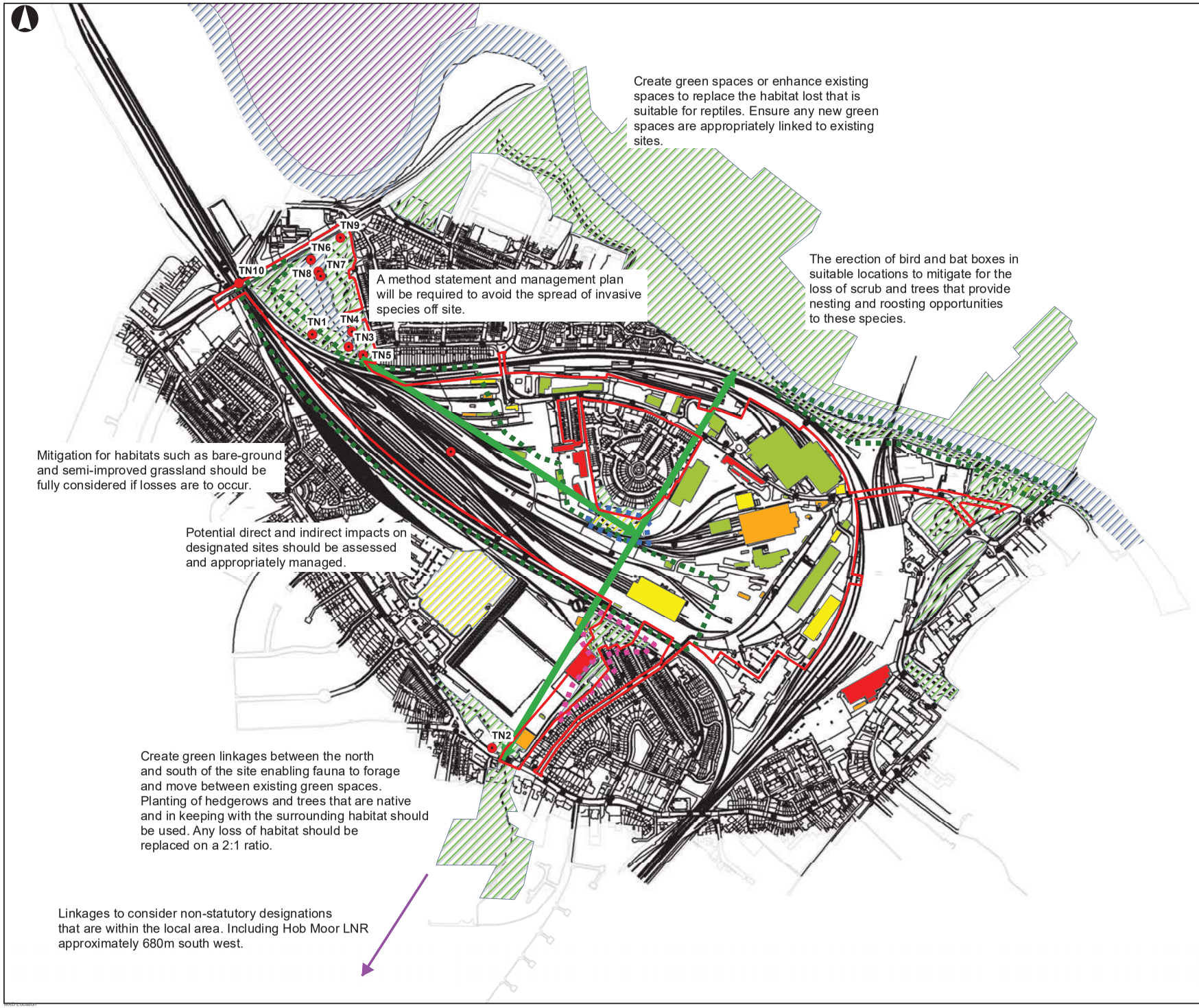
Scale at A3
1:5,500

Job No	Drawing Status
250114-00	**Draft**

Drawing No	Issue
251869/PEA/02	**Rev 1.0**

MXD Location

A3



Legend

- Proposed Redline boundary
- Creation of connective linkages
- Target note
- Survey area for birds, badgers & bats
- Survey area for botanical
- Survey area for botanical, badger, birds, reptiles, invertebrates & bats
- SINC
- SSSI
- Site of Local Interest
- Existing greenspace
- Approximate redline boundary
- Building wih high bat roost potential
- Building wih low bat roost potential
- Building wih moderate bat roost potential
- Building wih negligible bat roost potential
- Linkages off site to local non-statuatory sites

TN1 - Japanese knotweed
TN2 & TN3 - Giant hogweed

Issue	Date	By	Chkd	Appd
P1	16-07-18	YL	RC	RC

Metres
0 105 210 420

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York Central Partnership

Job Title
York Central

Ecological Constraints and Opportunities Plan

Scale at A3
1:7,740

Job No	Drawing Status
251869-00	**Issue**

Drawing No	Issue
251869/PEA/03	**P1**

Appendix A

Desk Study

NORTH & EAST YORKSHIRE ECOLOGICAL DATA CENTRE

Our Ref: E02247
Your Ref: 250114

Site Data Search

Non-Statutory Sites

Local Nature Reserves:
Though not strictly speaking non-Statutory sites, the LNR within the search area have been included for completeness:

Name or location of site	*Grid Reference*
Clifton Backies	SE 597 542
Hob Moor	SE 582 503
St Nicholas Fields	SE 616 517

Local Wildlife Sites:
Local Wildlife Sites are known in the City of York as SINC (Sites of Importance for Nature Conservation). The following sites were found to be within (or partly within) the search area and their locations are shown on the enclosed map:

Site Code	*Site Name*	*Grid reference*
4	Bachelor Hill	SE 569 508
12	Clifton Backies	SE 597 545
13	Clifton Bridge	SE 589 528
14	Clifton Ings	SE 583 530
20	Hob Moor	SE 585 505
23	Knavesmire Stables Meadow	SE 590 490
31	Rawcliffe Meadows	SE 581 534
32	Rawcliffe Ings Dyke	SE 573 544
35	Severus Hill Reservoir Basin	SE 583 519
63	R. Ouse	SE 573 542 - SE 591 524
103	Holgate Millennium Green	SE 584 523
104	Fishpond Wood	SE 572 517
106	Danebury Crt	SE 596 457
198	Extn to Hob Moor Hob Moor Community School	SE 581 506
202	Poppleton Glassworks (5-30)	SE 570 538
203	British Sugar Sidings	SE 576 532
217	Poppleton Ings South - Ditch	SE 573 539 - SE 576 536
261	Rawcliffe Lake and Grasslands	SE 587 545
264	Cherry Lane	SE 589 495

Further details of SINC within the City of York can be obtained from the Countryside Service, Directorate of City Strategy, West Offices, Station Rise, York, YO1 6GA.
Tel: (01904) 551662. Email: natural.environment@york.gov.uk

Yorkshire Wildlife Trust Reserves
There were no YWT reserves within the search area.

NORTH & EAST YORKSHIRE ECOLOGICAL DATA CENTRE

Our Ref: E02247
Your Ref: 250114

Species data search

Our species database search found various records of notable and protected species in the area. Please note that a lack of survey information for any particular area or taxonomic group does not necessarily mean that there is no nature conservation interest present and I would therefore recommend that a site survey is carried out in order to assess any ecological interest that might be present before proceeding with the development.

Where a filtered search for Notable and/or Protected species has been requested, the species list will contain only those species with the following status:

- Berne Convention
- Birds directive
- Bonn convention
- Conservation regulations 1994
- EC CITES lists
- Habitats & species directive
- IUCN Red list of threatened species
- National BAP priority species
- Red data book species
- Species of conservation concern list
- Wildlife & Countryside act 1981
- LBAP species

Also in addition to the records shown on the enclosed sheet, there may be records within the search area held by the North Yorkshire Bat Group. For further information on these records, you should contact the North Yorkshire Bat Group directly, contact details for which are given below.

One particular point to bear in mind is that many bridges in York provide good opportunities for bats and support bat roosts. Please consult the North Yorkshire Bat Group regarding this aspect if the proposal is likely to require working close to or within the structure of any bridge. Bats are European Protected Species under the Conservation (Natural Habitats &c.) Regulations 1994. As you are probably aware, should a proposal be likely to affect or disturb bats and/or their roosts and therefore require derogation from the Regulations, a licence application to the Wildlife Licensing Unit, Natural England, is required in advance of the works commencing. The relevant contact is:

John Drewett, Chairman, North Yorkshire Bat Group, No Man's Common, Arrathorne, Bedale, DL8 1NA. Tel: 01677 451886.
www.nybats.org.uk
johndrewett@btinternet.com

NB: The species search has been restricted to records from the last 50 years. However, if older records are specifically required, these may be obtained at additional cost from NEYEDC upon request.

SINC Citation 2010

Site Code 103

Holgate Millennium Green - Leeman Roadd
GR SE 583 523
Last Surveyed : 8th June 2009
Previous Surveys : 1991, 2004
Principal NVC community: **MG1** *Arrhenatherum elatius* grassland (small areas of **MG4** *Alopecurus pratensis – Sanguisorba officinalis* grassland & S28 *Phalaris arundinacea* tall-herb fen).
Approx. Area : 1.3 ha.

This urban greenspace adjoins Holgate Beck near its entry into the River Ouse. It was known historically as Brick Kiln Bridge Ings, so was presumably at one time floodplain hay meadow.

The Beck itself has cut down to create an incised channel and terrace. Most of the site is false oat (*Arrhenatherum elatius*) grassland with small plantations of broadleaved trees, mostly young but include some mature Poplars and Crack Willow near the beck. Typical grassland vegetation includes false oat, cocksfoot (*Dactylis glomerata*), rough meadow-grass (*Poa trivialis*), cow parsley (*Anthriscus sylvestris*), meadow buttercup (*Ranunculus acris*) and tansy (*Tanacetum vulgare*). On wetter ground near the stream there are stands of reed canary grass (*Phalaris arundinacea*), accompanied by rough meadow-grass, greater willowherb (*Epilobium hirsutum*), stinging nettle (*Urtica dioica*) and Himalayan balsam (*Impatiens glandulifera*). Giant hogweed (*Heracleum mantegazzianum*) and Japanese knotweed (*Fallopia japonica*) are present in un-managed vegetation on the east side of the Holgate Beck.

A silty polythene-lined pond contains mainly introduced species including greater reedmace (*Typha latifolia*), yellow flag (*Iris pseudacorus*), an undetermined lily, galingale (*Cyperus longulus*), water-milfoil (*Myriophyllum* sp.) and water soldier (*Stratiotes aloides*), the latter being a potential nuisance species.

A distinct band of herb-rich grassland extends along the east-facing facing terrace slope for over 100 metres. This contains frequent to abundant meadow foxtail (*Alopecurus pratensis*), false oat, Yorkshire fog (*Holcus lanatus*), creeping bent (*Agrostis stolonifera*), smooth meadow-grass (*Poa pratensis*), meadowsweet (*Filipendula ulmaria*), great burnet (*Sanguisorba officinalis*) and meadow buttercup. Species present in smaller amounts include red clover (*Trifolium pratense*), meadow vetchling (*Lathyrus pratens*is), meadow cranesbill (*Geranium pratense*), common knapweed (*Centaurea nigra*), glaucous sedge (*Carex flacca*), crested dogstail (*Cynosurus cristatus*) and sweet vernal grass (*Anthoxanthum odoratum*).

Previous surveys have also recorded both Crow Garlic (*Allium vineale*) and Field Garlic (*A. oleraceum*) and Bistort (*Persicaria bistorta*).

The beck itself was extremely turbid when visited although in the early 1990's there was reasonable cover of curled pondweed (*Potamogeton crispus*), *Elodea* sp. and amphibious bistort (*Persicaria amphibia*). Water Voles were present then but have not been confirmed recently. The beck banks support reed canary grass, false oat, cocksfoot and cow parsley.

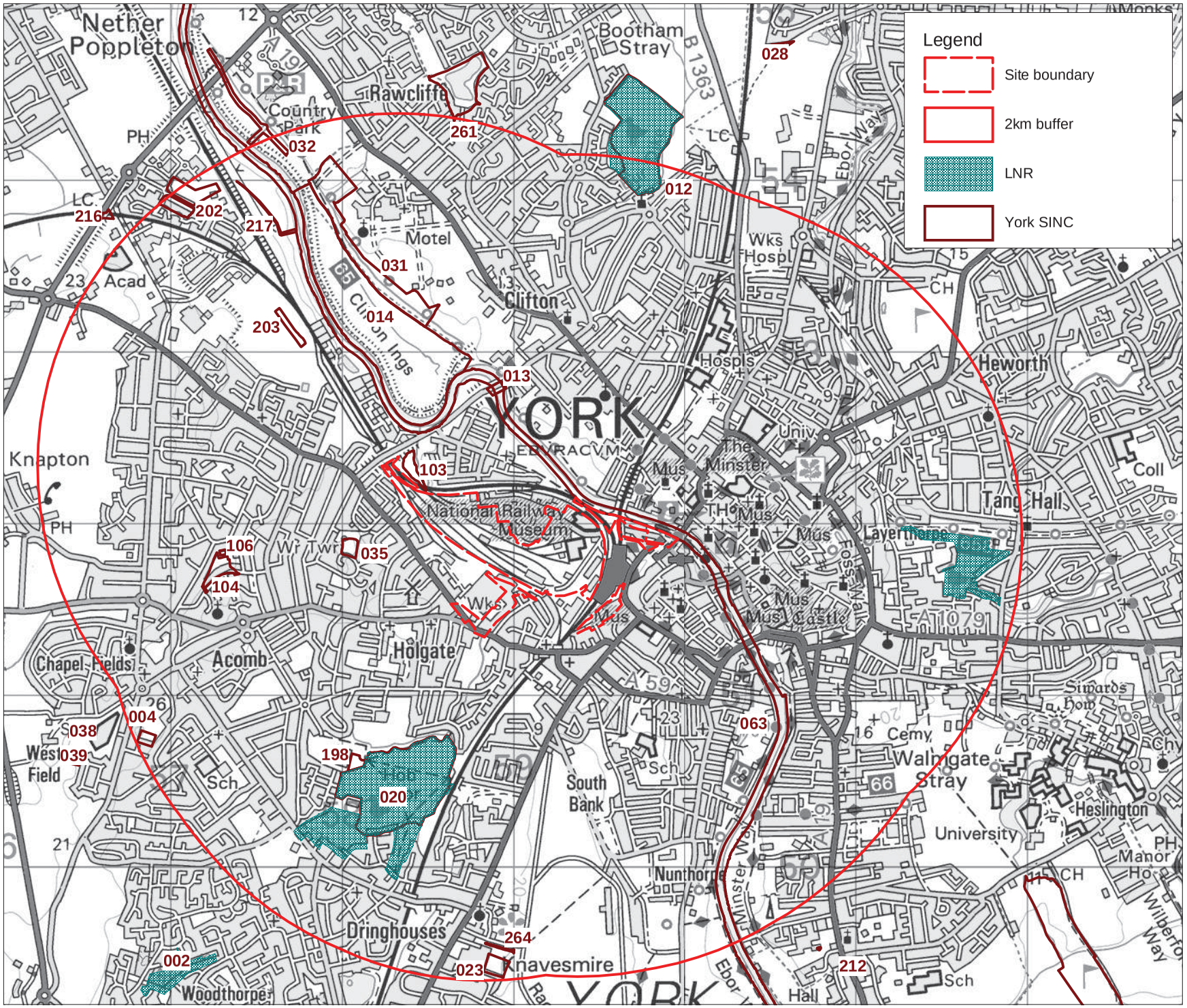
Assessment:
The site scores 10/8 using guideline Gr4 (neutral grassland in the Vale of York). Of the qualifying species, six are of at least 'occasional' status. One or two indicator species may have been overlooked: for instance, bistort (*Persicaria bistorta*) has been recorded in the recent past. However, most neutral grassland indicators are restricted to a small area of remnant flood meadow grassland. The area of this vegetation is <0.1 hectare but extends in a narrow strip >100 metres in length. This retains sufficient similarity to NVC MG4 grassland (meadow foxtail – great burnet flood meadow) for guideline Gr1 to apply, though it only constitutes a small part of the site.

Threats
The site requires careful management and removal of cuttings to ensure that the Mg4 grassland is maintained. The willows need management to both maintain there integrity and not overly shade the adjacent limited extent of Mg4 grassland.

Invasive weeds such as Japanese Knotweed, Himalayan Balsam and Giant Hogweed should be controlled and, if possible eradicated from the site.

Designation
The Holgate Millennium Green is designated as a Site of Importance for Nature Conservation under Criteria Gr1, the presence of Mg4 grassland. Only the area of Mg4 grassland should be treated as SINC.

The majority of the site, whilst not of SINC status, is included and should be considered as part of a single management unit and as part of a buffer for the area of interest. This would not prevent some development, provided it does not impact on the primary interest of the site.



Client: Arup

Client Ref: 250114

Our Ref: E02247

Description: Map showing non-Statutory sites of nature conservation within the search area

Scope of search: Site within boundary + 2km buffer all centred at SE 590 518

Scale: 1: 30,000 when printed at A4

Date produced: 29/06/2016

NEYEDC

Our ref:	E02247
Date:	29/06/2016
Species list for data search of area:	Site within boundary + 2km buffer all centred at SE 590518

The table below lists all species for which records have been found within the search area. The date refers to the most recent occurrence for each species.

SPECIES LIST

Scientific name	Common name	Taxonomic group	Year	Designated as
Bufo bufo	Common Toad	amphibian	2015	UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b)
Lissotriton vulgaris	Smooth Newt	amphibian	2011	Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b)
Rana temporaria	Common Frog	amphibian	2011	Habitats Directive Annex 5 Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b)
Triturus cristatus	Great Crested Newt	amphibian	2011	Bern Convention Appendix 2 Habitats Directive Annex 4 The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)
Accipiter gentilis	Northern Goshawk	bird	1981	Bonn Convention Appendix 2 EC CITES Annex A RDB Birds - 2 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Accipiter nisus	Eurasian Sparrowhawk	bird	2015	Bonn Convention Appendix 2 EC CITES Annex A
Alauda arvensis	Sky Lark	bird	2009	UK BAP Non-strict
Alcedo atthis	Common Kingfisher	bird	2014	Bern Convention Appendix 2 Birds Directive Annex 1 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Anas clypeata	Northern Shoveler	bird	1984	Bonn Convention Appendix 2 EC CITES Annex C RDB Birds - 4b
Anas crecca	Eurasian Teal	bird	1999	Bonn Convention Appendix 2 EC CITES Annex C RDB Birds - 1b
Anas platyrhynchos	Mallard	bird	2004	Bonn Convention Appendix 2
Anser anser	Greylag Goose	bird	2002	Bonn Convention Appendix 2 RDB Birds - 1b Wildlife and Countryside Act 1981 (Schedule 1 Part 2)
Anthus pratensis	Meadow Pipit	bird	2003	Bern Convention Appendix 2
Asio flammeus	Short-eared Owl	bird	1986	Bern Convention Appendix 2 Birds Directive Annex 1 EC CITES Annex A
Aythya ferina	Common Pochard	bird	1984	Bonn Convention Appendix 2 RDB Birds - 1b RDB Birds - 2
Aythya fuligula	Tufted Duck	bird	1984	Bonn Convention Appendix 2
Botaurus stellaris	Great Bittern	bird	1981	Bern Convention Appendix 2 Birds Directive Annex 1 RDB Birds - 2 RDB Birds - 3 RDB Birds - 4a UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Branta canadensis	Greater Canada Goose	bird	2003	Bonn Convention Appendix 2 Wildlife and Countryside Act 1981 (Schedule 9 Part 1)

Scientific name	Common name	Taxonomic group	Year	Designated as
Caprimulgus europaeus	European Nightjar	bird	1981	Bern Convention Appendix 2 Birds Directive Annex 1 RDB Birds - 5 UK Biodiversity Action Plan priority species
Carduelis cannabina	Common Linnet	bird	2009	Bern Convention Appendix 2 UK BAP Non-strict
Carduelis carduelis	European Goldfinch	bird	2009	Bern Convention Appendix 2
Carduelis chloris	European Greenfinch	bird	2009	Bern Convention Appendix 2
Carduelis flammea	Common Redpoll	bird	1998	Bern Convention Appendix 2
Carduelis flavirostris	Twite	bird	1986	Bern Convention Appendix 2 RDB Birds - 1a RDB Birds - 1b UK BAP Non-strict
Circus cyaneus	Hen Harrier	bird	1979	Birds Directive Annex 1 Bonn Convention Appendix 2 EC CITES Annex A RDB Birds - 5
Crex crex	Corn Crake	bird	1981	Bern Convention Appendix 2 Birds Directive Annex 1 Bonn Convention Appendix 2 RDB Birds - 3 UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Cuculus canorus	Common Cuckoo	bird	1996	UK Biodiversity Action Plan priority species
Cyanistes caeruleus	Blue Tit	bird	2005	Bern Convention Appendix 2
Dendrocopos major	Great Spotted Woodpecker	bird	2003	Bern Convention Appendix 2
Egretta garzetta	Little Egret	bird	2009	Bern Convention Appendix 2 Birds Directive Annex 1 EC CITES Annex A
Emberiza calandra	Corn Bunting	bird	2009	UK BAP Non-strict
Emberiza citrinella	Yellowhammer	bird	2009	Bern Convention Appendix 2 UK Biodiversity Action Plan priority species
Emberiza schoeniclus	Reed Bunting	bird	2009	Bern Convention Appendix 2 UK Biodiversity Action Plan priority species
Erithacus rubecula	European Robin	bird	2005	Bern Convention Appendix 2
Falco columbarius	Merlin	bird	1996	Bern Convention Appendix 2 Birds Directive Annex 1 Bonn Convention Appendix 2 EC CITES Annex A RDB Birds - 5 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Falco peregrinus	Peregrine Falcon	bird	1985	Bern Convention Appendix 2 Birds Directive Annex 1 Bonn Convention Appendix 2 EC CITES Annex A RDB - Internationally Important RDB Birds - 1a Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Falco subbuteo	Eurasian Hobby	bird	2009	Bern Convention Appendix 2 Bonn Convention Appendix 2 EC CITES Annex A Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Falco tinnunculus	Common Kestrel	bird	2003	Bern Convention Appendix 2 Bonn Convention Appendix 2 EC CITES Annex A
Gallinago gallinago	Common Snipe	bird	2009	Bonn Convention Appendix 2
Gallinula chloropus	Common Moorhen	bird	2014	Bonn Convention Appendix 2

Scientific name	Common name	Taxonomic group	Year	Designated as
Gavia arctica	Black-throated Diver	bird	1986	Bern Convention Appendix 2 Birds Directive Annex 1 RDB Birds - 1b RDB Birds - 2 UK Biodiversity Action Plan priority species
Gavia stellata	Red-throated Diver	bird	1985	Bern Convention Appendix 2 Birds Directive Annex 1 Bonn Convention Appendix 2 RDB Birds - 1a RDB Birds - 1b
Grus grus	Common Crane	bird	2009	Bern Convention Appendix 2 Birds Directive Annex 1 Bonn Convention Appendix 2 EC CITES Annex A RDB Birds - 2
Lymnocryptes minimus	Jack Snipe	bird	2009	Bonn Convention Appendix 2
Milvus milvus	Red Kite	bird	2009	Birds Directive Annex 1 Bonn Convention Appendix 2 EC CITES Annex A IUCN (2001) - Lower risk - near threatened RDB Birds - 2 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Motacilla flava subsp. flavissima	Yellow Wagtail	bird	1996	UK Biodiversity Action Plan priority species
Muscicapa striata	Spotted Flycatcher	bird	2009	Bern Convention Appendix 2 Bonn Convention Appendix 2 UK Biodiversity Action Plan priority species
Oenanthe oenanthe	Northern Wheatear	bird	1996	Bern Convention Appendix 2
Parus major	Great Tit	bird	2004	Bern Convention Appendix 2
Passer domesticus	House Sparrow	bird	2005	UK Biodiversity Action Plan priority species
Passer montanus	Eurasian Tree Sparrow	bird	2009	UK Biodiversity Action Plan priority species
Perdix perdix	Grey Partridge	bird	1999	RDB Birds - 3 UK Biodiversity Action Plan priority species
Pernis apivorus	European Honey-buzzard	bird	2009	Birds Directive Annex 1 Bonn Convention Appendix 2 EC CITES Annex A RDB Birds - 2 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Philomachus pugnax	Ruff	bird	1984	Birds Directive Annex 1 Bonn Convention Appendix 2 RDB Birds - 2 RDB Birds - 4a Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Picus viridis	Green Woodpecker	bird	1999	Bern Convention Appendix 2
Podiceps auritus	Slavonian Grebe	bird	1980	Bern Convention Appendix 2 Birds Directive Annex 1 Bonn Convention Appendix 2 RDB Birds - 2 RDB Birds - 4a Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Prunella modularis	Hedge Accentor	bird	2003	Bern Convention Appendix 2 UK BAP Non-strict
Pyrrhula pyrrhula	Common Bullfinch	bird	2003	UK BAP Non-strict
Riparia riparia	Sand Martin	bird	1997	Bern Convention Appendix 2
Saxicola rubetra	Whinchat	bird	1996	Bern Convention Appendix 2
Scolopax rusticola	Eurasian Woodcock	bird	2009	Bonn Convention Appendix 2
Strix aluco	Tawny Owl	bird	2004	Bern Convention Appendix 2 EC CITES Annex A
Sturnus vulgaris	Common Starling	bird	2004	UK BAP Non-strict

Scientific name	Common name	Taxonomic group	Year	Designated as
Tringa nebularia	Common Greenshank	bird	1984	Bonn Convention Appendix 2 RDB Birds - 5 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Tringa ochropus	Green Sandpiper	bird	1984	Bern Convention Appendix 2 Bonn Convention Appendix 2 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Turdus iliacus	Redwing	bird	2009	RDB Birds - 2 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Turdus philomelos	Song Thrush	bird	2011	UK BAP Non-strict
Turdus pilaris	Fieldfare	bird	2009	RDB Birds - 2 Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Salmo salar	Atlantic Salmon	bony fish (Actinopterygii)	1997	Habitats Directive Annex 5 RDB - Internationally Important The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 4) UK Biodiversity Action Plan priority species
Allium oleraceum	Field Garlic	flowering plant	2003	IUCN (2001) - Vulnerable
Apera spica-venti	Loose Silky-bent	flowering plant	2003	IUCN (2001) - Lower risk - near threatened Nationally scarce
Arenaria serpyllifolia	Thyme-Leaved Sandwort	flowering plant	2009	Bonn Convention Appendix 2
Cyperus longus	Galingale	flowering plant	2009	IUCN (2001) - Lower risk - near threatened Nationally scarce
Dactylorhiza purpurella	Northern Marsh-orchid	flowering plant	2015	UK BAP Non-strict
Fallopia japonica	Japanese Knotweed	flowering plant	2014	Wildlife and Countryside Act 1981 (Schedule 9 Part 2)
Filago vulgaris	Common Cudweed	flowering plant	2003	IUCN (2001) - Lower risk - near threatened
Galanthus nivalis	Snowdrop	flowering plant	2004	Habitats Directive Annex 5
Heracleum mantegazzianum	Giant Hogweed	flowering plant	2009	Wildlife and Countryside Act 1981 (Schedule 9 Part 2)
Hyacinthoides non-scripta	Bluebell	flowering plant	1991	Wildlife and Countryside Act 1981 (Schedule 8)
Lathyrus palustris	Marsh Pea	flowering plant	2003	IUCN (2001) - Lower risk - near threatened Nationally scarce
Oenanthe fistulosa	Tubular Water-dropwort	flowering plant	2008	IUCN (2001) - Vulnerable UK Biodiversity Action Plan priority species
Ophrys apifera	Bee Orchid	flowering plant	2003	EC CITES Annex B
Potamogeton pusillus	Lesser Pondweed	flowering plant	1997	Nationally scarce
Puccinellia rupestris	Stiff Saltmarsh-grass	flowering plant	2006	Nationally scarce
Spergula arvensis	Corn Spurrey	flowering plant	2003	IUCN (2001) - Vulnerable
Stratiotes aloides	Water-soldier	flowering plant	2003	IUCN (2001) - Lower risk - near threatened Nationally rare Nationally scarce
Viola tricolor	Wild Pansy	flowering plant	1992	IUCN (2001) - Lower risk - near threatened
Sialis nigripes	Sialis nigripes	insect - alderfly (Megaloptera)	1999	Nationally Notable
Agabus (Agabus) uliginosus	Agabus (Agabus) uliginosus	insect - beetle (Coleoptera)	1997	IUCN (2001) - Lower risk - near threatened
Amidobia talpa	Amidobia talpa	insect - beetle (Coleoptera)	1997	Nationally Notable
Chrysolina graminis	Tansy Beetle	insect - beetle (Coleoptera)	2004	UK Biodiversity Action Plan priority species
Datomicra nigra	Datomicra nigra	insect - beetle (Coleoptera)	1997	Nationally Notable
Helophorus (Helophorus) longitarsis	Helophorus (Helophorus) longitarsis	insect - beetle (Coleoptera)	2003	Nationally scarce

Scientific name	Common name	Taxonomic group	Year	Designated as
Heterocerus marginatus	Heterocerus marginatus	insect - beetle (Coleoptera)	1997	Nationally scarce
Hydroporus neglectus	Hydroporus neglectus	insect - beetle (Coleoptera)	2009	Nationally scarce
Oxypoda exoleta	Oxypoda exoleta	insect - beetle (Coleoptera)	1997	Nationally Notable
Philhygra britteni	Philhygra britteni	insect - beetle (Coleoptera)	1997	Nationally Notable
Platystethus (Craetopycrus) nodifrons	Platystethus (Craetopycrus) nodifrons	insect - beetle (Coleoptera)	1997	Nationally Notable
Psylliodes chrysocephala	Cabbage-stem Flea Beetle	insect - beetle (Coleoptera)	1997	UK Biodiversity Action Plan priority species
Ceraclea senilis	Ceraclea senilis	insect - caddis fly (Trichoptera)	1997	Nationally Notable
Beris clavipes	Beris clavipes	insect - true fly (Diptera)	1995	Nationally Notable
Cheilosia barbata	Cheilosia barbata	insect - true fly (Diptera)	1998	Nationally Notable
Chrysotus gramineus	Chrysotus gramineus	insect - true fly (Diptera)	1998	Nationally Notable
Colobaea punctata	Colobaea punctata	insect - true fly (Diptera)	1995	Nationally Notable
Dolichopus trivialis	Dolichopus trivialis	insect - true fly (Diptera)	1998	Nationally scarce
Drapetis simulans	Drapetis simulans	insect - true fly (Diptera)	1995	Nationally Notable
Fannia rondanii	Fannia rondanii	insect - true fly (Diptera)	1979	Nationally Notable
Melanostoma mellinum	Melanostoma mellinum	insect - true fly (Diptera)	1998	Nationally Notable
Paroxyna absinthii	Paroxyna absinthii	insect - true fly (Diptera)	1995	Nationally Notable
Pherbellia dorsata	Pherbellia dorsata	insect - true fly (Diptera)	1995	Nationally Notable
Pipizella viduata	Pipizella viduata	insect - true fly (Diptera)	1998	Nationally Notable
Platypalpus albicornis	Platypalpus albicornis	insect - true fly (Diptera)	1995	Nationally Notable
Platypalpus cothurnatus	Platypalpus cothurnatus	insect - true fly (Diptera)	1995	Nationally Notable
Platypalpus politus	Platypalpus politus	insect - true fly (Diptera)	1995	Nationally Notable
Platypalpus ruficornis	Platypalpus ruficornis	insect - true fly (Diptera)	1995	Nationally Notable
Lampetra fluviatilis	River Lamprey	jawless fish (Agnatha)	1997	Habitats Directive Annex 5 The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 4) UK Biodiversity Action Plan priority species
Petromyzon marinus	Sea Lamprey	jawless fish (Agnatha)	1997	UK Biodiversity Action Plan priority species
Pseudanodonta complanata	Pseudanodonta complanata	mollusc	2000	UK Biodiversity Action Plan priority species
Natrix natrix	Grass Snake	reptile	1976	UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b)
Meioneta mollis	Meioneta mollis	spider (Araneae)	1995	UK Biodiversity Action Plan priority species

Scientific name	Common name	Taxonomic group	Year	Designated as
Arvicola amphibius	European Water Vole	terrestrial mammal	2003	UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)
Erinaceus europaeus	West European Hedgehog	terrestrial mammal	2015	RDB - Internationally Important UK Biodiversity Action Plan priority species
Lutra lutra	European Otter	terrestrial mammal	2012	Bern Convention Appendix 2 EC CITES Annex A Habitats Directive Annex 4 IUCN (2001) - Lower risk - near threatened RDB - Internationally Important The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)
Meles meles	Eurasian Badger	terrestrial mammal	2008	Protection of Badgers Act (1992) RDB - Internationally Important
Micromys minutus	Harvest Mouse	terrestrial mammal	2003	UK Biodiversity Action Plan priority species
Myotis	Unidentified Bat	terrestrial mammal	2008	Bonn Convention Appendix 2
Myotis daubentonii	Daubenton's Bat	terrestrial mammal	2004	Bern Convention Appendix 2 Bonn Convention Appendix 2 Habitats Directive Annex 4 RDB - Internationally Important The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)
Myotis mystacinus	Whiskered Bat	terrestrial mammal	1973	Bern Convention Appendix 2 Bonn Convention Appendix 2 Habitats Directive Annex 4 The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)

Scientific name	Common name	Taxonomic group	Year	Designated as
Nyctalus noctula	Noctule Bat	terrestrial mammal	2004	Bern Convention Appendix 2 Bonn Convention Appendix 2 Habitats Directive Annex 4 The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) UK Biodiversity Action Plan priority species Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)
Pipistrellus	Pipistrellus	terrestrial mammal	2008	Bonn Convention Appendix 2
Pipistrellus pipistrellus	Pipistrellus pipistrellus	terrestrial mammal	2015	Bern Convention Appendix 2 Bonn Convention Appendix 2 Habitats Directive Annex 4 RDB - Internationally Important The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)
Pipistrellus pygmaeus	Soprano Pipistrelle	terrestrial mammal	2014	Bern Convention Appendix 2 Bonn Convention Appendix 2 Habitats Directive Annex 4 RDB - Internationally Important The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) UK Biodiversity Action Plan priority species
Sciurus carolinensis	Eastern Grey Squirrel	terrestrial mammal	2005	Wildlife and Countryside Act 1981 (Schedule 9 Part 1)
Vespertilionidae	Vespertilionidae	terrestrial mammal	2004	Bonn Convention Appendix 2 The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking)) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a) Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b) Wildlife and Countryside Act 1981 (Schedule 5)

Appendix B

Bat Roost Suitability Assessment

B1

Building Number	Building Description	Bat Roost Suitability
1	Single storey warehouse comprised of metal with a pitched roof and metal soffit. At north-western end the metal soffit has lifted providing a potential roosting site.	Low
2	Single story blue metal building with a flat roof and a barge board that has a grill at its base that would prevent bat access.	Negligible
3	Single story metal building with pitched roof, but lacking a soffit or barge behind/within which bats could roost.	Negligible
4	Single storey metal warehouse with brick finish at each end. Close inspection not possible but bat suitability is considered negligible from the views that were available of this structure.	Negligible
5	Single storey timber building with pitched slate roof, roof slates are in a good condition, but a timber board has been lost from northern end of the structure. There is some vegetation surrounding.	Moderate
6	Warehouse with brick lower and metal upper and roof. There are gaps where metal and brick meet but pot likely to be low for bats.	Low
7	Two storey brick building with single storey extensions. All with concrete roofs. Windows intact no surrounding cavities.	Negligible
8	Single storey small brick building. Clay roof tiles. Ends of tiles on front of building are grilled. Rear does not seem to have been.	Negligible
9	Single storey brick building with flat roof, barge board is cobwebby except at the side door. **Survey internally as this may remove the need for bat activity surveys at this structure.**	Low
10	Two storey brick building with multi pitched roof. Generally in a good state of repair, potential gap in brick work at western end. Not all of the roof is visible from the ground due to its complexity. No vegetation immediately surrounding the building.	Moderate
11	Small single story building, part flat roof and part pitched and covered with slate, gaps at end of pitch beneath slates. No vegetation immediately surrounding the building.	Moderate
12	Two storey brick building, with pitched slate food. Needs more detailed inspection. Front end offices with moderate potential while the warehouse at the rear is of negligible value.	Moderate
13	Single storey brick building with a pitched roof covered in felt. This attaches to a secons warehouse with a pitched metal roof.	Negligible
14	Small flat roofed concrete shed.	Negligible
15	New metal portacabin, which is well sealed.	Negligible
16	Single storey temporary building, timber, barge board along the southern and northern face behind which bats could roost. Some vegetation surrounding.	Moderate

Building Number	Building Description	Bat Roost Suitability
17	Metal warehouse with a pitched roof and a metal soffit. There is a gap around exterior, but considered sub optimal for bats.	Negligible
18	Two storey metal warehouse with plastic skylights in the roof roof. There is some vegetation surrounding the building which is dominated by buddleja.	Negligible
18a	Large warehouse composed of a mix of materials. Metal roof in some areas and corrugated concrete roof in others. Brick walls are damaged but the damage does not look to extend into structure/cavity wall.	Moderate
19	Single storey brick buildings with clay roof tiles. Occasional ridge tile has been lost, gap observed at the western gable end of the building.	Moderate
20	Slipped/ missing roof tiles on north-western corner and on south-east corner. Rest is in good condition. Gutter board all tight to wall.	Moderate
21	Single storey brick building, pitched roof with slate. Some of the tiles have moved and been lifted but the roof is in a reasonable state of repair. There are gaps at top of brick wall.	Moderate
22	Brick building with a metal roof. There is a wooden beam at the top of the wall which has warped creating a gap that bats could roost in. In addition, glass has been lost from the windows providing potential access points for bats.	Moderate
23	Brick single storey building with pitched corrugated concrete roof. Small gaps into building at the top of brick work.	Low
24	Small brick building with a pitched slate roof. There is a gap by a glass sheet in the roof of this structure and gaps at top of wall, into ridge tiles and bricks missing from wall.	Moderate
25	A single storey brick building with concrete top stones on a parapet. The only pot for bat are three areas where mortar has been lost between bricks or where the brickwork has split to form a crack.	Low
26	Two storey brick building. With a barge on southern and northern face of the building. Looks to be close fitting but recommend that a survey is undertaken due to the optimal location of this building (adjacent to the river).	Low
27	Single storey building made up of several different materials. Building at rear is brick with a corrugated cement roof The overhang could provide bats with a potential access point to a roosting site.	Low
28	Large brick built building with a metal roof that overhangs. Brick is in good conditions and the where the roof meets the brick wall there are no gaps that would allow bats to gain access. The entrance to this building is single storey with a flat roof. It is made of concrete which has no potential bat access points.	Negligible
29a	Two storey brick building with flat and pitched roof sections. Pitched roof has a slate roof covering. Typically in good condition, rare lifted tile, mortar lost, low bat roost potential due to the good condition of roof. Windows are boarded up but close fitting.	Low

Building Number	Building Description	Bat Roost Suitability
29b	An old petrol station forecourt which is now used as a car wash.	Negligible
30	Single storey brick building with a single pitch covered in slates. Potential for bats to enter where roof meets brick wall.	Moderate
31	Two storey brick building connecting to a warehouse, made of brick . House has pitched roof with slates ridge made of felt. Disused. Lifted tiles, gaps around windows, lifted felt, limited vegetation surrounding the building. High bat potential. Large number of access points into the warehouse building, due to failed soffits and lifted roof overhang. Roof of corrugated concrete.	High
32	Very complex roof to a two and single story building. Slate and clay tile roof, in need of repair.	High
33	Brick building with pitched, hipped roof with slates, mortar lost from ridge tiles, therefore several potential access points.	High
34	Corrugated concrete warehouse.	Negligible
35	Metal warehouse, with pitched roof and plastic skylights.	Negligible
36	Brick building with pitched roof in poor state of repair. Multiple flat roofed building. Adjacent to trees.	High
37	Brick warehouses with corrugated concrete pitched roof.	Negligible
38	Brick warehouse, double pitched roof with a corrugated roof. Potential access point for bats into soffit at western and southern sides of the building.	Low
38a	Single storey flat roofed building, brick with concrete roof, broken windows.	Negligible
39	Large plastic tent.	Negligible
40	Large two storey brick warehouse. Gaps into brickwork around pipes. Stone at top of walls. Gaps into ridge tiles, slipped tiles.	High
41	Unusual building, potentially for water storage. Missing glass and cracks in walls, adjacent to single storey brick building with pitched slate roof.	Moderate
42	Appears to be a single storey residential building, with a pitched slate roof, where some of the slates have lifted.	Moderate
43	Red brick building with cement cladding on end of roof. Pitched slated roof. Slipped slates on east side. Roof in better condition on the west side. Bricks crumbling on east side. Adjacent building with timber cladding on north side and slate roof in good condition. Vented posts may provide access. Also potential access where roof adjoins timber cladding wall on the northern end. No evidence of bats. Building surrounded by buddleja and silver birch.	Moderate
44	Brick substation with flat felt roof. Small gaps in mortar between a couple of bricks but covered in cobwebs. Wooden fascia boards abut the roof which are tight to the bricks. No evidence of bats.	Negligible
45	Double pitched warehouse, brick walls, corrugated roof all close fitting roof. Southern end of building three storeys with slate on the roof, lost tiles, views of roof obstructed.	High

Building Number	Building Description	Bat Roost Suitability
46	Flat roof single storey temporary building made of timber, Windows all in place, soffit in good condition.	Negligible
47	Brick building with pitched slate roof. Wooden fascia tight again top of walls. Few slates missing on roof and ridge tiles missing. No roof void. Two glass windows and wooden door with hole in allowing access. No roof void.	Low
48	Building with pitched slate roof, slates in good condition to the west but views of eastern pitch limited. Moderate suitability for bats. Flat roofed section negligible suitability. Barge board close fitting, metal screwed down.	Moderate
Bridge on Water Lane	Concrete bridge with crack/missing mortar at south-eastern corner where the deck joins the abutment. Potentially a gap where the deck joins the central abutment.	Low
49	Warehouse building with wooden clad walls and pitched roof with mix of corrugated metal roof. Skylight windows throughout building.	Negligible
50	Warehouse building. One storey metal cladded building with pitched corrugated metal roof. Skylight windows on eastern end of building.	Negligible
51	One storey pitched corrugated metal roof building. Corrugated metal cladding on exterior walls.	Negligible
52	Warehouse buildings with open sides. Corrugated metal walls and roof.	Negligible

Appendix C

Habitat Suitability Index - Great Crested Newts

C1

	WB1		**WB2**		**WB3**		**WB4**		**WB5**	
	Result	Score	Result	Score	Result	Score	Result	Score	Result	Score
Geographic Location	Zone A	1	Zone A	1	Zone A	1	Zone A	1	Zone A	1
Area (m^2)	30	0.05	30	0.05	12	0.05	25	0.05	45	0.05
Permanence	Never dries	0.9	Never dries	0.9	Never dries	0.9	Rarely dries	1	Never dries	0.9
Water Quality	Moderate	0.67	Poor	0.33	Poor	0.33	Moderate	0.67	Bad	0.01
Shade	0%	1	0%	1	50%	1	0%	1	0%	1
Waterfowl	Major	0.01	Absent	1	Minor	0.67	Absent	1	Absent	1
Fish	Possible	0.7	Possible	0.7	Possible	0.7	Absent	1	Possible	0.7
Pond Count	9	0.9	9	0.9	9	0.9	9	0.9	9	0.9
Terrestrial Habitat	None	0.01	Poor	0.33	Poor	0.33	Moderate	0.67	None	0.01
Macrophytes	95%	0.85	10%	0.4	10%	0.4	96%	0.8	0%	0.3
Habitat Suitability Index		**0.2624**		**0.5095**		**0.4896**		**0.662**		**0.2461**
		Poor		**Below average**		**Poor**		**Average**		**Poor**

Appendix 11G
Black Redstart Survey

York Central

Black redstart survey

August 2017

Control Sheet

Job reference:	CSE075-002
Title:	York Central
Type:	Black Redstart Survey
Client:	ARUP
Prepared by:	Craig Sandham
Version:	v1.0
Status:	FINAL
Restricted distribution:	No
Reviewed and approved for issue:	 Craig Sandham
Date:	15.8.17

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Opinions and information provided in the report are on the basis of CS Ecology Ltd using due skill, care and diligence in the preparation of the same. It should be noted, that whilst every effort is made to meet the client's brief, no site investigation can ensure complete assessment or prediction of the natural environment.

Contents

1 Introduction

1.1 Background

CS Ecology Ltd. was commissioned by Arup in April 2017 to undertake a black redstart *Phoenicurus ochruros* survey of the York Central site (hereon in referred to as 'the site'. This work follows on from a habitat-based scoping assessment undertaken by CS Ecology Ltd. in 2016; this found the site to be potentially suitable for black redstart. The site comprises numerous large railway sheds, industrial units, brick built buildings (both in use and disused), small areas of scrub/ grassed habitat and railway sidings, and in addition the proximity of the River Ouse. The habitats taken as a whole fulfil five key habitat preferences of black redstart[1]:

a. Availability of sparsely vegetated stony ground for foraging.
b. Presence of complex structures in the form of large buildings which function as facsimiles of the species natural breeding habitat of cliffs.
c. A variety of ledges or holes for nest sites.
d. Proximity to water which increases the volume of insect prey available to feed young.
e. Absence of an extensive shrub layer which is favourable to the European robin *Erithacus rubecula*, which is thought to outcompete black redstart.

1.2 Personnel

Tim Marlow BSc (Hons) MCIEEM undertook the survey work, he is an experienced ornithologist and 'general' ecologist who has undertaken many bird assessments and surveys for a variety of projects over the last fifteen years.

1.3 Survey objectives

The objective of the survey is to ascertain the status, breeding or otherwise of black redstart at the site. Although the focus of the survey, other species of bird were also recorded during the survey visits, and as such the species and number of breeding pairs determined. The survey also sets out to identify areas of the site which are of particular value to breeding birds and make recommendations as appropriate.

[1] http://www.blackredstarts.org.uk/pages/ecoredstart.html

2 Methodology

2.1 Field survey

The black redstart survey was undertaken in accordance with the methodology recommended in Gilbert *et al*. 1998 and with additional reference to 'site survey guidance' available at http://www.blackredstarts.org.uk/pages/sitesurvey.html.

Five visits were undertaken between early May and the end of June. Visits were undertaken from one hour before sunrise for six hours and one evening survey was undertaken from approximately four hours before sunset. Visits were undertaken on days with no rain and light to moderate winds as poor weather can inhibit bird activity and reduce detectability.

A predetermined route was taken round the site and timed pauses were made at designated points which afforded opportunities to listen for song over a wide area of suitable habitat. The start point of the route was varied to ensure even coverage of the site at different times. Dates, times and weather details of visits are given below:

Date	Time	Cloud cover	Wind & direction	Rainfall
02.05.2017	04:30 – 10:30	4 – 8/8	1 East	Nil
18.05.2017	04:15 – 10:15	2/8	1 West	Nil
02.06.2017	04:00 – 10:00	4 – 6/8	1 West	Nil
15.06.2017	03:45 – 09:45	2 – 7/8	1 South-west	Nil
30.06.2017	18:00 – 22:30	8/8	1 West	2 hours light rain at 21:00

In addition to the black redstart survey, a territory mapping survey (Bibby, Burgess & Hill, 1992) was undertaken concurrently in which all singing birds were recorded (it is assumed that a singing bird is a territorial male and may thus indicate the presence of a breeding pair) and their locations marked on a map on each visit. The estimated centre of all breeding territories were then plotted using the results from each visit (based on mean positions of the data sets). Non-breeding birds or those for which breeding could not be confirmed were also recorded.

Evidence used to assign breeding status[2]:

Non-breeder (Nb) – migrant or summering species.

Possible Breeder (Pob) – observed in suitable habitat, singing male.

Probable breeder (Prb) – pair in suitable habitat, permanent territory, courtship and display, visiting probable nest site, agitated behaviour, brood path on incubating bird.

Confirmed breeder (Cb) – distraction display, used nest of eggshells from this season, recently fledged or downy young. Adults entering or leaving nest site indicating occupied nest, adults carrying faecal sac or food for young, nest containing eggs.

Conservation status (e.g. Red, amber or green status) is determined using findings in Hayhow *et al*. 2016 and current UK planning legislation (e.g. Species of principal importance under s41 of the Natural Environment & Rural Communities Act 2006).

[2] EOAC. (1979). Categories of Breeding Bird Evidence. European Ornithological Atlas Committee.

3 Results

3.1 Field survey results

Species & BTO code	Taxon	Conservation status	Cb	Pob	Prb	T	Comments
Greylag Goose **GJ**	*Anser anser*	Amber	3	0	0	**3**	Breeding confirmed. Three pairs raised young in the Memorial Park area.
Common Shelduck **SU**	*Tadorna tadorna*	Amber	0	0	0	**0**	Non-breeding. A group of four recorded flying over in June.
Mallard **MA**	*Anas platyrynchos*	Amber	0	0	0	**0**	Non-breeding. A pair recorded flying over.
Grey Heron **H**	*Ardea cinerea*	Green	0	0	0	**0**	Non-breeding. Two recorded flying over.
Common Curlew **CU**	*Numenius arquata*	Red S41	0	0	0	**0**	Non-breeding. A singing bird recorded flying over in June may have been holding territory in meadows to the north of the site.
Lesser Black-backed Gull **LB**	*Larus fuscus*	Amber	0	0	0	**0**	Non-breeding. Singles recorded on the rooftops of industrial buildings.

Species & BTO code	Taxon	Conservation status	Cb	Pob	Prb	T	Comments
Herring Gull **HG**	*Larus argentatus*	Red S41	0	0	0	**0**	Non-breeding. Recorded on the rooftops of industrial buildings, max. 111.
Common Stock Dove **SD**	*Columba oenas*	Amber	0	0	1	**0**	Probable breeding. One permanent territory located around an old railway building (B18a).
Common Woodpigeon **WP**	*Columba palumbus*	Green	0	2	7	**9**	Probable breeding. Widespread across the site.
Collared Dove **CD**	*Streptopelia decaocto*	Green	0	2	0	**2**	Possible breeding. Birds recorded in suitable breeding habitat at two locations.
Common Swift **SI**	*Apus apus*	Amber	0	0	0	**0**	Non-breeding. Small numbers recorded foraging over the site.
Common House Martin **HM**	*Delichon urbica*	Green	0	0	0	**0**	Non-breeding. Small numbers presumed to be breeding in nearby housing estates recorded foraging over the site.
Grey Wagtail **GL**	*Motacilla cinerea*	Amber	0	0	0	**0**	Non-breeding. A single bird recorded flying over.
Pied Wagtail **PW**	*Motacilla alba*	Green	0	1	0	**0**	Possible breeding. Recorded in suitable breeding habitat around an old railway building.

Species & BTO code	Taxon	Conservation status	Cb	Pob	Prb	T	Comments
Winter Wren **WR**	*Troglodytes troglodytes*	Green	0	2	3	**5**	Probable breeding. Widespread across the site.
Dunnock **D**	*Prunella modularis*	Amber S41	0	1	4	**5**	Probable breeding. Widespread across the site.
European Robin **R**	*Erithacus rubecula*	Green	1	2	3	**6**	Confirmed breeding. Widespread across the site.
Ring Ouzel **RZ**	*Turdus torquatus*	Red S41	0	0	0	**0**	Non-breeding. A migrant bird was recorded on the first visit in early May.
Common Blackbird **B**	*Turdus merula*	Green	0	1	6	**7**	Probable breeding. Widespread across the site.
Song Thrush **ST**	*Turdus philomelos*	Red S41	0	4	0	**4**	Possible breeding. Widespread but uncommon across the site.
Lesser Whitethroat **LW**	*Sylvia curruca*	Green	0	0	1	**1**	Probable breeding. A single permanent territory located in trackside scrub inside the site.
Common Whitethroat **WH**	*Sylvia communis*	Amber	0	0	1	**1**	Probable breeding. A single permanent territory located in trackside scrub inside the site.

Species & BTO code	Taxon	Conservation status	Cb	Pob	Prb	T	Comments
Blackcap **BC**	*Sylvia atricapilla*	Green	0	1	1	**2**	Probable breeding. Two permanent territories located in trackside scrub inside the Network Rail site.
Common Chiffchaff **CC**	*Phylloscopus colybitta*	Green	0	0	1	**1**	Probable breeding. A single permanent territory located in trackside scrub inside the Network Rail site.
Great Tit **GT**	*Parus major*	Green	o	3	1	**4**	Possible breeding. Widespread but uncommon across the site.
Blue Tit **BT**	*Cyanistes caeruleus*	Green	0	2	0	**2**	Possible breeding. Uncommon with just two possible territories located.
Eurasian Jay **J**	*Garrulus glandarius*	Green	0	0	0	**0**	Non-breeding. A single bird recorded on the northern site boundary is likely to have come from nearby parkland.
Common Magpie **MG**	*Pica Pica*	Green	0	0	2	**2**	Probable breeding. Two permanent territories located.
Carrion Crow **C**	*Corvus corone*	Green	0	0	1	**1**	Probable breeding. One permanent territory located.
Common Starling **SG**	*Sternus vulgaris*	Red S41	0	0	0	**0**	Non-breeding. Though numerous suitable buildings are present within the site the species was only recorded flying over and on one occasion perched.

Species & BTO code	Taxon	Conservation status	Cb	Pob	Prb	T	Comments
House Sparrow **HS**	*Passer domesticus*	Red S41	5	0	0	**5**	Confirmed breeding. Four pairs were located in industrial buildings (B37) and one in offices (B 31). Birds from nearby housing estates also use the trackside scrub in the Network Rail site to forage.
Common Chaffinch **CH**	*Fringilla coelebs*	Green	0	2	1	**3**	Probable breeding. Widespread across the site but uncommon.
European Greenfinch **GR**	*Carduelis chloris*	Green	0	1	1	**2**	Probable breeding. Widespread across the site but uncommon.
European Goldfinch **GO**	*Carduelis carduelis*	Green	0	0	5	**5**	Probable breeding. Widespread across the site.
Eurasian Bullfinch **BF**	*Pyrrhula pyrrhula*	Red S41	0	1	0	**0**	Possible breeding. Recorded in suitable breeding habitat in trackside scrub at the eastern end of the site.

Total number of species = 35. Cb – Confirmed breeding; Prb – Probable breeding; Pob – Possible breeding; Nb – Non-breeding. T = maximum number of total breeding territories.

4 Evaluation & Conclusion

Black redstart was not detected during the survey visits, however a total of 35 species were recorded during the survey of which 3 were confirmed breeders (Cb), 14 were probable breeders (Prb), 6 were possible breeders (Pob), and 12 were non-breeders (Nb) of which 7 were only recorded flying over.

A number of species of conservation concern (7 Red List species, 9 Amber List species and 8 Species of Principal Importance) were recorded, but no species afforded special protection under Schedule 1 of the Wildlife and Countryside Act 1981 were found on the site.

Breeding bird species diversity on the site was found to be fairly high for an area of its size and inner city location. The number and densities of breeding bird species of conservation concern found on the site was low. Some species and individual birds not breeding within the site boundary do utilise the site as an important foraging area.

The most important areas of the site for breeding birds are:

1. The trackside scrub and sidings in the centre of the site. The scrub habitat supports species not found elsewhere on the site including chiffchaff and lesser whitethroat, whilst house sparrows and other birds from the nearby estates and gardens utilise the area for foraging.

2. The trackside scrub at the extreme east end of the site. The scrub habitat supports species including common whitethroat and eurasian bullfinch.

3. Building 37 provides nesting habitat for house sparrow (four pairs were located during the 2017 surveys).

Notwithstanding the above, the site is not considered to be important for breeding birds at the national, regional or county level. However, the site is considered to be important for breeding birds at the local level.

5 Recommendations

5.1 Scrub habitat

Areas of scrub, although considered unsightly to look at, offer value to breeding and foraging birds and as such should be retained wherever practicable in any redevelopment of the site. Where this is not possible, areas of scrub should be established to replace that lost.

The existing scrub habitat has been created by the presence of track-side ballast which prevents excessive dominance by grasses and other plant species thus ensuring a comparatively sparse and open structure to the habitat. This habitat type is favoured by a variety of plant species and, in turn, a variety of invertebrates. Both plants and invertebrates are exploited by foraging birds. Insectivorous bird species such as lesser whitethroat and common whitethroat breed on the site and it is unusual to find species such as these, which are associated with scrub, in a city centre.

Species such as european goldfinch and eurasian bullfinch feed on the seeds of plants found in the scrub habitat which is also important for birds nesting in nearby houses and gardens, in particular the Red Listed house sparrow, the local population of which is likely to depend heavily on the track-side scrub.

5.2 Nest boxes

Nest boxes or other synthetic hole-nesting options should be considered in order to provide potential nesting habitat for birds. Examples specific to birds encountered at the site should be considered as follows:

Plate 1. House sparrow ‘terrace’ box which may be hung or integrated within brickwork.

A multi-hole nest box from Schwegler, suitable for house sparrow (Plate 1). The design of the box means it can be incorporated within the built structure or hung as desired.

Whilst swifts did not breed at the site, they do use it for foraging purposes and breeding could be encouraged through the provision of suitable nesting sites, such as the swift box from Schwegler shown below.

Plate 2. Swift box, which may be hung or incorporated within the brickwork of a structure

Stock dove will readily use nest boxes including the one below from CJ Wildlife (Plate 3). The box may also attract other species, including jackdaw and tawny owl, which although not recorded during the surveys, may utilise the site periodically.

Plate 3. Wooden box suitable for stock dove

5.3 Other habitats

The provision of ponds and/ or water features should be considered in order to encourage food and bathing opportunities for birds and provide habitat linkages for wildlife in the York area. There would likely be associated educational benefits available once such habitats had established.

6 References

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Appendix 1 - Legislative and Planning Context

This section summarises the legislation which is relevant, in ecological terms, to this assessment, i.e. legislation relevant to species present or potentially present within the survey area is included here along with legislation relevant to protected sites in the vicinity. Note that qualified legal expertise should be sought in case of any uncertainty.

Birds

The Wildlife and Countryside Act 1981 (as amended) is the principal legislation affording protection to UK wild birds. Under this legislation all birds, their nests and eggs are protected by law and it is an offence, with certain exceptions to recklessly or intentionally:

a) Kill, injure or take any wild bird;

b) Take, damage or destroy the nest of any wild bird while in use or being built;

c) Take or destroy the egg of any wild bird.

In addition, species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) are specially protected at all times.

National Planning Policy Framework (NPPF, 2012)

The NPPF states that: If significant harm to biodiversity resulting from a development cannot be avoided or adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused (NPPF Para 118); Planning decisions should contribute to conserving and enhancing the natural environment (NPPF Para 17).

Natural Environment and Communities Act (NERC, 2006)

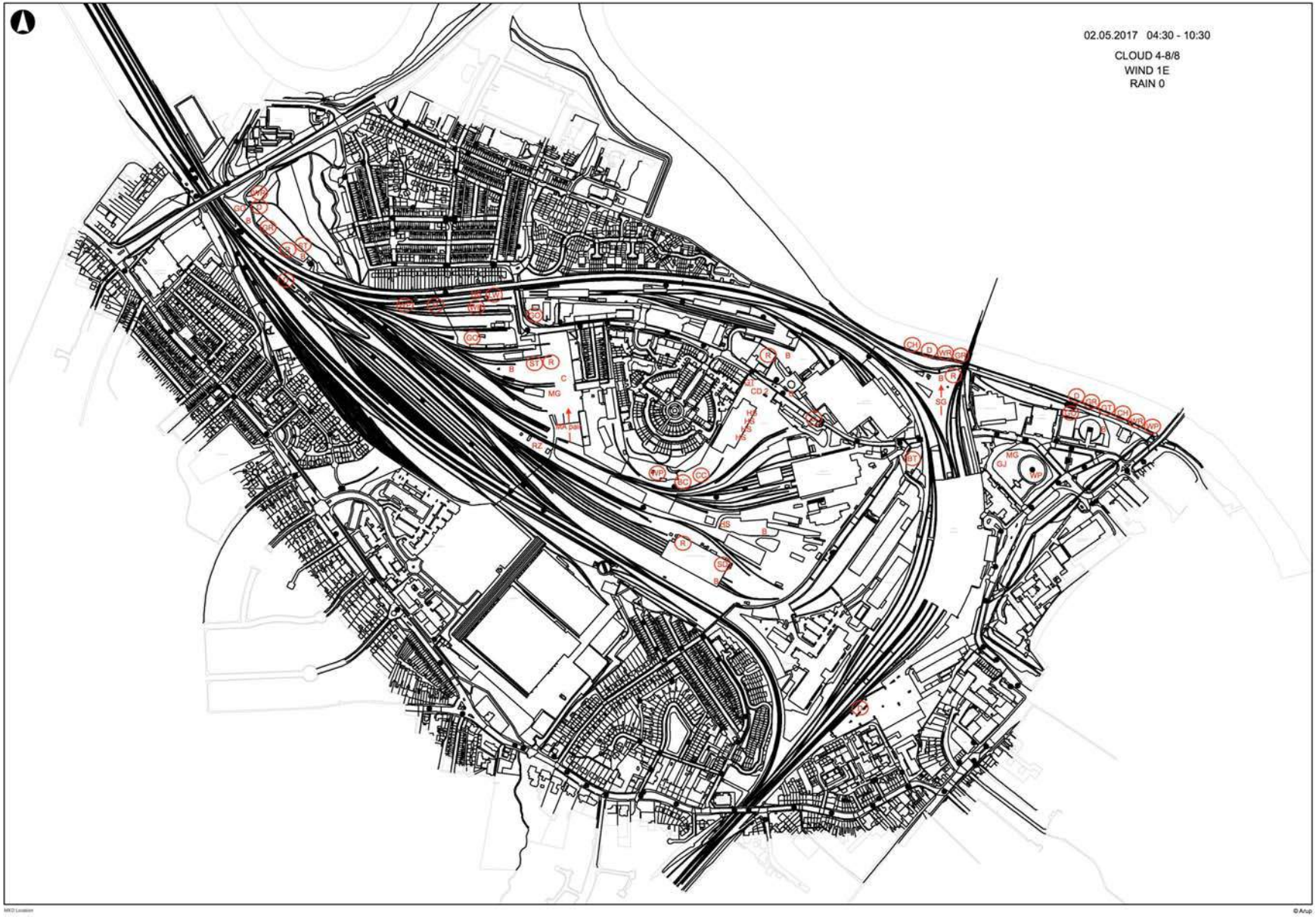
The Natural Environment and Rural Communities (NERC) Act came into force on 1st Oct 2006. Section 40 of the Act requires all public bodies to have regard to biodiversity conservation when carrying out their functions. This is commonly referred to as the ‘Biodiversity duty’

This duty extends to all public bodies the biodiversity duty of section 74 of the Countryside and Rights of Way Act 2000 (CROW), which placed a duty on Government and Ministers.

The aim of the biodiversity duty is to raise the profile of biodiversity in England and Wales, so that the conservation of biodiversity becomes properly embedded in all relevant policies and decisions made by public authorities.

Appendix 2 – Survey Maps

A3



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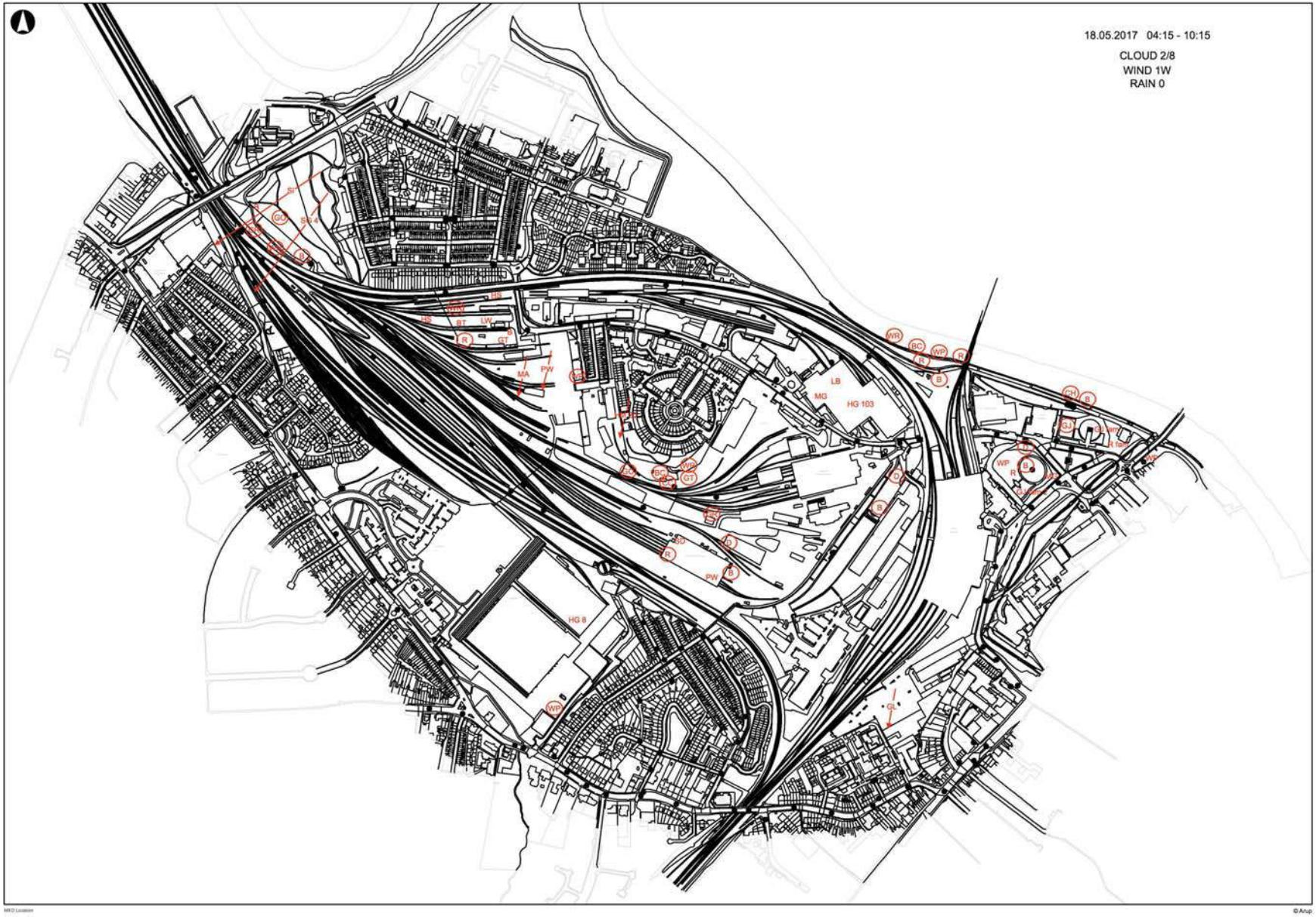

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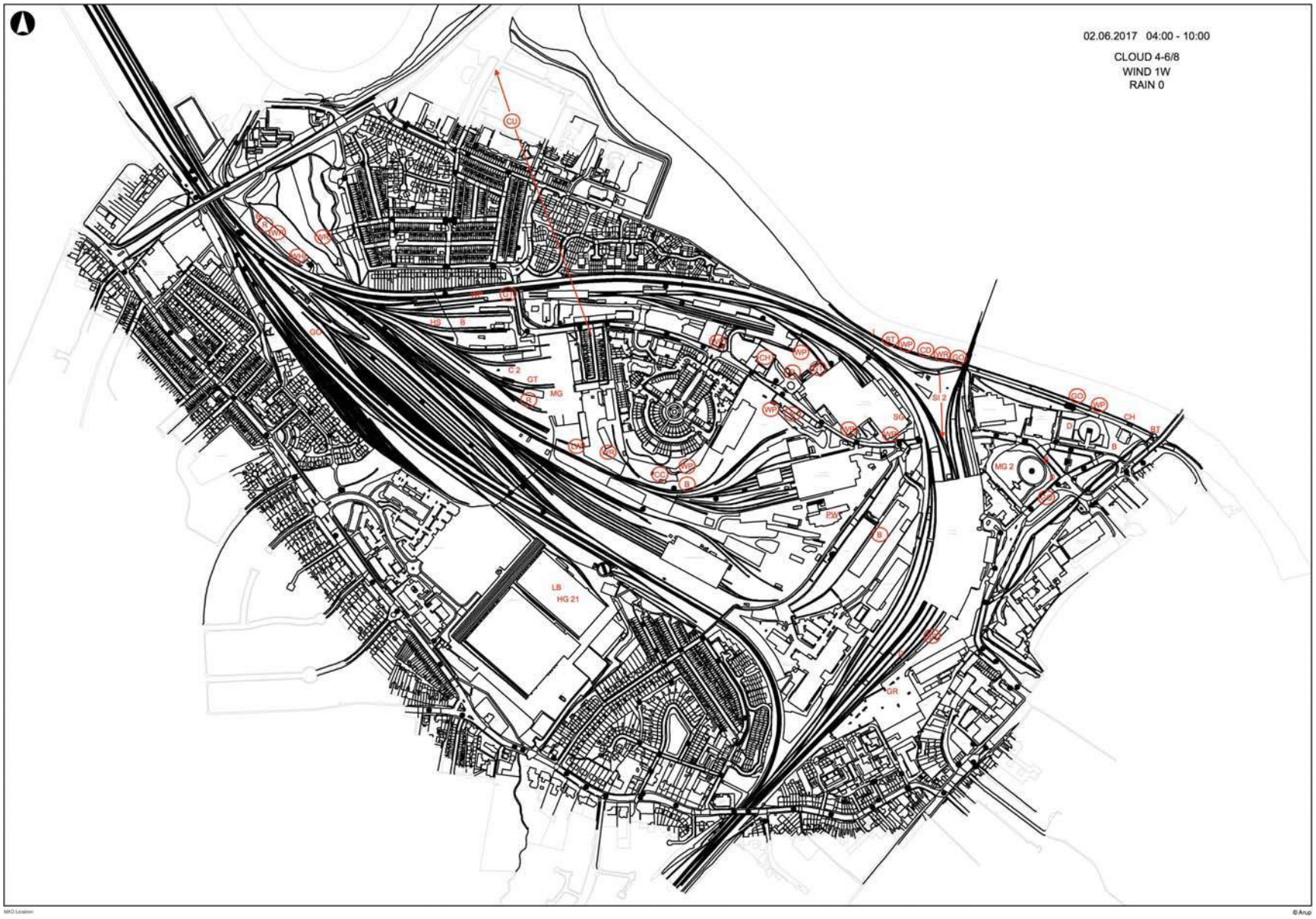

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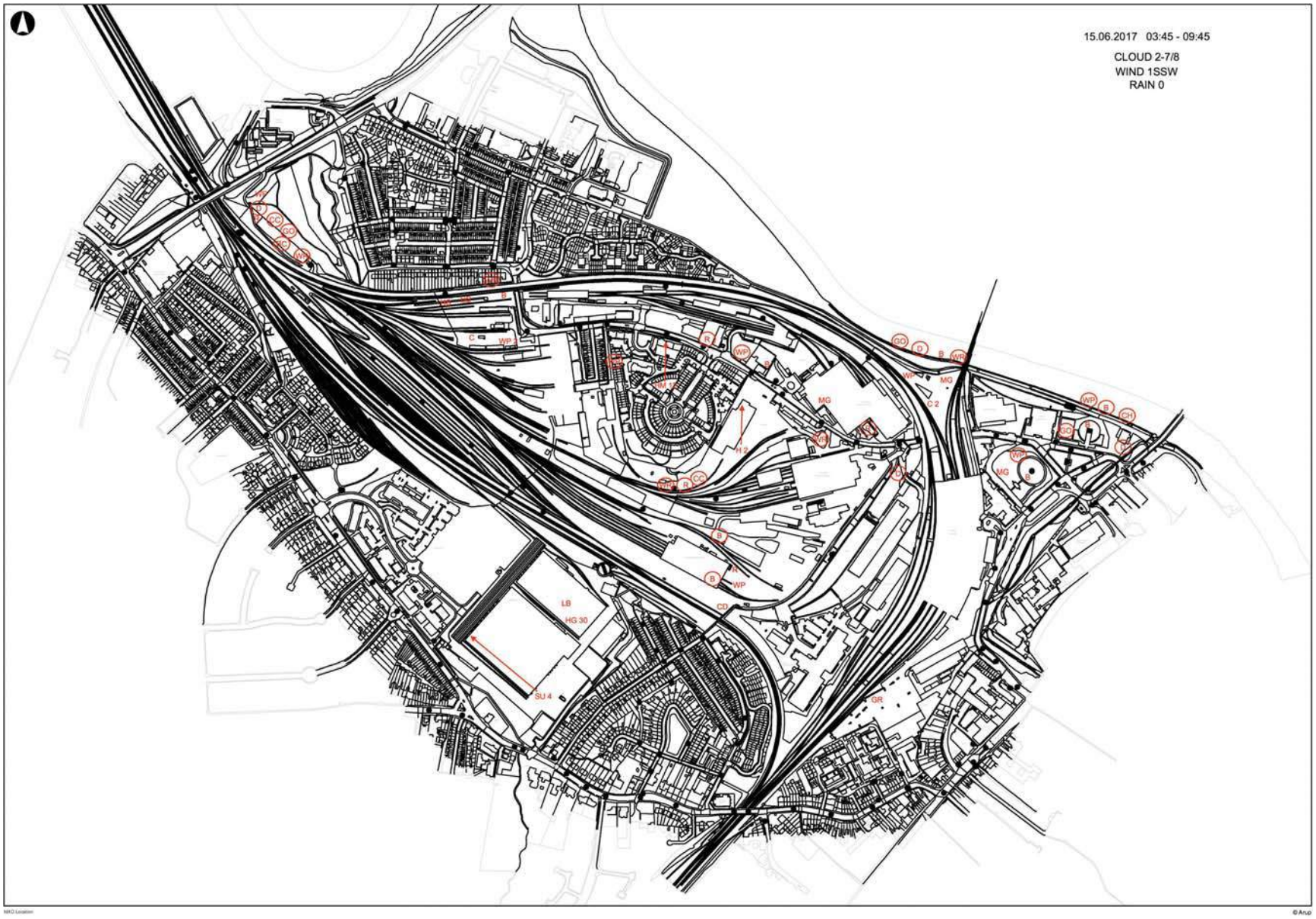

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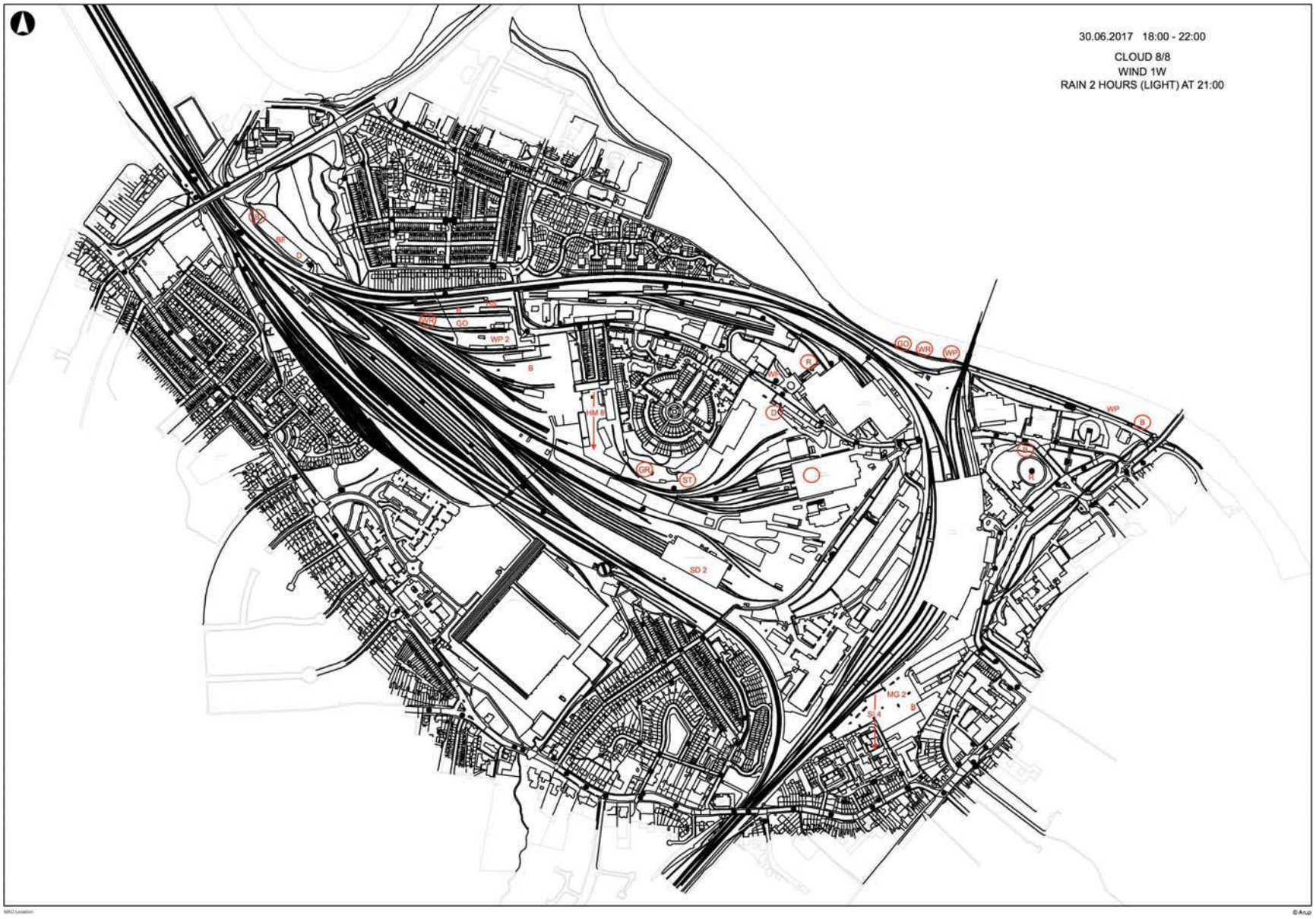

Appendix 11H
Invertebrate Assessment

York Central Station

An invertebrate assessment

A report for:
ARUP

29/05/2017

By:
Conops Entomology Ltd

Report Number: 04.17

York Central Station
An invertebrate assessment

Report number: 04.17

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Contents

1 Introduction

1.1 To undertake an invertebrate assessment of railway sidings and ancillary land at York Central Station (referred to as 'the site' from this point forward) prior to possible development. The assessment was to appraise the key habitats and/or features of the site through the recording of invertebrates. These data were to be used to assess the value to invertebrates of those habitats or features in order to undertake a valuation of the site for its importance as an invertebrate resource. From the collection of data and subsequent assessment and valuation, suitable recommendations could then be put forward in the event that some or all of those features or key habitats may be impacted by a proposed development.

1.2 The site is located at OS grid reference SE 587519.

1.3 The site comprises open mosaic swards over limestone ballast and also gravel, bunds of various grade material, scrub, ruderals and hard standing. There are piles of rotting sleepers throughout the site, and also some formal planted areas.

2 Methods and timings

2.1 The methods utilised for the assessment are those recommended in the Natural England guidance document 'Surveying terrestrial and freshwater invertebrates for conservation evaluation' (2007). In some instances the method has been made bespoke for the site assessment but still retains the overall approach to assessing features and habitats for conservation assessment.

Sweep netting

2.2 This method provides the main proportion of the survey element, and is the most efficient method of cataloguing a site's invertebrate resource.

Spot sampling

2.3 Spot sampling is employed to collect large, conspicuous invertebrates such as bees and wasps from flowering plants, and to supplement the sweep samples. Spot sampling is often the most effective method of recording species from high-fidelity niches.

Vacuum sampling

2.4 Beetles and other crawling invertebrates are sampled using a suction sampler. This was used on all four visits to the site.

Grubbing

2.5 Fallen deadwood, piles of rotting timber (for deadwood beetles) and short turf (for surface running beetles) are fingertip searched for any hiding or crawling invertebrates, principally beetles.

Survey timing

2.6 The site was visited on four dates:

08/08/16: Cloud and sun, blustery 17–21°C
23/08/16: Cloud and sun 17–21°C
15/09/16: Hot and sunny 19–23°C
23/05/17: Warm and sunny, blustery 16-21°C

3 Results summary

The full list of species recorded can be found in Appendix IV.

Species of importance

Scientific name	Vernacular name	National status	Habitat preferences and species notes	Site notes
Aulacobaris picicornis	A weevil	Nationally Scarce A	A species largely of southern counties in the UK.	None
Hipparchia semele	Grayling	NERC Act S41 Butterfly Conservation status: High Priority as declined by 45% since 1970s[1].	Prefers parched sites with fine-leaved grasses including Fescues (*Festuca* spp) and bent grasses (*Agrostis* spp).	A few individuals noted from central area of the sidings on ballast. Habitat appears suitable for breeding.
Hylaeus signatus	A solitary bee	Nationally Scarce B (Nb)	Synonymous with brownfield sites. Mainly collects pollen from wild mignonette (*Reseda lutea*) and weld (*Reseda luteola*).	A number of males and females recorded from across the site.
Lasiommata megera	Wall	NERC Act S41 Butterfly Conservation status: High Priority as declined by 38% since 1970s[2].	Dry grassland with outcrops or bare ground. Larvae on fine-leaved grasses such as bent (*Agrostis* spp) and fescues (*Festuca* spp).	Single specimen recorded. Habitat is suitable for breeding.
Osmia spinulosa	A solitary bee	Nationally 'local' but this record appears to constitute a new record for Yorkshire and is further north than any other known locality, this species being largely of the south and southeast (south of	Flowery sites with composites such as cat's-ear and tall hawkweeds.	Single female recorded.

[1] Grayling species page. Butterfly Conservation. *http://butterfly-conservation.org/679-1024/grayling.html* [Accessed on 29/09/16].
[2] Wall species page. Butterfly Conservation. *http://butterfly-conservation.org/679-727/wall.html* . [Accessed on 23/05/17]

Scientific name	Vernacular name	National status	Habitat preferences and species notes	Site notes
		Leicestershire).		
Pemphredon morio	A solitary wasp	NS B	Nests in deadwood in sunny situations and forages in scrub and grassland.	A few individuals recorded from rotting sleepers and scrub on the site.
Polydrusus formosus	A weevil	Nationally Scarce A	None	From birch scrub.
Rhopalus parumpunctatus	A bug	Nationally Scarce	A species largely of dry, bare and patchy swards of the south and east of England.	Recorded from the limestone ballast compounds, south of the Freightliner building.
Saldula orthochila	A bug	Nationally Scarce	Found on dry habitats across the UK but is more frequent in the south of England.	Recorded from the limestone ballast compounds, south of the Freightliner building.
Tyria jacobaeae	Cinnabar	NERC Act S41	Open habitats where there is ragwort.	Anywhere where there is ragwort.

Table 1Species of importance

3.1 The most up-to-date information or species reviews are used in the assessment. Where there is no up-to-date review, Pantheon (2017[3]) is used.

Resources for determining status

Alexander, K.N.A. and Denton, J.S. (2014) *A review of the beetles of Great Britain: The darkling beetles and their allies. Species Status No. 18.* Natural England Commissioning Reports, Number 148.

Bantock, T. (2016) *A review of the Hemiptera of Great Britain: The shield bugs and their allies. Species Status No. 26.* Natural England Commissioning Reports, Number 190.

Duff, A. (2007) *Identification – Longhorn beetles: Part 2*. British Wildlife 19: 35–43.

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Shirt, D.B. (1987) *British Red Data Books: 2. Insects*. Nature Conservancy Council Peterborough.

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[3] Webb, J., Heaver, D., Lott, D., Dean, H.J., van Breda, J., Curson, J., Harvey, M., Gurney, M., Roy, D.B., van Breda, A., Drake, M., Alexander, K.N.A. and Foster, G. (2017). *Pantheon - database version 3.7.4*. [online] Available at: http://www.brc.ac.uk/pantheon/ [Accessed *28.05.17*].

Telfer, M.G. (2016) *A review of the beetles of Great Britain: Ground beetles (Carabidae): Species Status No. 25.* Natural England Commissioning Reports, Number 189.

Results analysis

3.2 The table in this section has been generated using the Pantheon software package. Pantheon is an analytical tool developed by Natural England and the Centre for Ecology & Hydrology (CEH) to assist invertebrate nature conservation in England. Site data in the form of species lists can be imported into Pantheon, which then analyses the species within the lists, assigning them to habitats and resources. Pantheon also consigns the most up-to-date national status to the species where it is available.

3.3 The information obtained from Pantheon can then be used to assign quality to sites and their features, assist in management decisions and also facilitate requirement for further surveys, where required and appropriate.

3.4 For more information on this new resource see http://www.brc.ac.uk/pantheon/.

Site resource usage table (taken from Pantheon, 2017)

Broad biotope	Habitat	No. of species	Species with conservation status	Conservation status
open habitats	tall sward & scrub	73	2	*Hippodamia variegata* (Nb) *Tyria jacobaeae* (S41)
open habitats	short sward & bare ground	48	6	*Aulacobaris picicornis* (Nb) *Hipparchia semele* (S41) *Hylaus signatus* (NS) *Lasiommata megera* (S41) *Rhopalus parumpunctatus* (NS) *Saldula orthochila* (NS)
tree-associated	arboreal	11	1	*Polydrusus formosus* (Na)
tree-associated	decaying wood	8	1	*Pemphredon morio* (Nb)
wetland	peatland	6	0	-
tree-associated	shaded woodland floor	5	0	-
wetland	marshland	3	0	-

4 Discussion

Habitats

4.1 The site is represented by a range of habitats covering three broad biotopes. There are, however, two principal key biotopes on the site and particularly two habitats that dominate the site in terms of species associations, scarce species representation and physical extent of each habitat.

4.2 The habitat with the greatest number of species associations is tall sward and scrub habitat which holds 73 species of affiliation from the targeted survey effort. This habitat is widely distributed around the site. It is represented by a wide range of species, from common and ubiquitous species of open habitats, such as many of the true bugs and beetles, to some higher-fidelity species that are plant-dependent, such as some of the fruitflies (*Tephritis* spp) and those that require mosaics of different habitats in close proximity to one another.

4.3 The short sward and bare ground habitat, although only represented by 43 affiliated species includes a longer list of scarce species associated with it. The habitat is of high quality with numerous niches and it is this high quality that enables this list of scarce and high fidelity species to be present on the site.

4.4 Overall, the resources associated with the two key habitats (taller swards and scrub and short sward and bare ground) on the site are widespread, but there are key areas around the site that are of higher value in terms of quality. These are the exposed limestone ballast and patchy sward areas of the sidings, and the sparsely vegetated areas to the south of the Freightliner building.

Species

4.5 The site includes eleven species of value. This includes ten that have a national status and a single species with no national status but is a significant record for the site, and county.

4.6 The butterfly resource on the site is of some value and includes two significant species. These are the Grayling and Wall butterflies (both S41). The Grayling is a species that has declined by 45% since the 1970s and as such, all sites where it is present hold value at a broad geographical scale. Coupled with the presence of the Wall (declined by 38%) and other species including the Brown Argus and Common Blue contribute to the butterfly resource and overall open mosaic assemblage of the site.

4.7 The limestone ballast and patchy flowery swards are also of importance to ground dwelling bugs such as *Rhopalus parumpunctatus* (NS) *and Saldula orthochila* (NS), species more readily recorded from sandy districts in southern England.

4.8 The ample quantities of rotting timber across the site are also of value as they are home to the Nationally Scarce B *Pemphredon morio* (a solitary wasp) amongst other, more common species.

5 Assessment summary

Site assessment

5.1 The site is a matrix of two dominating habitats: an early successional mosaic and established taller grassland and scrub fringes. There are other features that contribute to this mosaic; they include piles of rotting timber in which a suite of solitary bees and wasps nest, and a few discrete damp areas at which fly diversity increases, including shoreflies and dolyflies.

5.2 The greatest asset to the site, however, is the early successional mosaic habitat that is establishing over the limestone ballast. This feature of the site is noted by Pantheon (2017) as being valuable to the invertebrates (based on the resource usage table) and as a consequence is likely to be of some significance to the geographical area.

5.3 The site includes a suite of significant and high fidelity species to open mosaics. Possibly the most notable is the Grayling butterfly (NERC Act S41). This species has undergone dramatic decline over the preceding 40 years with a drop in distribution of 45%. It is now largely restricted to coastal sites on parched dune grasslands and dry heathy sites.

5.4 The Wall (*Lasiommata megera*) is another species of parched sites with patchy fine-leaved swards. Although this species is still widespread it is declining rapidly as consequence of a changing climate and is now regarded as threatened in many areas. The north-east, including York is still an area where it can be found with some regularity on suitable habitat but this is a stronghold and as such holds value at a wide geographical scale.

5.5 The presence of *Osmia spinulosa* (a solitary bee), although a species without a national status, is significant. This record is a very long way from any other locality, being normally recorded south of a line between the Wash on the east coast, where Lincolnshire meets Norfolk, and Bristol. Given the industrial use of the site, however, it is possible that the species has been unintentionally brought in on ballast or other materials deposited onto or at the sidings.

5.6 This mosaic of habitats is of considerable value to invertebrates as illustrated by the Pantheon analysis and the scarce species recorded. It offers a range of opportunities for nesting and breeding invertebrates in close proximity to foraging locations. This juxtaposition of habitats and features is what elevates many brownfield sites above the wider landscape, which tends towards homogenous swards and habitats, whereas brownfield and open mosaic swards are categorised as heterogenous habitats.

5.7 It is this heterogeneity that is of principal value, and the juxtaposed habitats and features should be retained wherever possible. If they cannot be retained then they should be adequately replicated as part of a mitigation scheme.

Site evaluation

5.8 There are a number of scarce, important and high fidelity species associated with the site. Some are genuinely scarce nationally and one (*O.spinulosa*) is a county and possible regional first record.

5.9 The valuation of the site takes into consideration the range of species recorded, including the scarce species, the overall assemblages and the importance of the mosaic habitats to the species. By using the experience of the surveyor, his knowledge of invertebrates and site assessment and also by consulting the guidance notes prepared by Colin Plant Associates for CIEEM (Chartered Institute of Environmental Managers and Ecologists) (Appendix III) it is suggested that the site's key features should be considered to be of **County (medium) importance** (Plant, 2009).

5.10 The site is considered to be of County (medium) importance due to the extent of the habitat that is present, species associated with it at this site and the unlikely existence of similar brownfield limestone ballast sites of this size and quality elsewhere within the county supporting a similar array of scarce and high fidelity species. Given the type of site, there is potential for other significant invertebrates to be recorded.

5.11 A lower category of District (low) importance is not thought appropriate for this site due to the number of nationally and regionally significant species including two scarce butterfly species restricted to open, patchy ground sites and also the presence of other high fidelity species to urban mosaic sites that are unlikely to be recorded in the wider countryside. Some species are also likely to be at the northern edge of their range such as *Rhopalus parumpunctatus* and *Saldula orthochila* with *Osmia spinulosa* well beyond the current known range further elevating this site's importance and potential uniqueness at a wide geographical scale.

6 Recommendations

6.1 The success of any mitigation for loss of part or all of the site's key features will be dependent on incorporating the following habitats and features in juxtaposition with one another, and creating features that are both extensive and optimal.

6.2 All invertebrate-related mitigation should be undertaken on low-fertility soils. Only peripheral ruderal areas can be created on nutrient-rich topsoils.

Open mosaics

6.3 The presence of open mosaics is the most notable feature of this site. It is important that all of the features that comprise the mosaic are in close proximity to one another and are in an optimal state. This will be relatively easily achieved when utilising nutrient-poor calcareous subsoils and limestone ballast material.

6.4 The open mosaics should be exposed to full sun for much of the day, including the key period between 10:00 and 16:00 hours.

6.5 Vertical or near vertical exposures will help diversify the mosaics and provide nesting opportunities for the ground-nesting bees and wasps at the site. Some slumping of the vertical faces is permissible and for some species a desirable feature and should not be viewed negatively.

6.6 The bare ground and short flowery turf mosaic should approximate to (50%) bare ground and (50%) vegetation cover. The material used can be mixed, and utilising on-site materials including the railway ballast is ideal. The ground surface can be uneven, with divots and shallow depressions. This varied microtopography is an important feature, as it increases the value of the mitigation. Overworking of the material should be avoided, as this tends to result in an even surface, which is undesirable for invertebrate mitigation.

6.7 The material should not be compacted as, particularly for the Grayling and Wall butterflies, dry and parched conditions are required and this would be best achieved by creating an unconsolidated, open-structured and permeable substrate.

Butterfly banks

6.8 A useful feature that benefits a wide range of open mosaic and flower foraging invertebrates is a flower-rich bund or bank. This is especially valuable to butterflies (such as the Common Blue and Brown Argus). The features are also valuable to a wider range of pollinating invertebrates and those that require thermophilic conditions and/or high-density flower stands.

- Invertebrate banks are essentially mounded materials. These features are partially compacted with machinery, but other parts of the banks can be allowed to settle naturally to encourage niche variation, through slumping.

- Medium, coarse aggregate material can be used for these banks. A limestone or other high pH material is preferable (such as the ballast), as this gives rise to a richer flora, including bird's-foot trefoil. Partly crushed material from on site would be ideal.

- The banks should be optimally in a southerly facing aspect for greatest sun exposure and in a crescent or sinuous shape, which further elevates the microclimate of the feature.

- However, to benefit solitary bees and wasps, a fine-grade sandy, partially-compacted material would be required for them to dig into. To this end, three or more banks are recommended, each being slightly different and approximately 15m in length; or a combination of several smaller banks with a cumulative total of 45-50m of linear length and in an optimal state is suggested.

- The banks should be at least 1 metre in height but preferably between 1.5 to 3 metres.

- Ideally, the banks should be sown with a suitable flower mix, allowed to colonise naturally, or topped with any existing flower-rich turf that can be lifted and relocated from on site. A mixture of all three options can also be undertaken.

Flowering swards

6.9 The flowering areas should be sown with an appropriate mix of flowering plants to benefit the range of nectivorous species found on the site, and therefore should include the following:

- Hawkweeds (*Hieracium* spp.)
- Common bird's-foot trefoil (*Lotus corniculatus*)
- St. John's wort (*Hieracium* spp.)
- Vetches (*Vicia* spp.)
- Hawkbits (*Leontodon* spp.)
- Red clover (*Trifolium pratense*)
- Other trefoils (Fabaceae)
- Meadow vetchling (*Lathyrus pratensis*)
- Woundworts (*Stachys* spp.)

6.10 The flowering swards should have some areas of high densities of flowers. Most standard mixes do not have a high enough proportion of flowering plants that are suitable for brownfield site mitigation, so a bespoke mix or additional ordering of supplementary flower seed is advised.

Scrub fringe

6.11 Scrub, or specifically spring blossom, is an integral part of a healthy and functioning invertebrate site. It is a key provider of pollen and nectar in spring from March to late June before the grassland flowers dominate. A range of species that provide flowers through this period is recommended, including willows (*Salix* spp.), blackthorn (*Prunus spinosa*) and hawthorn (*Crataegus monogyna*). Planting of scrub can be undertaken in suitable locations across the site, especially near to or adjacent to key bee and wasp locations.

Deadwood

6.12 To cater for important deadwood-nesting bees and wasps, dry, desiccated wood in sunny and sheltered situations is required. The deadwood should be of large volume and at least partly stripped of bark to desiccate quickly. The size of material is important, as large volume pieces rot down slowly, providing long-term value. Timber with a diameter greater than 30 cm is therefore advised. This should be close to scrub or trees, which offer foraging for the nesting species and provide added shelter to the deadwood feature. Several of these deadwood features should be situated around the mitigation site.

Ruderal areas

6.13 Although not thought of as high-value habitats, ruderal areas are important features to a well-functioning invertebrate site, as they offer a huge amount of pollen and nectar to pollinators. Small patches of ruderals can be allowed to develop in any unused space for mitigation or around the development, but ideally close to the principal invertebrate features being retained or created.

Juxtapositions and interfaces

6.14 To increase the complexity of the mitigation and therefore provide a wide range of niches for high-fidelity invertebrates, features such as the flower-rich invertebrate banks, patchy scrub fringe, flowery grassland and bare ground should all be in close proximity to one another wherever possible. An intricate mosaic of habitats and juxtapositions will generate many opportunities for invertebrates and in turn elevate the biodiversity value of the landholding.

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8 Appendices

Appendix I: Red Data Book definitions
Appendix II: International Union for Conservation Nature (IUCN) definitions
Appendix III: Criteria for defining invertebrate sites of significance. Taken from Plant (2009)
Appendix IV: Survey results
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Appendix I: Red Data Book definitions

Red Data Book category 1 (RDB 1) – Endangered
Species that are known or believed to occur as only a single population within one 10 km square of the National Grid.

Red Data Book category 2 (RDB 2) – Vulnerable
Species declining throughout their range or in vulnerable habitats.

Red Data Book category 3 (RDB 3) – Rare
Species that are estimated to exist in only 15 or fewer post-1970 10 km squares. This criterion may be relaxed where populations are likely to exist in over 15 10 km squares but occupy small areas of especially vulnerable habitat.

Nationally Notable (Scarce) category A (NS A) – Notable A
Taxa that do not fall within the RDB category but that are nonetheless uncommon in Great Britain and thought to occur in 30 or fewer 10 km squares of the National Grid or, for less well recorded groups, between 8 and 20 vice counties.

Nationally Notable (Scarce) category B (NS B) – Notable B
Taxa that do not fall within the RDB category but that are nonetheless uncommon in Great Britain and thought to occur in 31–100 10 km squares of the National Grid or, for less well recorded groups, between 8 and 20 vice counties.

Nationally Notable (Scarce) (N) – Notable
Species that are estimated to occur within the range of 16–100 10 km squares. The subdividing of this category into Notable A and Notable B has not been attempted for many species in this part of the review.

Appendix II: International Union for Conservation Nature (IUCN) definitions

REGIONALLY EXTINCT (RE) A taxon is Extinct when there is no reasonable doubt that the last individual has died. In this review the last date for a record is set at fifty years before publication.
CRITICALLY ENDANGERED (CR) A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered.
ENDANGERED (EN) A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Table 4).
VULNERABLE (VU) A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Table 4).
NEAR THREATENED (NT) A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
LEAST CONCERN (LC) A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
DATA DEFICIENT (DD) A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.
NOT EVALUATED (NE) A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.

Appendix III: Criteria for defining invertebrate sites of significance. Taken from Plant (2009)

Importance	Description	Minimum qualifying criteria
International (high) importance	European important site (i.e. SAC)	Internationally important invertebrate populations present or containing RDB 1 (Endangered) species or containing any species protected under European legislation or containing habitats that are threatened or rare at the European level (including, but not exclusively so, habitats listed on the EU Habitats Directive).
National (high) importance	UK important site (SSSI)	Achieving SSSI invertebrate criteria (NCC, 1989) or containing RDB 2 (Vulnerable) or containing viable populations of RDB 3 (Rare) species or containing viable populations of any species protected under UK legislation or containing habitats that are threatened or rare nationally (Great Britain).
Regional (medium) importance (for border sites, both regions must be taken into account)	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in south-east England	Habitat that is scarce or threatened in the region or that has, or is reasonably expected to have, the presence of an assemblage of invertebrates including at least 10 Nationally Notable species or at least 10 species listed as Regionally Notable for the English Nature region in question in the Recorder database or elsewhere or a combination of these categories amounting to 10 species in total.
County (medium) importance (for border sites, both counties must be taken into account)	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the county in question	Habitat that is scarce or threatened in the county and/or that contains, or is reasonably expected to contain, an assemblage of invertebrates that includes viable populations of at least five Nationally Notable species or viable populations of at least five species regarded as Regionally Scarce by the county records centres and/or field club.
District (low) importance	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the administrative district	A rather vague definition of habitats falling below county significance level, but which may be of greater significance than merely Local. They include sites for which Nationally Notable species in the range from one to four examples are reasonably expected but not yet necessarily recorded and where this omission is considered likely to be partly due to under-recording.
Local (low) importance	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the affected and neighbouring parishes (except Scotland, where the local area may best be defined as being within a radius of 5 km)	Habitats or species unique or of some other significance within the local area.
Importance within the context of the site only (low importance)	—	Although almost no area is completely without significance, these are the areas with nothing more than expected 'background' populations of common species and the occasional Nationally Local species.

Appendix IV: Survey results

Only species with a national status have been annotated. All others are common or local species.

Taxon	Vernacular name	Date first recorded	Status
Acanthosoma haemorrhoidale	Hawthorn Shieldbug	15-Sep-16	
Adalia bipunctata	2-spot Ladybird	23-Aug-16	
Adalia decempunctata	10-spot Ladybird	23-May-17	
Aeshna grandis	Brown Hawker	08-Aug-16	
Agenioideus cinctellus	a spider-hunter wasp	23-Aug-16	
Aglais io	Peacock	08-Aug-16	
Aglais urticae	Small Tortoiseshell	08-Aug-16	
Altica oleracea	a leaf beetle	08-Aug-16	
Amara bifrons	a ground beetle	23-Aug-16	
Amara communis	a ground beetle	23-Aug-16	
Amara tibialis	a ground beetle	23-Aug-16	
Andrena chrysosceles	a mining bee	23-May-17	
Andrena minutula	a mining bee	23-Aug-16	
Anthocoris nemorum	a bug	08-Aug-16	
Anthophora furcata	Fork Tailed Flower Bee	08-Aug-16	
Apolygus lucorum	a bug	08-Aug-16	
Aricia agestis	Brown Argus	23-Aug-16	
Athous haemorrhoidalis	a click beetle	23-May-17	
Aulacobaris picicornis	a weevil	08-Aug-16	Nb
Bembidion properans	a beetle	23-Aug-16	
Bombus hortorum	Small Garden Bumble Bee	08-Aug-16	
Bombus hypnorum	a bumblebee	23-May-17	
Bombus lapidarius	Large Red Tailed Bumble Bee	23-May-17	
Bombus lucorum sens. str.	White-tailed Bumble Bee	08-Aug-16	
Bombus pascuorum	Common Carder Bee	23-May-17	
Bombus pratorum	Early Bumble Bee	23-May-17	
Bombus sylvestris	a bumblebee	08-Aug-16	
Bombus terrestris	Buff-tailed Bumble Bee	08-Aug-16	
Bruchela rufipes	a weevil	08-Aug-16	
Cantharis rustica	a soldier beetle	23-May-17	
Celastrina argiolus	Holly Blue	08-Aug-16	
Ceramica pisi	Broom Moth	23-Aug-16	
Cerceris arenaria	Sand Tailed Digger Wasp	23-Aug-16	
Chilocorus renipustulatus	Kidney-spot Ladybird	15-Sep-16	
Chorosoma schillingi	a bug	08-Aug-16	
Chorthippus brunneus	Common Field Grasshopper	08-Aug-16	
Chrysolina hyperici	a leaf beetle	08-Aug-16	
Closterotomus norwegicus	a bug	23-Aug-16	
Coccinella septempunctata	7-spot Ladybird	23-Aug-16	

Coremacera marginata	a snail-killing fly	23-Aug-16	
Coreus marginatus	Dock Bug	23-Aug-16	
Corizus hyoscyami	a bug	08-Aug-16	
Crepidodera aurata	a leaf beetle	23-Aug-16	
Crepidodera fulvicornis	a leaf beetle	23-May-17	
Deraeocoris lutescens	a bug	15-Sep-16	
Discomyza incurva	a fly	23-Aug-16	
Dolichopus griseipennis	a dolyfly	23-Aug-16	
Dolycoris baccarum	Hairy Shieldbug	15-Sep-16	
Ectemnius continuus	a digger wasp	08-Aug-16	
Ectemnius rubicola	a digger wasp	08-Aug-16	
Elasmucha grisea	Parent Bug	23-Aug-16	
Eristalis pertinax	a hoverfly	08-Aug-16	
Eristalis tenax	a hoverfly	08-Aug-16	
Eupeodes corollae	a hoverfly	15-Sep-16	
Evagetes crassicornis	a spider-hunter wasp	23-May-17	
Formica lemani	an ant	23-May-17	
Geomyza tripunctata	a seedfly	15-Sep-16	
Glocianus distinctus	a weevil	23-May-17	
Gonepteryx rhamni	Brimstone	23-May-17	
Halictus rubicundus	a mining bee	23-Aug-16	
Halictus tumulorum	a mining bee	08-Aug-16	
Harmonia axyridis	Harlequin Ladybird	08-Aug-16	
Harpalus affinis	a ground beetle	23-Aug-16	
Harpalus rubripes	a ground beetle	23-Aug-16	
Helophilus pendulus	a hoverfly	23-Aug-16	
Himacerus mirmicoides	a bug	08-Aug-16	
Hipparchia semele	Grayling	08-Aug-16	S41
Hippodamia variegata	Adonis' Ladybird	23-Aug-16	Nb
Hylaeus confusus	a solitary bee	23-Aug-16	
Hylaeus hyalinatus	a solitary bee	08-Aug-16	
Hylaeus signatus	Large Yellow-faced Bee	08-Aug-16	NS
Hypera suspiciosa	a weevil	15-Sep-16	
Lagria hirta	a beetle	23-Aug-16	
Lasioglossum albipes	a mining bee	08-Aug-16	
Lasioglossum cupromicans	a mining bee	08-Aug-16	
Lasioglossum leucopus	a mining bee	08-Aug-16	
Lasioglossum leucozonium	a mining bee	08-Aug-16	
Lasioglossum villosulum	Shaggy Mining Bee	08-Aug-16	
Lasiommata megera	Wall	23-May-17	S41
Lasius niger sens. str.	an ant	23-May-17	
Leptophyes punctatissima	Speckled Bush Cricket	23-Aug-16	
Liocoris tripustulatus	a bug	08-Aug-16	
Lygus rugulipennis	a bug	15-Sep-16	

Maniola jurtina	Meadow Brown	08-Aug-16	
Megachile versicolor	a leaf-cutter bee	08-Aug-16	
Megalonotus chiragra	a bug	23-Aug-16	
Melanostoma mellinum	a hoverfly	15-Sep-16	
Melanostoma scalare	a hoverfly	08-Aug-16	
Meligethes aeneus	Common Pollen Beetle	08-Aug-16	
Micropeza corrigiolata	a stil-legged fly	23-May-17	
Mimumesa dahlbomi	a digger wasp	08-Aug-16	
Nabis rugosus	a bug	23-Aug-16	
Nephrotoma appendiculata	a cranefly	23-May-17	
Noeeta pupillata	a fruitfly	08-Aug-16	
Notiophilus substriatus	a beetle	23-May-17	
Nysius huttoni	a bug	23-Aug-16	
Nysius thymi	a bug	08-Aug-16	
Oedemera lurida	a beetle	08-Aug-16	
Olibrus affinis	a beetle	23-May-17	
Olibrus liquidus	a beetle	08-Aug-16	
Olibrus liquidus	a beetle	23-May-17	
Opomyza florum	a seedfly	15-Sep-16	
Osmia caerulescens	a mason bee	23-May-17	
Osmia spinulosa	a mason bee	08-Aug-16	
Oxyna parietina	a fruitfly	23-May-17	
Palomena prasina	Common Green Shieldbug	08-Aug-16	
Paradromius linearis	a ground beetle	08-Aug-16	
Paragus haemorrhous	a hoverfly	23-Aug-16	
Pararge aegeria	Speckled Wood	23-Aug-16	
Pemphredon inornata	a digger wasp	23-Aug-16	
Pemphredon morio	a digger wasp	08-Aug-16	Nb
Pherbellia cinerella	a snail-killing fly	08-Aug-16	
Philonthus cognatus	a rove beetle	23-Aug-16	
Phlogophora meticulosa	Angle Shades	15-Sep-16	
Phratora vulgatissima	Blue Willow Beetle	23-May-17	
Phyllobius argentatus	Silver-green Leaf Weevil	08-Aug-16	
Physocephala rufipes	a thick-headed fly	08-Aug-16	
Phytocoris varipes	a bug	23-Aug-16	
Phytocoris varipes	a bug	08-Aug-16	
Pieris brassicae	Large White	08-Aug-16	
Pieris napi	Green-veined White	08-Aug-16	
Pieris rapae	Small White	08-Aug-16	
Pipizella viduata	a hoverfly	23-May-17	
Plagiognathus chrysanthemi	a bug	08-Aug-16	
Platycheirus clypeatus	a hoverfly	15-Sep-16	
Platydracus stercorarius	a rove beetle	23-Aug-16	
Polydrusus formosus	a weevil	23-May-17	Na

Polyommatus icarus	Common Blue	08-Aug-16	
Propylea quattuordecimpunctata	14-spot Ladybird	08-Aug-16	
Protapion fulvipes	White Clover Seed Weevil	23-May-17	
Pseudomalus auratus	a cuckoo wasp	23-May-17	
Psylliodes chrysocephala	a leaf beetle	15-Sep-16	
Psyllobora vigintiduopunctata	22-spot Ladybird	08-Aug-16	
Rhinusa antirrhini	a weevil	08-Aug-16	
Rhopalus parumpunctatus	a bug	23-Aug-16	NS
Rhopalus subrufus	a bug	08-Aug-16	
Saldula orthochila	a bug	23-May-17	NS
Sapromyza sexpunctata	a fly	08-Aug-16	
Scaeva pyrastri	a hoverfly	15-Sep-16	
Sehirus luctuosus	Forget-me-not Shieldbug	23-Aug-16	
Sericomyia silentis	a hoverfly	23-Aug-16	
Sitona humeralis	a weevil	23-Aug-16	
Sitona lepidus	a weevil	23-Aug-16	
Sitona lineatus	a weevil	23-Aug-16	
Sphaeroderma testaceum	a leaf beetle	23-Aug-16	
Sphaerophoria interrupta	a hoverfly	23-Aug-16	
Sphaerophoria scripta	a hoverfly	08-Aug-16	
Sphecodes ephippius	a cuckoo bee	08-Aug-16	
Stenodema laevigata	a bug	23-Aug-16	
Stictopleurus punctatonervosus	a bug	08-Aug-16	
Syntormon denticulatum	a dolyfly	15-Sep-16	
Syritta pipiens	a hoverfly	08-Aug-16	
Tachyporus hypnorum	a rove beetle	23-Aug-16	
Taphropeltus contractus	a bug	23-May-17	
Tephritis cometa	a fruitfly	15-Sep-16	
Tephritis formosa	a fruitfly	23-Aug-16	
Tephritis hyoscyami	a fruitfly	08-Aug-16	
Tephritis leontodontis	a fruitfly	08-Aug-16	
Tephritis vespertina	a fruitfly	15-Sep-16	
Terellia serratulae	a fruitfly	23-Aug-16	
Tetrix subulata	Slender Ground Hopper	23-Aug-16	
Tetrix undulata	Common Ground Hopper	23-Aug-16	
Tipula oleracea	a cranefly	23-May-17	
Trichosirocalus troglodytes	a weevil	23-May-17	
Tyria jacobaeae	Cinnabar	08-Aug-16	S41
Vanessa cardui	Painted Lady	08-Aug-16	
Vespula germanica	German Wasp	08-Aug-16	
Vespula vulgaris	Common Wasp	08-Aug-16	
Xantholinus linearis	a rove beetle	23-Aug-16	

Appendix V: Site photographs

Illustration of highly varied mosaic of material, features and structures

Piles of decaying sleepers (home to deadwood nesting bees and wasps) in close proximity to good flowering resources

Grayling butterfly

Appendix 11I
Water Vole Survey Report

York Central

Water Vole Survey Report

Issue | 2 July 2018

Job number 251869-00

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ARUP

Contents

Drawings

Executive Summary

Ove Arup and Partners Ltd. (Arup) was commissioned by York Central Partnership to undertake a water vole survey to determine the presence or likely absence of water vole at Holgate Beck.

Two survey visits were undertaken in May and August 2017. No signs of water vole were identified within the watercourse on the first survey visit. Large feeding piles characteristic of water vole were identified during the second visit, however water vole latrines are the only field sign that can be reliably used to confirm water vole presence. No other signs of water vole were identified. A supplementary artificial latrine survey was undertaken in April and May 2018. No water vole latrines or other activities were recorded during the survey. The water level of Holgate Beck fluctuated significantly during the 2018 survey period which also lowers the suitability of the habitat for burrow construction. It is therefore concluded that water vole are likely absent from Holgate Beck and consequently no further surveys are required.

1 Introduction

1.1 Project Background

Ove Arup and Partners Ltd. (Arup) was commissioned by York Central Partnership (YCP) to undertake a Preliminary Ecological Appraisal (PEA) (Phase 1 Habitat survey and protected species scoping study) of the York Central Site ('the Site'). The field survey for the PEA was undertaken in 2016 and an additional parcel of land known as 'Millennium Green' was surveyed in 2017. The watercourse identified within Millennium Green, known as Holgate Beck, was identified to provide optimal habitat for water vole *Arvicola amphibius*. Additionally, records of water vole were identified at Rawcliffe Meadows and Clifton Ings located approximately 0.6 km to the north of the Site. Connectivity between the record location and Holgate Beck is provided by a culvert linking the Holgate Beck and the River Ouse, which is adjacent to Rawcliffe Meadows and Clifton Ings.

Arup was subsequently commissioned by YCP to undertake a water vole survey to identify the presence or likely absence of water vole within the Site.

1.2 Site and Proposed Development Description

The Site is located to the west of York City Centre predominantly to the west of York Railway Station on an area of railway sidings. There is a parcel of land comprising the Millennium Green Land on the north-east of the York Central Site. The remainder of the Site includes amenity parklands, car parking and allotments. The dominant land use surrounding the Site is residential with smaller areas of land occupied by commercial businesses and greenspace.

Holgate Beck, a tributary of the River Ouse, runs north westwards across the Site, entering a culvert close to Holgate Road on the southern corner of the Site and re-emerging at surface in Millennium Green

It is proposed that the Site is redeveloped to be of mixed-use to provide an improved infrastructure within a close proximity to York Railway Station. The proposed Development would allow for the potential redevelopment of the National Railway Museum and provide space for commercial and residential properties. This will also include the incorporation of open public/greenspace through the Site.

1.3 Report Objectives

The purpose of the water vole survey was to ascertain the presence or likely absence of water vole within Holgate Beck. This report outlines results and identifies impacts and mitigation, as appropriate.

1.4 Report Structure

The report includes:

- Section 2: Legal Context;
- Section 3: Methodology;
- Section 4: Results; and
- Section 5: Discussion and Conclusions.

2 Legal Context

2.1 Water Vole

The water vole is fully protected under Section 9 of Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Protection was extended by the Countryside and Rights of Way Act 2000. The water vole is also included as a Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

2.1.1 Wildlife and Countryside Act (WCA) 1981 (as amended)

This is the primary legislation covering endangered species in England and sets out the framework for the designation of Sites of Special Scientific Interest (SSSIs). It confers differing levels of protection on species themselves, their habitats or both, depending on their conservation status.

Water vole are fully protected through their inclusion in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Under the legislation it is an offence to:

- Intentionally kill, injure or take (capture) a water vole;
- Possess or control a live or dead water vole, or any part of a water vole;
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place which water vole use for shelter or protection, or to intentionally or recklessly disturb water vole while they are using such a place; and
- Sell, offer for sale or advertise for live or dead water vole.

2.1.2 Countryside and Rights of Way Act 2000

This Act affords a greater level of protection to SSSIs, provides enhanced management arrangements for Areas of Outstanding Beauty (AONBs) and strengthens wildlife enforcement legislation. This Act has amended the Wildlife and Countryside Act (WCA) by the addition of the term ‘recklessly’ to Section 1(5) and Section 9 (4) which has resulted in additional obligations with respect to protected species. As such, it is now an offence to intentionally or recklessly disturb protected species listed on the relevant Schedules of the WCA 1981.

2.1.3 Natural Environment and Rural Communities Act 2006

The Natural Environment and Rural Communities (NERC) Act 2006, is designed to help achieve a rich and diverse natural environment and thriving rural communities. The Act implements key elements of the Government’s Rural Strategy published in July 2004 and includes under Section 40 a Duty to conserve biodiversity; specifically Subsection (1) states ‘*Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity.’* Section 41

(S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under Section 40, above. Water vole is included as a S41 Species of Principal Importance in England.

2.1.4 National Planning Policy Framework

National Planning Policy Framework (NPPF) 2012 also places a duty on all public bodies including local planning authorities to consider habitats and species of Principal Importance listed in Section 41 of the NERC Act and Priority Species/Habitats within Biodiversity Action Plans when considering a planning application.

3 Methodology

3.1 Field Survey

All surveys were undertaken in accordance with current guidance.[1] This involved a thorough search for signs of water vole activity both on the banks of the watercourse and a minimum of 2 m from the bank top by a suitably experienced ecologist. Where optimal habitat was present at the top of the bank then the search area was extended to an appropriate distance e.g. 3 m.

For each area of potentially suitable habitat within the Site, the following information was recorded:

- Sightings of individual water voles;
- Burrows;
- Feeding platforms and evidence of feeding;
- Food remains;
- Latrines; and
- Footprints.

The suitability of a watercourse for water vole may change markedly over the course of the breeding season (March to October). Two survey visits were therefore undertaken in accordance with the guidance[1]. The first visit was undertaken in May 2017 and the second was undertaken in August 2017 during suitable weather conditions (Table 3.1).

Table 3.1: Weather conditions during water vole survey.

Date	Weather conditions
08/05/17	Precipitation: None Temperature: 11°C Wind: Beaufort 2 Cloud cover: 70%
03/08/17	Precipitation: None Temperature: 19°C Wind: Beaufort 2 Cloud cover: 60%

3.2 Supplementary Artificial Latrine Survey

A supplementary artificial water vole latrine survey was undertaken within Holgate Beck in April and May 2018. Rafts are used as artificial latrine sites to maximise the potential of recording water vole. Artificial rafts formed from pieces of 'Cellotex' (approximately 60 cm x 30 cm) were positioned within vegetation at the toe of the bank. Rafts were placed at approximately 10 m intervals and tethered in place[1]. A total of 16 rafts were deployed throughout the Beck. The

[1] Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)*. Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

rafts were checked for water vole latrines weekly for a period of five weeks. Checks were undertaken during suitable weather conditions and avoided after periods of heavy rain which may have washed away latrines (Table 3.2).

Table 3.2: Weather conditions during supplementary artificial latrine survey.

Date	Weather conditions
17/04/18	Precipitation: None Temperature: 15°C Wind: Beaufort 3 Cloud cover: 60%
24/04/18	Precipitation: Light rain Temperature: 13°C Wind: Beaufort 2 Cloud cover: 100%
02/05/18	Precipitation: Light rain Temperature: 8°C Wind: Beaufort 3 Cloud cover: 100%
11/05/18	Precipitation: None Temperature: 16°C Wind: Beaufort 3 Cloud cover: 80%
17/05/18	Precipitation: None Temperature: 14°C Wind: Beaufort 2 Cloud cover: 70%
25/05/18	Precipitation: None Temperature: 12°C Wind: Beaufort 2 Cloud cover: 100%

3.3 Survey Limitations

Water vole are a highly mobile species and can occupy a number of different locations over a number of years and seasons. Water vole, like many other small mammals, have extremely dynamic populations; they are subject to seasonal population expansion and contraction. Therefore, the absence of evidence of any water vole signs should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, professional judgement allows for the presence/likely absence of this species to be predicted with sufficient certainty so as to not significantly limit the validity of these findings.

4 Results

4.1 Field Survey

No signs of water vole were recorded within the watercourse on the first survey visit in May 2017.

During the second survey visit in August 2017 it was noted that there was an increase in suitable vegetation for water vole to use for shelter and foraging. Several large feeding stations were identified within the vegetation on Holgate Beck during (Drawing 4.1). Reed canary grass *Phalaris arundinacea*, was the main constituent of the feeding stations. Much of the vegetation had been cut (grazed) at a 45° angle which while characteristic of water vole, is also distinguishing to other small mammals. However, the extent and size of the feeding stations were considered to be representative of water vole. The majority of feeding stations were identified on the eastern bank, with many clustered within a small area.

Several latrines were also recorded within the vegetation during the second survey visit (Drawing 4.1). However, these were generally deemed to be too small to be water vole and attributed to a different small mammal such as field vole *Microtus agrestis.*

4.2 Supplementary Artificial Latrine Survey

No signs of water vole latrines or other activities were recorded during the survey period within Holgate Beck or on the rafts. Four rafts were found to be missing on 11th May 2018. The subsequent visit on 17th May 2018 found a further one missing and one destroyed. It was deemed unnecessary to replace the vandalised rafts due to the public nature of the Site and the number of remaining rafts which were left untampered.

The water levels fluctuated significantly. The water level was observed to break bank top height at the start of the survey and dropped by approximately 1 m at the end of the survey period.

5 Discussion and Conclusion

Several feeding stations characteristic of water vole were identified during the second survey visit in August 2017. Latrines were also identified; however, these were deemed to be characteristic of smaller mammal species. Water vole latrines are the only field sign that can be reliably used to confirm water vole presence [1]. No water vole latrines or other signs of activity were identified during the supplementary artificial latrine survey in 2018.

Records of water vole at Rawcliffe Meadows and Clifton Ings located approximately 0.6 km north of the Site were identified during the desk study. Connectivity between the record location and Holgate Beck is provided by a culvert linking the Holgate Beck and the River Ouse, which is adjacent to Rawcliffe Meadows and Clifton Ings. However, no signs of water vole latrines or other signs of activity were identified during the survey in 2017 or 2018. In addition, the fluctuating water levels of Holgate Beck, which were observed to drop by approximately 1 m in 2018, lowers the habitat suitability of the banks for burrow construction. It is therefore considered that water vole are likely absent from Holgate Beck and no further surveys are required.

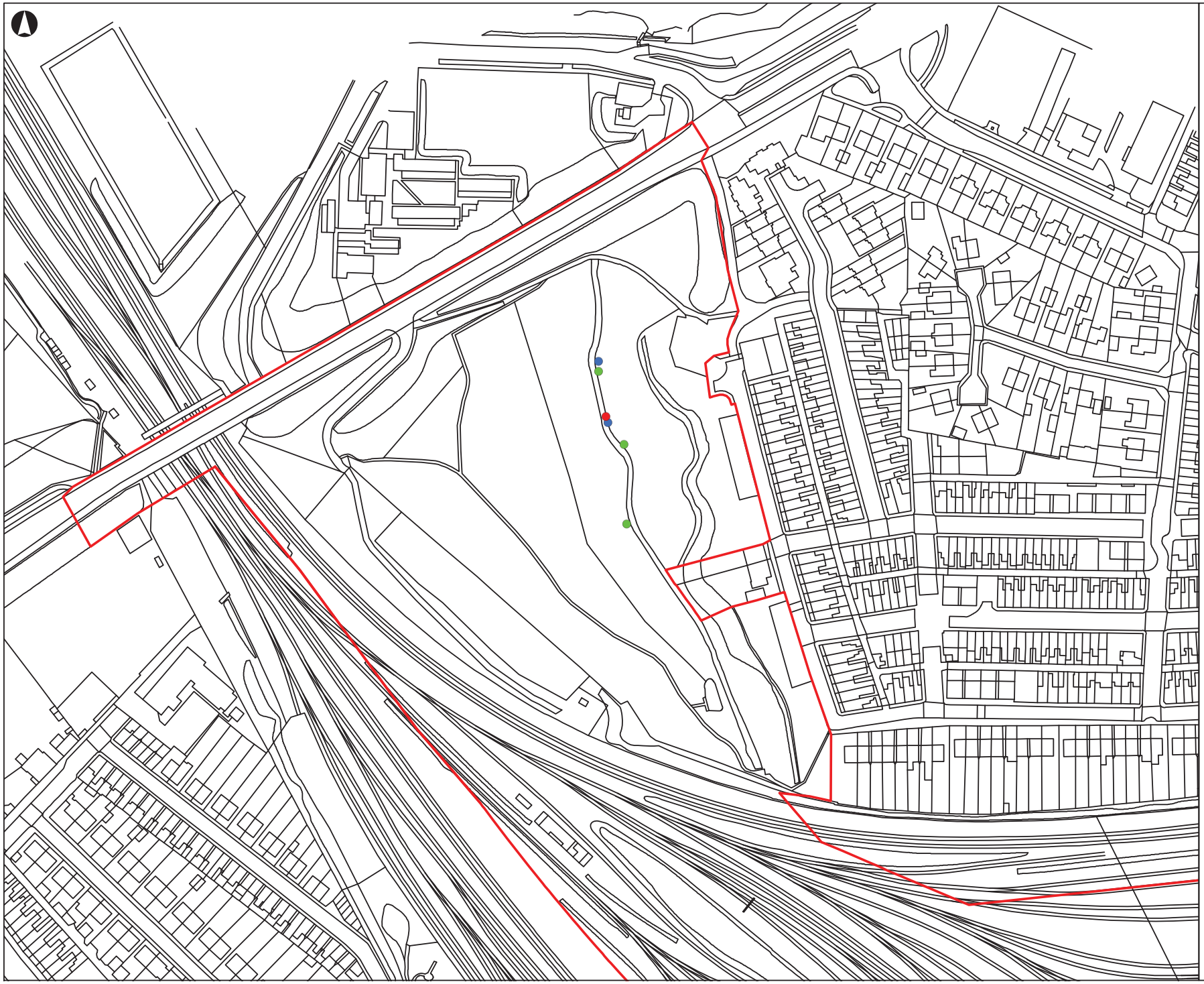
Disclaimer

This report is the result of survey work undertaken in May 2017 and August 2017 and April to May 2018. This report refers, within the limitations stated, to the condition or proposed Development of the Site at the time of the inspections. Changes in legislation, guidance, best practice etc may necessitate a re-assessment/survey. It is also advised that if there is a delay of over two years in undertaking the works, a re-survey may be required. No warranty is given as to the possibility of future changes in the condition of the Site.

This report is produced solely for the benefit of YCP and no liability is accepted for any reliance placed on it by any other party. This report is prepared for the proposed uses stated in the report and should not be used in a different context.

Drawings

A3



Legend

- Proposed Redline boundary
- Small Mammal Latrine
- Feeding Station
- Small Mammal Burrow

Issue	Date	By	Chkd	Appd
P1	08-08-18	JS	AM	RC

Metres
0 20 40 80

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Client
York Central Partnership

Job Title
York Central

Drawing 1 - Water Vole Survey Map

Scale at A3
1:1,600

Job No	Drawing Status
251869-00	Issue

Drawing No	Issue
1	P1

MXD Location

Appendix 11J
Millennium Green National Vegetation Classification Survey

York Central

Millennium Green National Vegetation Classification Survey

Issue | 2 July 2018

Job number 251869-00

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ARUP

Contents

Drawings

Appendices

Executive Summary

This report details the results of the National Vegetation Classification survey undertaken at Millennium Green. The key results are as follows:

- The presence of MG4 *Alopecurus pratensis-Sanguisorba officinalis* grassland community was confirmed within Millennium Green;
- The extent of MG4 grassland within Millennium Green is approximately 140 m in length and covers an area of 0.16 ha;
- The MG4 grassland transitions into MG1c *Arrhenatherum elatius* grassland *Filipendula ulmaria* sub-community to the west. A transition to tall ruderal vegetation was identified to the east; and

  Mmanagement/removal of the invasive species Himalayan balsam *Impatiens glandulifera* and giant hogweed *Heracleum mantegazzianum* is recommended within Millennium Green and on the eastern bank of Holgate Beck, to prevent further spread and reduction of floral biodiversity of the Site.

1 Introduction

Ove Arup and Partners Ltd. (Arup) was commissioned by York Central Partnership (YCP) to undertake a National Vegetation Classification (NVC) survey of the MG4[1] grassland within Millennium Green (approximate grid reference: SE584523).

1.1 Site and Proposed Development Description

Millennium Green is a non-statutory local site referred to as a Site of Importance for Nature Conservation (SINC) and is designated due to the presence of MG4 grassland[2]. For the purposes of this report, Millennium Green is referred to as 'the site'.

The Site is located to the west of York City Centre predominantly to the west of York Railway Station on an area of railway sidings. This area is largely composed of ephemeral, brownfield and bare ground habitats. There is a parcel of land comprising the Millennium Green Land on the north-east of the York Central Site. The remainder of the Site includes amenity parklands, car parking and allotments. The dominant land use surrounding the Site is residential with smaller areas of land occupied by commercial businesses and greenspace.

Holgate Beck, a tributary of the River Ouse, runs north westwards across the Site, entering a culvert close to Holgate Road on the southern corner of the Site and re-emerging at surface in Millennium Green

It is proposed that the Site is redeveloped to be of mixed-use to provide an improved infrastructure within a close proximity to York Railway Station. The proposed Development would allow for the potential redevelopment of the National Railway Museum and provide space for commercial and residential properties. This will also include the incorporation of open public/greenspace through the Site.

1.2 Report Objectives

The report objectives are to provide baseline data and condition of the MG4 grassland and allow for identification of the extent of the important habitat. This information will inform the ecology chapter of the Environmental Impact Assessment (EIA).

1.3 Report Structure

The report includes:

- Section 2: Policy Context;
- Section 3: Methodology;

[1] National Vegetation Classification.
[2] SINC Citation (2010) Site Code 103. Holgate Millennium Green, Leeman Road.

- Section 4: Results; and
- Section 5: Discussion.

2 Policy Context

Non-statutory local sites are referred to as SINC's within the region. These sites are of county importance for their wildlife value. They have no statutory protection but are recognised by Local Authorities and statutory agencies and their presence is fully considered when determining planning applications.

3 Methodology

3.1 National Vegetation Classification Survey

A field survey of the MG4 grassland to the west of Holgate Beck within Millennium Green was carried out in May 2018. The stands of grassland were initially assessed to ensure quadrat (2 m x 2 m) samples were taken within areas that were uniform in both species distribution and physiognomic structure. The NVC methodology for sampling vegetation in the field was followed.[3] The Domin scale was used to identify the abundance of species within quadrats (Table 3.1). Five quadrat samples were taken within the grassland that was initially identified to resemble the MG4 grassland. The frequency of each species across all quadrats was also calculated (Table 3.2). The data was analysed using Volume 3, British Plant Communities[4] supplemented with analysis using the Match software[5] to aid with assignment of potential grassland communities.

Table 3.1: The Domin scale of cover/abundance.

Cover (%)	Domin
91-100	10
76-90	9
51-75	8
34-50	7
26-33	6
11-25	5
4-10	4
<4 (many individuals)	3
<4 (several individuals)	2
<4 (few individuals)	1

Table 3.2: Frequency of species.

Frequency (%) of species across quadrats	Frequency class
1-20 (i.e. 1 stand in 5)	I
21-40	II
41-60	III
61-80	IV
81-100	V

[3] Rodwell, J.S. (2006) National Vegetation Classification: Users' handbook. Joint Nature Conservation Committee.
[4] Rodwell, J.S., Pigott, C.D., Ratcliffe, D.A., Malloch, A.J.C., Birks, H.J.B., Proctor, M.C.F., Shimwell, D.W., Huntley, J.P., Radford, E., Wigginton, M.J. and Wilkins, P. (1998) British Plant Communities, Volume 3, Grasslands and montane communities. Cambridge University Press.
[5] Thomson, A. (2004) Match version 4. A computer program to aid the assignment of vegetation data to the communities and subcommunities of the National Vegetation Classification. Institute of Natural and Environmental Sciences, University of Lancaster, Lancaster, LA1 4YQ, UK.

3.2 Survey Limitations

Any grid references provided within this report are approximate (obtained through handheld GPS devices) and are to be used as a guide only.

4 Results

4.1 National Vegetation Classification

The location of quadrats 1-5 and approximate area which the MG4 grassland is present, is detailed in Drawing 2.

The results of the species abundance in each of the five quadrats is summarised in Table 4.1. A calculation of the floristic value (frequency and abundance) across quadrats 1-5 is detailed and the floristic table value of species within MG4[4] grassland is included for comparison. Full results of the survey are detailed in Appendix A.

Table 4.1: Species abundance within quadrat samples and frequency across quadrats (floristic value).

Species	**Cover (Domin scale)**					**Floristic value of Q1-5**	**Floristic table MG4[4]**
	Quadrat 1	**Quadrat 2**	**Quadrat 3**	**Quadrat 4**	**Quadrat 5**		
Cocksfoot *Dactylis glomerata*	1	5	7	6	7	V (1-7)	III (1-5)
Yorkshire fog *Holcus lanatus*	7	0	7	4	8	IV (4-8)	IV (2-5)
Meadowsweet *Filipendula ulmaria**	8	1	6	8	0	IV (1-8)	V (1-6)
Meadow crane's-bill *Geranium pratense*	0	6	5	5	7	IV (5-7)	N/A
Lesser celandine *Ranunculus ficaria*	0	6	4	4	3	IV (3-6)	N/A
Meadow foxtail *Alopecurus pratensis*	0	4	1	6	4	IV (1-6)	IV (1-6)
Smooth meadow grass *Poa pratensis*	1	5	4	4	0	IV (1-5)	I (3)
Common dandelion *Taraxacum officinale* agg.	2	5	5	1	0	IV (1-5)	V (1-5)
False-oat grass *Arrhenatherum elatius*	0	7	4	2	0	III (2-7)	II (2-4)

Species	Cover (Domin scale)					Floristic value of Q1-5	Floristic table MG4[4]
	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5		
Meadow buttercup *Ranunculus acris*	4	0	2	1	4	IV (1-4)	V (2-5)
Great burnet *Sanguisorba officinalis*	5	0	8	4	0	III (4-8)	V (2-7)
Meadow vetchling *Lathyrus pratensis*	4	0	5	0	1	III (1-5)	IV (2-5)
Hedge bindweed *Calystegia septum*	0	4	0	0	4	II (4)	N/A
Broadleaved dock *Rumex obtusifolius*	0	5	1	0	0	II (1-5)	N/A
Creeping buttercup *Ranunculus repens*	0	0	1	0	5	II (1-5)	III (1-5)
Crested dog's-tail *Cynosurus cristatus*	4	0	1	0	0	II (1-4)	V (1-6)
Red fescue *Festuca rubra*	1	0	0	0	4	II (1-4)	V (2-6)
Cleavers *Galium aparine*	0	4	1	0	0	II (1-4)	N/A
Red clover *Trifolium pratense*	2	0	2	0	0	II (2)	V (1-5)
Creeping soft grass *Holcus mollis*	0	1	0	0	1	II (1)	N/A
Glaucous sedge *Carex flacca*	4	0	0	0	0	I (4)	N/A
Common hogweed *Heracleum sphondylium*	0	4	0	0	0	I (4)	I (3-4)
Rough meadow grass *Poa trivialis*	0	0	0	0	4	I (4)	I (1-7)

Species	Cover (Domin scale)					Floristic value of Q1-5	Floristic table MG4[4]
	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5		
Sweet vernal grass *Anthoxanthum odoratum*	2	0	0	0	0	I (2)	III (2-6)
Common chickweed *Stellaria media*	2	0	0	0	0	I (2)	N/A
Common nettle *Urtica dioica*	0	2	0	0	0	I (2)	N/A
White clover *Trifolium repens*	0	0	1	0	0	I (1)	IV (2-5)
Couch grass *Elymus repens*	0	0	0	1	0	I (1)	N/A

*Species in bold represent constant species found in MG4 grassland communities.

Nine species were identified across the quadrats which are listed as constant species within the MG4 grassland. Of these, five species (meadowsweet *Filipendula ulmaria*, meadow foxtail *Alopecurus pratensis*, common dandelion *Taraxacum officinale* agg., great burnet *Sanguisorba officinalis* and meadow vetchling *Lathyrus pratensis*) showed similar frequencies and abundance within quadrats.

Ten species were identified across the quadrats which do not form part of the MG4 grassland within the floristic table.[4] These include meadow crane's-bill *Geranium pratense*, hedge bindweed *Calystegia septum*, lesser celandine *Ranunculus ficaria*, broadleaved dock *Rumex obtusifolius*, cleavers *Galium aparine*, creeping soft grass *Holcus mollis*, glaucous sedge *Carex flacca*, common chickweed *Stellaria media*, common nettle *Urtica dioica* and couch grass *Elymus repens*.

The top five grassland communities identified with Match were used as a guide for comparison of the survey results and the floristic tables within Rodwell (1998).[4] The results of the analysis are summarised in Table 4.2.

Table 4.2: Analysis results from Match.

Community	Co-efficient
MG7	43.5
MG1	43.2
MG4	42.8
MG9	41.8
MG7	41.4
Matches against sub-communities	
MG1c	51.8

Community	Co-efficient
MG7D	43.5
MG1	43.2
MG4	42.8
MG9	41.8

4.2 Additional Notes

The vegetation to the east of the MG4 grassland (TN1; Drawing 2) transitions into tall ruderal vegetation. Species present include common hogweed *Heracleum sphondylium*, common nettle *Urtica dioica*, cow parsley *Anthriscus sylvestris*, great willowherb *Epilobium hirsutum*, cleavers *Galium aparine* and reed canary grass *Phalaris arundinacea*. The ground flora layer includes lesser celandine *Ranunculus ficaria*, garlic mustard *Alliaria petiolate*, rough meadow grass *Poa trivialis* and hedge bindweed *Calystegia sepium*.

An area of scrub and scattered trees also exists to the east of the MG4 grassland. Tree species include willow *Salix* sp. and hawthorn *Crataegus monogyna*.

The grassland community to the west of the MG4 grassland (TN2; Drawing 2) transitions into a grass dominated sward, species present include Yorkshire fog *Holcus lanatus*, cocksfoot *Dactylis glomerata*, false-oat grass *Arrhenatherum elatius*, smooth meadow grass *Poa* pratensis, meadow foxtail and reed canary grass. Locally dense patches of tall ruderal species were also identified. Species present include common nettle and common hogweed. Local dense patches of meadowsweet were also identified.

4.2.1 Invasive Species

The invasive species Himalayan balsam *Impatiens glandulifera* was identified in large stands within the tall ruderal vegetation to the east (TN1, TN3; Drawing 2). In addition, numerous giant hogweed *Heracleum mantegazzianum* stands were identified along the bank of Holgate Beck (TN4; Drawing 2).

5 Discussion

The abundance and frequency of species identified in quadrats 1-5 (Table 4.1) is representative of the MG4 grassland community detailed in Rodwell (1998)[4] which is a species-rich and somewhat varied sward of grasses and herbaceous dicotyledons.

Comparisons of the species abundance and frequency identified within the quadrats was made against suggested grassland communities from analysis using Match (Table 4.2). The composition was not considered representative of MG7 or MG9, primarily due to the lack of constant species identified within the quadrats, which represent those communities. MG7 contains perennial ryegrass *Lolium perenne* and MG9 contains tufted hairgrass *Deschampsia cespitosa* and Yorkshire fog. Although Yorkshire fog was identified within the sward, no tufted hairgrass was identified within the quadrats.

The vegetation composition to the west of the identified MG4 grassland transitions into a grass dominated sward where the herb species richness and presence reduces. Although there are local dense patches of the herbaceous species meadowsweet, other tall ruderal species are also locally abundant such as common nettle, cow parsley and common hogweed. The dominant grassland species was observed to transition between cocksfoot, false-oat grass and one small area of Yorkshire fog. The abundance and frequency of grass species identified is representative of the MG1c grassland community: *Arrhenatherum elatius* grassland *Filipendula ulmaria* sub-community. This community is characterised by coarse-leaved tussock grasses such as false-oat grass, cocksfoot and Yorkshire fog.

The vegetation composition to the east of the identified MG4 transitions to tall ruderal vegetation which replaces the varied sward of grasses and herbaceous dicotyledons. The vegetation composition is dominated by Himalayan balsam, common hogweed, common nettle, cow parsley, great willowherb, cleavers and reed canary grass.

The location and area of the MG4 grassland in Millennium Green is outlined within Drawing 2. The length is approximately 140 m and is approximately 0.16 ha. This was identified to be a similar location and area to the description within the Millennium Green SINC citation[2].

MG4 grassland community is a lowland grassland characteristic of where traditional hay-meadow treatment has been applied to seasonally-flooded land with alluvial soil. Due to land use change, improvement of grassland and river drainage, its occurrence is limited to areas where common rights have kept treatment unchanged for many generations.[5]

Millennium Green is a public open space which is managed by the Millennium Green Trust. The grassland is managed infrequently through mechanical cutting and there is no livestock grazing on the Site. As such, the transition from MG4 to MG1 grassland community, is likely to be as a result of no livestock grazing.

The invasive plant species identified by the banks of Holgate Beck are likely to spread without appropriate management/removal. Himalayan balsam was identified adjacent to the transition areas of MG4 to tall ruderal vegetation. Consequently, management of invasive species is recommended within Millennium Green to prevent further spread and reduction of floral biodiversity. In addition, management of these species on the east bank of Holgate Beck is recommended concurrently to ensure successful management/removal. This is likely to require continual monitoring and additional programmes of management due to Holgate Beck which will form a pathway for spread of potential invasive species from upstream areas of Millennium Green.

Disclaimer

This report is the result of survey work undertaken in May 2018. This report refers, within the limitations stated, to the condition or proposed Development of the Site at the time of the inspections. Changes in legislation, guidance, best practice etc may necessitate a re-assessment/survey. It is also advised that if there is a delay of over two years in undertaking the works, a re-survey may be required. No warranty is given as to the possibility of future changes in the condition of the Site.

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Drawings

A3

Legend

Redline boundary

Issue	Date	By	Chkd	Appd
P1	01-06-18	YL	KP	RC

Metres

0 80 160 320

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Client

York Central Partnership

Job Title

York Central

York Central Development Redline Boundary

Scale at A3

1:6,000

Job No	Drawing Status
251869-00	**Issue**

Drawing No	Issue
Drawing 1	**P1**

MXD Location

A3

Legend

- Redline boundary
- NVC quadrat locations
- Target note
- Approximate MG4 grassland area

TN1: Tall ruderal vegetation
TN2: Grass dominated sward
TN3: Himalayan balsam stands
TN4: Giant hogweed stands

Issue	Date	By	Chkd	Appd
P1	01-06-18	YL	KP	RC

Metres
0 20 40 80

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Job Title
York Central

NVC Survey Quadrat Locations and Approximate Extent of MG4 Grassland

Scale at A3
1:1,500

Job No	Drawing Status
251869-00	Issue

Drawing No	Issue
Drawing 2	P1

MXD Location

Appendix A

NVC Quadrat Survey Data

A1

Sample	**1**	**2**	**3**	**4**	**5**
Grid reference:	SE 58379 52389	SE 58389 52356	SE58390 52345	SE 58407 52326	SE 58411 52298
Habitat:	Neutral grassland	Neutral grassland	Neutral grassland	Neutral grassland	Neutral grassland
Aspect:	East	East	East	East	East
Slope (degrees):	10	15	15	15	10
Stand area (m x m):	~100m	~100m	~100m	~100m	~100m
Sample area (m x m):	2 x 2	2 x 2	2 x 2	2 x 2	2 x 2
Layers (mean height, m cm mm):	30cm	50cm	40cm	40cm	40cm
Layers (cover, %):	N/a	N/a	N/a	N/a	N/a
Species:	*Cover (<4%f/s/m up to 100%)*	*Cover*	*Cover*	*Cover*	*Cover*
Lathyrus pratensis	4		5		1
Filipendula ulmaria	8	1	6	8	
Ranunculus acris	4		2	1	4
Trifolium pratense	2		2		
Carex flacca	4				
Anthoxanthum odoratum	2				
Holcus lanatus	7		7	4	8
Cynosurus cristatus	4		1		
Sanguisorba officialise	5		8	4	
Poa pratensis	1	5	4	4	
Dactylus glomerata	1	5	7	6	7
Festuca rubra	1				4
Taraxacum officinale agg.	2	5	5	1	
Stellaria media	2				

Sample	1	2	3	4	5
Geranium pratense		6	5	5	7
Galium aparine		4	1		
Heracleum sphondylium		4			
Calystegia septum		4			4
Rumex obtusifolius		5	1		
Ranunculus ficaria		6	4	4	3
Alopecurus pratensis		4	1	6	4
Holcus mollis		1			1
Urtica dioica		2			
Trifolium repens			1		
Ranunculus repens			1		5
Agropyron repens				1	
Poa trivialis					4
Arrhenatherum elatius		7	4	2	

Appendix 12A
Groundsure Report

Ove Arup & Partners International Ltd

9th Floor, 3 St Paul's Place, Norfolk Street,
SHEFFIELD, S1 2JE

Groundsure Reference:	GS-4540528
Your Reference:	251869-00_York_Central
Report Date	5 Dec 2017
Report Delivery Method:	Email - pdf

Enviro Insight

Address: 459021.27826074475, 451907.7566675513,

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Enviro Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,

Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

Enviro Insight

Address:	**459021.27826074475, 451907.7566675513,**
Date:	**5 Dec 2017**
Reference:	**GS-4540528**
Client:	**Ove Arup & Partners International Ltd**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	16-Apr-2014
Grid Reference:	459021,451908
Site Size:	50.19ha

Report Reference: GS-4540528
Client Reference: 251869-00_York_Central

Contents Page

Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	219	69	135	71
1.2 Additional Information – Historical Tank Database	73	9	55	37
1.3 Additional Information – Historical Energy Features Database	29	4	46	35
1.4 Additional Information – Historical Petrol and Fuel Site Database	3	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	35	0	30	34
1.6 Potentially Infilled Land	13	6	16	29

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	0
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	1	2
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	6	0	0	6
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	1	4	48	14
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	1	0
2.2 Records of COMAH and NIHHS sites	0	0	1	1
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	6	1	4	3
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	2	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	1	0	1	2
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	1	0	0	1	5
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	5	0	0	21

Section 4: Current Land Use

	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	24	6	64	Not searched
4.2 Records of Petrol and Fuel Sites	1	1	0	0
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology

5.1 Are there any records of Artificial Ground and Made Ground present beneath the study site?	No
5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?	Yes
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology

	0-500m
6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?	Yes
6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?	Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	2	5
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	3	3	6	8
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	3	3	6	5
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	1	0	2	0	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	Yes	No	Yes	Yes
6.10 Detailed River Network entries within 500m of the site	4	4	5	10	Not searched	Not searched
6.11 Surface water features within 250m of the study site	Yes	Yes	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Are there any Enviroment Agency Zone 2 floodplains within 250m of the study site?	Yes
7.2 Are there any Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	Yes
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	High
7.4 Are there any Flood Defences within 250m of the study site?	Yes
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	Yes
7.6 Are there any areas used for Flood Storage within 250m of the study site?	Yes
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Potential at Surface
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Low

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	1	0	1	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	0	0
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	1	2
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	0	0	0	1	2	3
8.14 Records of Green Belt land	1	0	0	0	2	5

Section 9: Natural Hazards

9.1 What is the maximum risk of natural ground subsidence?	Moderate
9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?	Low
9.1.2 What is the maximum Landslides hazard rating identified on the study site?	Low
9.1.3 What is the maximum Soluble Rocks hazard rating identified on the study site?	Negligible
9.1.4 What is the maximum Compressible Ground hazard rating identified on the study site?	Moderate
9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?	Very Low
9.1.6 What is the maximum Running Sand hazard rating identified on the study site?	Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining

10.1 Are there any coal mining areas within 75m of the study site?	No
10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?	No
10.3 Are there any brine affected areas within 75m of the study site?	No

Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections:

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

8. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

9. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence and radon..

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, Groundsure provide a free Technical Helpline (08444 159000) for further information and guidance.

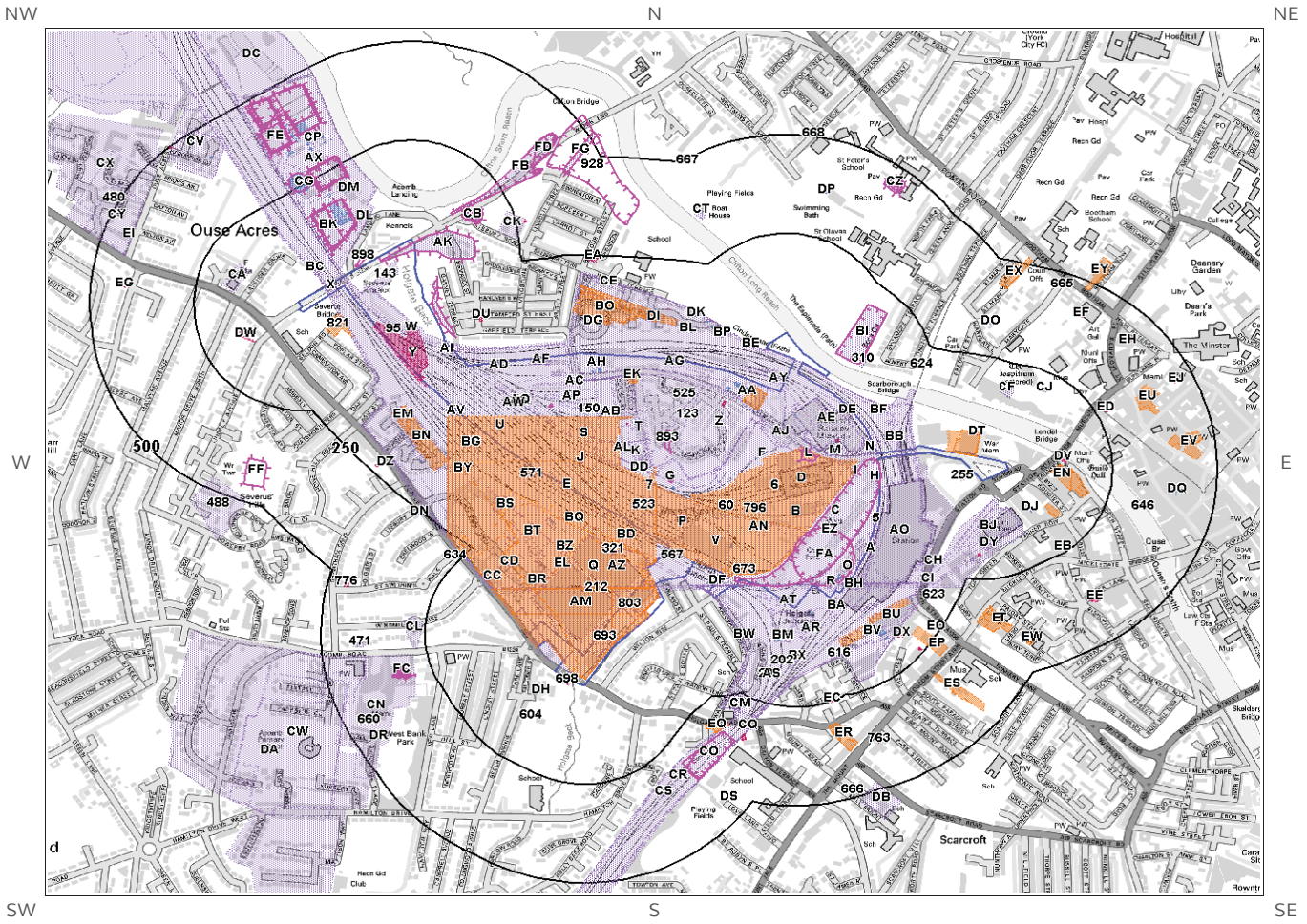
Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier “A” on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as “Not Shown”.

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Historical Land Use



Historical 1:10,000 and 1:10,560 scale mapping

Industrial Land Use

Potentially Infilled Land

Site Outline

250
500
Search Buffers (m)

Historical 1:2,500, 1:1,250 and 1:500 scale mapping

Energy Features

Petrol Stations

Tanks

Garages

1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 494

ID	Distance [m]	Direction	Use	Date
1A	0	On Site	Railway Sidings	1907
2A	0	On Site	Railway Sidings	1907
3A	0	On Site	Railway Buildings	1907
4A	0	On Site	Railway Building	1929
5	0	On Site	Railway Buildings	1907
6	0	On Site	Goods Station	1957
7	0	On Site	Unspecified Works	1957
8C	0	On Site	Railway Building	1950
9B	0	On Site	Railway Building	1929
10B	0	On Site	Railway Building	1950
11B	0	On Site	Railway Building	1929
12B	0	On Site	Railway Building	1950
13C	0	On Site	Railway Building	1957
14D	0	On Site	Goods Station	1950
15D	0	On Site	Goods Station	1929
16D	0	On Site	Goods Shed	1907
17E	0	On Site	Railway Building	1929
18E	0	On Site	Railway Building	1950
19F	0	On Site	Concrete Depot	1929
20F	0	On Site	Concrete Depot	1950
21H	0	On Site	Railway Building	1972
22E	0	On Site	Railway Building	1929
23E	0	On Site	Railway Building	1950
24G	0	On Site	Unspecified Old Shaft	1907
25G	0	On Site	Unspecified Old Shaft	1950
26G	0	On Site	Unspecified Old Shaft	1929
27F	0	On Site	Unspecified Depot	1957
28E	0	On Site	Railway Building	1957
29E	0	On Site	Railway Building	1950
30E	0	On Site	Railway Building	1929
31H	0	On Site	Railway Building	1929
32I	0	On Site	Railway Building	1907
33I	0	On Site	Railway Building	1983
34O	0	On Site	Railway Building	1907

35I	0	On Site	Railway Building	1972
36I	0	On Site	Railway Building	1983
37I	0	On Site	Railway Building	1972
38J	0	On Site	Railway Building	1957
39J	0	On Site	Railway Building	1950
40J	0	On Site	Railway Building	1929
41K	0	On Site	Railway Building	1950
42J	0	On Site	Railway Building	1907
43K	0	On Site	Railway Building	1957
44K	0	On Site	Railway Building	1950
45L	0	On Site	Unspecified Heap	1929
46L	0	On Site	Unspecified Heap	1907
47L	0	On Site	Unspecified Heap	1950
48K	0	On Site	Railway Building	1957
49M	0	On Site	Unspecified Tank	1950
50M	0	On Site	Unspecified Tank	1929
51M	0	On Site	Unspecified Tank	1957
52N	0	On Site	Railway Building	1972
53N	0	On Site	Railway Building	1983
54N	0	On Site	Railway Building	1950
55N	0	On Site	Railway Building	1907
56N	0	On Site	Railway Building	1929
57O	0	On Site	Railway Sidings	1907
58O	0	On Site	Unspecified Tank	1983
59O	0	On Site	Railway Building	1907
60	0	On Site	Wagon Works	1907
61O	0	On Site	Railway Building	1950
62A	0	On Site	Railway Building	1950
63R	0	On Site	Railway Building	1972
64P	0	On Site	Wagon Works	1929
65P	0	On Site	Wagon Works	1950
66Q	0	On Site	Carriage Works	1950
67Q	0	On Site	Carriage Works	1929
68R	0	On Site	Railway Building	1957
69V	0	On Site	Unspecified Works	1957
70B	0	On Site	Railway Building	1957
71H	0	On Site	Railway Building	1983
72G	0	On Site	Unspecified Old Shaft	1957
73I	0	On Site	Railway Building	1972
74K	0	On Site	Railway Buildings	1950
75T	0	On Site	Railway Building	1950
76S	0	On Site	Railway Buildings	1957
77S	0	On Site	Railway Building	1950
78S	0	On Site	Railway Building	1957
79U	0	On Site	Railway Buildings	1957
80T	0	On Site	Railway Building	1950

81U	0	On Site	Railway Building	1929
82G	0	On Site	Railway Building	1991
83L	0	On Site	Railway Building	1991
84AJ	0	On Site	Railway Buildings	1991
85D	0	On Site	Unspecified Works	1991
86I	0	On Site	Railway Building	1991
87I	0	On Site	Railway Building	1991
88H	0	On Site	Railway Building	1991
89AN	0	On Site	Railway Building	1991
90V	0	On Site	Wagon Repair Depot	1991
91X	0	On Site	Railway Building	1950
92W	0	On Site	Unspecified Tank	1950
93W	0	On Site	Unspecified Commercial/Industrial	1929
94X	0	On Site	Railway Building	1929
95	0	On Site	Gas Works	1907
96X	0	On Site	Railway Building	1907
97X	0	On Site	Railway Buildings	1957
98W	0	On Site	Unspecified Tank	1957
99AI	0	On Site	Railway Building	1957
100W	0	On Site	Gasometer	1907
101W	0	On Site	Unspecified Tank	1929
102Y	0	On Site	Unspecified Tanks	1907
103Y	0	On Site	Unspecified Tanks	1929
104Y	0	On Site	Railway Building	1991
105Z	0	On Site	Unspecified Depot	1983
106Z	0	On Site	Unspecified Works	1972
107AA	0	On Site	Railway Building	1907
108AA	0	On Site	Railway Building	1929
109AC	0	On Site	Railway Building	1950
110AA	0	On Site	Railway Building	1972
111AA	0	On Site	Railway Building	1983
112AB	0	On Site	Railway Building	1950
113AB	0	On Site	Unspecified Works	1991
114AB	0	On Site	Unspecified Works	1983
115AE	0	On Site	Engine Shed	1957
116AB	0	On Site	Unspecified Works	1972
117AB	0	On Site	Unspecified Disused Works	1907
118AC	0	On Site	Railway Building	1950
119AC	0	On Site	Railway Building	1957
120AC	0	On Site	Railway Building	1972
121AC	0	On Site	Railway Building	1991
122AC	0	On Site	Railway Building	1983
123	0	On Site	Unspecified Commercial/Industrial	1957
124AD	0	On Site	Railway Building	1950

125AD	0	On Site	Railway Building	1957
126AE	0	On Site	Unspecified Commercial/Industrial	1991
127AG	0	On Site	Railway Building	1950
128AF	0	On Site	Railway Building	1950
129AH	0	On Site	Unspecified Tank	1950
130AF	0	On Site	Railway Building	1957
131AG	0	On Site	Railway Building	1957
132AF	0	On Site	Railway Building	1983
133AF	0	On Site	Railway Building	1991
134AH	0	On Site	Unspecified Tank	1972
135AF	0	On Site	Railway Building	1972
136AI	0	On Site	Railway Buildings	1907
137Y	0	On Site	Railway Building	1972
138Y	0	On Site	Railway Building	1983
139AP	0	On Site	Engineering Works	1929
140X	0	On Site	Railway Buildings	1972
141AJ	0	On Site	Railway Sidings	1907
142DE	0	On Site	Railway Sidings	1929
143	0	On Site	Slaughter House	1972
144AK	0	On Site	Unspecified Pits	1983
145AK	0	On Site	Unspecified Pits	1991
146E	0	On Site	Railway Sidings	1907
147DD	0	On Site	Railway Sidings	1983
148AW	0	On Site	Railway Sidings	1929
149AL	0	On Site	Railway Sidings	1957
150	0	On Site	Railway Sidings	1950
151AL	0	On Site	Railway Sidings	1972
152EZ	0	On Site	Burial Ground	1972
153AM	0	On Site	Carriage Works	1972
154AZ	0	On Site	Unspecified Works	1972
155AM	0	On Site	Unspecified Works	1991
156AM	0	On Site	Carriage Works	1983
157AN	0	On Site	Railway Building	1983
158V	0	On Site	Wagon Repair Depot	1983
159V	0	On Site	Unspecified Works	1972
160G	0	On Site	Railway Building	1983
161G	0	On Site	Railway Building	1972
162G	0	On Site	Unspecified Tank	1972
163L	0	On Site	Railway Building	1983
164L	0	On Site	Railway Building	1972
165D	0	On Site	Unspecified Works	1983
166D	0	On Site	Goods Station	1972
167J	0	On Site	Railway Building	1907
168K	0	On Site	Railway Building	1983
169K	0	On Site	Railway Building	1972

170AO	0	On Site	Railway Station	1929
171AO	0	On Site	Railway Station	1950
172AO	0	On Site	Railway Station	1972
173AO	0	On Site	Railway Station	1991
174AO	0	On Site	Railway Station	1983
175AO	0	On Site	Railway Station	1957
176AJ	0	On Site	Railway Buildings	1983
177AJ	0	On Site	Railway Buildings	1972
178AE	0	On Site	Engine Shed	1907
179AP	0	On Site	Unspecified Old Shaft	1907
180AB	0	On Site	Railway Buildings	1950
181AB	0	On Site	Railway Buildings	1957
182AP	0	On Site	Railway Building	1950
183AP	0	On Site	Railway Building	1957
184AQ	0	On Site	Railway Building	1950
185AQ	0	On Site	Railway Building	1957
186AE	0	On Site	Engine Shed	1950
187AE	0	On Site	Engine Shed	1929
188AE	0	On Site	Engine Shed	1983
189AE	0	On Site	Engine Shed	1972
190AP	0	On Site	Railway Building	1950
191AP	0	On Site	Railway Building	1957
192AA	0	On Site	Railway Building	1972
193AA	0	On Site	Unspecified Tank	1950
194AA	0	On Site	Unspecified Tank	1929
195BS	0	On Site	Carriage Works	1907
196AQ	0	On Site	Railway Buildings	1950
197AQ	0	On Site	Railway Buildings	1957
198Z	0	On Site	Unspecified Depot	1991
199FA	0	On Site	Burial Ground	1950
200AS	0	On Site	Railway Sidings	1938
201	0	On Site	Railway Sidings	1938
202	0	On Site	Railway Sidings	1907
203AR	0	On Site	Unspecified Commercial/Industrial	1938
204AR	0	On Site	Unspecified Commercial/Industrial	1938
205AR	0	On Site	Unspecified Commercial/Industrial	1907
206AM	0	On Site	Carriage Works	1938
207AM	0	On Site	Unspecified Commercial/Industrial	1938
208AM	0	On Site	Railway Sidings	1938
209AM	0	On Site	Carriage Works	1907
210AM	0	On Site	Railway Sidings	1907
211AM	0	On Site	Railway Sidings	1938
212	0	On Site	Unspecified Works	1957

213AT	0	On Site	Railway Building	1957
214O	0	On Site	Railway Building	1957
215AS	0	On Site	Railway Sidings	1938
216AT	0	On Site	Railway Buildings	1938
217AU	0	On Site	Railway Sidings	1938
218AU	0	On Site	Unspecified Commercial/Industrial	1938
219BH	0	On Site	Railway Building	1938
220H	2	E	Railway Building	1929
221AY	4	NW	Railway Building	1983
222AO	5	S	Railway Station	1907
223AV	6	SW	Railway Building	1950
224AV	6	SW	Railway Building	1929
225AV	6	SW	Railway Building	1907
226AT	7	SW	Railway Buildings	1957
227AW	7	E	Unspecified Ground Workings	1991
228AW	7	E	Unspecified Ground Workings	1983
229AU	7	NE	Railway Buildings	1957
230N	12	E	Railway Sidings	1929
231N	12	E	Railway Building	1950
232N	12	E	Railway Sidings	1907
233AR	13	S	Unspecified Tanks	1938
234AR	16	SW	Unspecified Tanks	1957
235N	16	E	Railway Building	1957
236AR	18	SW	Unspecified Tanks	1938
237AR	18	SW	Unspecified Tanks	1938
238AX	19	NW	Water Works	1991
239AX	19	NW	Unspecified Works	1957
240AX	19	NW	Water Works	1972
241AX	19	NW	Water Works	1983
242AR	19	SW	Unspecified Tanks	1907
243BA	19	S	Railway Building	1938
244AY	20	NW	Railway Buildings	1957
245AZ	21	W	Unspecified Tank	1957
246O	21	SE	Railway Building	1907
247BB	23	N	Railway Building	1957
248AY	23	N	Railway Building	1950
249AY	23	N	Railway Building	1929
250BA	25	SE	Railway Building	1957
251AZ	27	W	Unspecified Tank	1950
252BB	27	N	Railway Sidings	1950
253BB	27	N	Railway Sidings	1929
254BB	27	N	Railway Sidings	1907
255	27	SW	Unspecified Tank	1957
256BA	28	SE	Unspecified Tank	1938

257BA	28	SE	Unspecified Tank	1938
258BA	28	SE	Unspecified Tank	1907
259AY	29	NW	Railway Building	1950
260AY	29	NW	Railway Building	1929
261BE	29	W	Railway Building	1957
262BC	33	NW	Railway Buildings	1950
263BC	33	NW	Railway Buildings	1957
264AT	33	SW	Railway Building	1972
265BD	33	SW	Railway Building	1957
266AT	34	SW	Railway Building	1957
267BD	34	SW	Railway Buildings	1957
268AX	35	NW	Unspecified Commercial/Industrial	1950
269AX	35	NW	Unspecified Commercial/Industrial	1929
270AX	35	NW	Water Works	1907
271BG	36	SW	Railway Buildings	1957
272BE	37	W	Railway Building	1950
273BE	37	W	Railway Building	1929
274BE	37	W	Railway Building	1907
275BC	38	NW	Railway Building	1907
276BF	40	NE	Railway Building	1929
277BF	40	NE	Railway Building	1950
278BG	41	SW	Railway Buildings	1950
279BG	41	SW	Railway Buildings	1929
280BF	47	E	Railway Buildings	1957
281BH	47	SE	Railway Station	1938
282BH	47	SE	Railway Station	1938
283BQ	48	SW	Railway Building	1991
284BH	48	SE	Railway Station	1938
285BI	49	NE	Unspecified Pit	1991
286BI	49	NE	Unspecified Pit	1983
287BI	49	NE	Unspecified Pit	1972
288BJ	50	SE	Old Railway Station	1907
289BG	51	SW	Railway Buildings	1950
290BG	51	SW	Railway Buildings	1929
291BG	51	SW	Unspecified Tank	1950
292BF	52	E	Railway Building	1950
293BF	54	E	Railway Sidings	1907
294BF	54	E	Railway Sidings	1929
295BF	60	NE	Railway Building	1972
296BJ	63	S	Railway Sidings	1929
297BH	66	SE	Railway Station	1907
298DG	68	N	Railway Building	1983
299AR	68	S	Railway Building	1938
300AR	69	S	Railway Building	1957

301BK	70	NW	Unspecified Tanks	1983
302BK	70	NW	Unspecified Tanks	1991
303AR	70	S	Railway Buildings	1957
304BN	71	SW	Railway Buildings	1957
305BL	71	N	Railway Building	1950
306BL	71	N	Railway Building	1929
307BL	72	N	Railway Building	1957
308BM	73	S	Railway Buildings	1938
309AR	73	S	Engine Sheds	1907
310	74	E	Boat House	1907
311BM	74	SW	Engine Sheds	1907
312BN	75	SW	Carriage Shed	1950
313BN	75	SW	Carriage Shed	1907
314BN	75	SW	Carriage Shed	1929
315BO	77	N	Carriage Shed	1950
316BO	77	N	Carriage Shed	1929
317BO	77	N	Carriage Shed	1957
318BO	79	N	Railway Building	1972
319BR	80	N	Railway Building	1950
320BP	81	N	Railway Building	1957
321	82	SW	Railway Building	1957
322BO	82	N	Carriage Shed	1983
323BV	83	SE	Unspecified Commercial/Industrial	1938
324DL	87	NW	Unspecified Tanks	1972
325BP	88	N	Railway Building	1991
326BP	88	N	Railway Building	1983
327BJ	88	SE	Old Railway Station	1929
328BJ	88	SE	Old Railway Station	1950
329BP	89	N	Railway Building	1957
330BQ	89	SW	Railway Buildings	1991
331BQ	89	SW	Railway Buildings	1983
332BQ	89	SW	Railway Buildings	1972
333BR	92	N	Railway Building	1929
334BJ	96	SE	Old Railway Station	1957
335BS	97	SW	Timber Shed	1929
336BT	99	SW	Railway Buildings	1991
337BT	99	SW	Railway Buildings	1983
338BT	99	SW	Railway Buildings	1972
339BU	100	SE	Railway Building	1983
340BU	100	SE	Railway Building	1972
341BU	100	SE	Railway Building	1991
342BT	102	SW	Railway Buildings	1957
343BY	102	SW	Railway Building	1957
344BV	103	SE	Railway Building	1957
345BT	103	SW	Railway Building	1950

346BX	104	S	Railway Buildings	1938
347BW	105	SE	Railway Building	1972
348BW	105	SE	Railway Building	1983
349BW	105	SE	Railway Building	1991
350BX	105	S	Railway Building	1957
351BY	107	SW	Railway Building	1950
352BY	107	SW	Railway Building	1929
353BV	108	SE	Railway Building	1983
354BV	108	SE	Railway Building	1972
355BR	109	NW	Railway Buildings	1991
356BR	109	NW	Railway Buildings	1983
357BR	110	NW	Railway Buildings	1972
358FB	115	NE	Unspecified Heap	1950
359BR	115	N	Railway Building	1929
360BY	117	SW	Railway Buildings	1957
361BN	122	SW	Railway Building	1991
362BN	122	SW	Railway Building	1983
363BN	122	SW	Railway Building	1972
364BY	123	SW	Railway Building	1929
365BY	123	SW	Railway Building	1950
366BZ	123	SW	Railway Buildings	1957
367BZ	127	SW	Railway Building	1950
368BN	128	SW	Railway Building	1950
369BN	128	SW	Railway Building	1929
370BX	128	S	Railway Building	1957
371BZ	129	N	Railway Building	1950
372BX	129	S	Railway Building	1938
373BZ	130	SW	Railway Building	1950
374BZ	130	SW	Railway Building	1950
375BX	130	S	Railway Building	1983
376BX	130	S	Railway Building	1972
377BX	130	S	Railway Building	1991
378BZ	131	N	Railway Building	1929
379BZ	132	SW	Railway Building	1929
380CB	134	NE	Unspecified Pit	1950
381BU	138	SE	Railway Building	1957
382CA	139	NW	Fire Station	1991
383CA	139	NW	Fire Station	1983
384CB	141	NE	Unspecified Pit	1957
385BZ	143	SW	Railway Building	1950
386BY	143	SW	Railway Building	1929
387CC	144	NW	Railway Building	1957
388CC	152	NW	Railway Building	1950
389CC	152	NW	Railway Building	1929
390CH	153	E	Railway Buildings	1907
391CD	154	NW	Railway Buildings	1957

392CD	157	NW	Railway Building	1929
393CD	157	NW	Railway Building	1950
394CI	157	E	Railway Building	1950
395DY	159	S	Railway Building	1907
396CE	160	N	Railway Building	1929
397CE	160	N	Railway Building	1907
398CE	160	N	Railway Building	1950
399CE	160	N	Railway Building	1957
400CF	161	N	Hospital	1957
401CF	161	N	Hospital	1972
402CF	161	N	Hospital	1983
403BT	164	N	Railway Building	1991
404BT	164	N	Railway Building	1983
405BT	165	SW	Railway Buildings	1929
406BT	165	SW	Railway Buildings	1950
407CD	167	N	Railway Building	1929
408CG	167	NW	Railway Sidings	1907
409CG	167	NW	Railway Sidings	1929
410CD	168	N	Railway Building	1950
411CH	171	E	Railway Building	1907
412BT	176	SW	Railway Building	1972
413CI	181	SE	Railway Buildings	1950
414CJ	201	NE	Unspecified Tank	1983
415CJ	201	NE	Unspecified Tank	1972
416CK	205	E	Unspecified Works	1991
417CK	205	E	Unspecified Works	1983
418CG	214	NW	Unspecified Tank	1991
419CG	214	NW	Unspecified Tank	1983
420CG	234	NW	Unspecified Tank	1957
421CG	237	NW	Unspecified Tank	1991
422CG	237	NW	Unspecified Tank	1972
423CG	237	NW	Unspecified Tank	1983
424CL	256	W	Windmill	1907
425CM	271	S	Railway Buildings	1938
426CL	272	W	Disused Windmill	1957
427CM	273	S	Railway Building	1972
428CM	273	S	Railway Building	1983
429CN	284	W	Nursery	1983
430CN	284	W	Nursery	1991
431AX	297	NW	Unspecified Tank	1950
432AX	297	NW	Unspecified Tank	1929
433CO	305	SE	Cuttings	1972
434CO	305	SE	Cuttings	1983
435CO	305	SE	Cuttings	1991
436CP	312	NW	Unspecified Tanks	1957
437CP	313	NW	Unspecified Tanks	1929

438CP	313	NW	Unspecified Tanks	1950
439CP	314	NW	Unspecified Tank	1929
440CQ	319	S	Railway Building	1957
441CO	319	SE	Cuttings	1907
442CR	323	SE	Railway Building	1938
443CQ	323	S	Railway Building	1938
444CQ	323	S	Railway Building	1938
445CR	324	SE	Railway Building	1957
446CR	326	SE	Railway Buildings	1938
447CR	326	SE	Railway Building	1938
448CR	326	SE	Railway Building	1938
449CR	326	SE	Railway Building	1957
450FD	331	NE	Unspecified Heap	1957
451CS	333	SE	Railway Building	1938
452CS	333	SE	Railway Building	1938
453CS	333	SE	Railway Building	1957
454CP	339	NW	Unspecified Tank	1950
455CP	339	NW	Unspecified Tank	1929
456CT	347	NW	Boat Houses	1957
457CT	353	NW	Boat Houses	1929
458CT	353	NW	Boat Houses	1950
459CU	358	NW	Unspecified Tanks	1991
460CU	358	NW	Unspecified Tanks	1983
461CQ	362	SW	Railway Station	1957
462CO	363	S	Railway Station	1938
463CO	363	S	Railway Station	1938
464CO	364	S	Railway Station	1938
465CT	365	NW	Unspecified Warehouse	1991
466CT	365	NW	Boat House	1983
467CT	365	NW	Boat House	1972
468CV	375	NW	Water Works	1950
469CV	379	NW	Unspecified Warehouse	1983
470CV	379	NW	Unspecified Warehouse	1991
471	396	W	Disused Windmill	1938
472CW	396	W	Nurseries	1938
473DA	397	W	Nurseries	1907
474CW	399	W	Nurseries	1938
475FG	402	NE	Unspecified Heap	1950
476CU	422	NW	Unspecified Pit	1907
477CX	431	W	Unspecified Works	1991
478CX	431	W	Unspecified Works	1983
479CY	431	W	Unspecified Works	1957
480	432	W	Unspecified Works	1972
481CY	435	W	Printing Works	1950
482CZ	438	NE	Unspecified Pit	1950
483CZ	438	NE	Unspecified Pit	1929

484CZ	443	NE	Unspecified Heap	1957
485CZ	444	NE	Unspecified Pit	1907
486DA	452	W	Nurseries	1938
487CW	452	W	Nurseries	1957
488	468	SW	Nursery	1907
489DB	479	SE	Nursery	1938
490DB	480	SE	Nursery	1938
491DB	480	SE	Nursery	1938
492DC	481	NW	Unspecified Works	1983
493DC	481	NW	Unspecified Works	1972
494DC	481	NW	Unspecified Works	1991

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical tanks within 500m of the search boundary: 174

ID	Distance (m)	Direction	Use	Date
495W	0	On Site	Gas Works	1909
496Y	0	On Site	Unspecified Tank	1931
497Y	0	On Site	Unspecified Tank	1937
498Y	0	On Site	Unspecified Tank	1892
499Y	0	On Site	Gasometer	1909
500Y	0	On Site	Gas Works	1909
501Y	0	On Site	Gas Works	1892
502W	0	On Site	Unspecified Tank	1937
503W	0	On Site	Gasometer	1909
504W	0	On Site	Gasometer	1892
505W	0	On Site	Unspecified Tank	1931
506Y	0	On Site	Tanks	1937
507Y	0	On Site	Gasometers	1892
508Y	0	On Site	Gasometers	1909
509Y	0	On Site	Tanks	1931
510DD	0	On Site	Unspecified Tank	1909
511AH	0	On Site	Unspecified Tank	1992
512AH	0	On Site	Unspecified Tank	1996
513AH	0	On Site	Unspecified Tank	1993
514AH	0	On Site	Unspecified Tank	1993
515AH	0	On Site	Unspecified Tank	1985
516AH	0	On Site	Unspecified Tank	1992
517AH	0	On Site	Unspecified Tank	1993
518AH	0	On Site	Unspecified Tank	1993

519AH	0	On Site	Unspecified Tank	1996
520AH	0	On Site	Unspecified Tank	1985
521T	0	On Site	Unspecified Tank	1931
522T	0	On Site	Unspecified Tank	1937
523	0	On Site	Unspecified Tank	1931
524G	0	On Site	Unspecified Tank	1909
525	0	On Site	Tanks	1937
526AA	0	On Site	Unspecified Tank	1961
527AA	0	On Site	Unspecified Tank	1960
528V	0	On Site	Unspecified Tank	1975
529V	0	On Site	Unspecified Tank	1986
530V	0	On Site	Unspecified Tank	1988
531AA	0	On Site	Tanks	1961
532AA	0	On Site	Tanks	1983
533AA	0	On Site	Tanks	1993
534AA	0	On Site	Tanks	1993
535AA	0	On Site	Tanks	1960
536AA	0	On Site	Tanks	1983
537AA	0	On Site	Tanks	1961
538AA	0	On Site	Tanks	1993
539AA	0	On Site	Tanks	1993
540AA	0	On Site	Tanks	1961
541DE	0	On Site	Unspecified Tank	1961
542DE	0	On Site	Unspecified Tank	1960
543M	0	On Site	Unspecified Tank	1931
544M	0	On Site	Gasometer	1909
545M	0	On Site	Unspecified Tank	1937
546BH	0	On Site	Unspecified Tank	1961
547M	0	On Site	Unspecified Tank	1962
548M	0	On Site	Unspecified Tank	1961
549BH	0	On Site	Unspecified Tank	1961
550AC	0	On Site	Unspecified Tank	1985
551AC	0	On Site	Unspecified Tank	1985
552AA	0	On Site	Tanks	1980
553AA	0	On Site	Tanks	1980
554W	0	On Site	Gasometer	1891
555Y	0	On Site	Gas Works	1891
556Y	0	On Site	Gasometer	1891
557Y	0	On Site	Gasometer	1891
558Y	0	On Site	Unspecified Tank	1891
559Y	0	On Site	Unspecified Tank	1891
560Y	0	On Site	Unspecified Tank	1891
561Y	0	On Site	Gasometer	1891
562AB	0	On Site	Unspecified Tank	1891
563DD	0	On Site	Unspecified Tank	1891
564G	0	On Site	Unspecified Tank	1891

565P	0	On Site	Unspecified Tank	1891
566DF	0	On Site	Unspecified Tank	1891
567	0	On Site	Unspecified Tank	1891
568DF	3	SE	Unspecified Tank	1891
569AT	8	SE	Unspecified Tank	1891
570BF	17	NE	Unspecified Tank	1891
571	20	SW	Unspecified Tank	1891
572AT	34	SE	Unspecified Tank	1937
573BG	48	SW	Unspecified Tank	1961
574BG	49	SW	Unspecified Tank	1962
575BG	49	SW	Unspecified Tank	1971
576AT	50	SW	Unspecified Tank	1891
577BG	53	SW	Unspecified Tank	1931
578BG	53	SW	Unspecified Tank	1937
579BG	53	SW	Unspecified Tank	1909
580DH	63	SW	Unspecified Tank	1892
581DG	69	N	Unspecified Tank	1985
582DH	74	SW	Unspecified Tank	1891
583BM	74	SW	Unspecified Tank	1937
584BQ	93	SW	Tanks	1971
585BQ	94	SW	Tanks	1987
586DI	94	N	Tanks	1985
587DI	94	N	Tanks	1985
588BP	99	N	Unspecified Tank	1983
589AR	104	SE	Unspecified Tank	1891
590BP	107	N	Tanks	1983
591BM	108	S	Unspecified Tank	1891
592DJ	110	SE	Unspecified Tank	1988
593DJ	110	SE	Unspecified Tank	1970
594DJ	111	SE	Unspecified Tank	1996
595DK	114	N	Tanks	1983
596BK	116	NW	Unspecified Tank	1973
597BK	117	NW	Unspecified Tank	1987
598BK	117	NW	Unspecified Tank	1987
599BK	117	NW	Unspecified Tank	1985
600DK	117	N	Tanks	1983
601BK	125	NW	Unspecified Tank	1973
602BK	126	NW	Unspecified Tank	1987
603BK	126	NW	Unspecified Tank	1987
604	129	SW	Unspecified Tank	1892
605BK	132	NW	Unspecified Tank	1985
606BV	138	SE	Unspecified Tank	1989
607BV	138	SE	Unspecified Tank	1989
608BV	138	SE	Unspecified Tank	1961
609BV	138	SE	Unspecified Tank	1995
610BV	138	SE	Unspecified Tank	1973

611BV	138	SE	Unspecified Tank	1962
612BV	140	SE	Unspecified Tank	1973
613BV	140	SE	Unspecified Tank	1962
614BV	140	SE	Unspecified Tank	1961
615DL	141	NW	Unspecified Tank	1985
616	149	S	Unspecified Tank	1891
617BV	158	SE	Unspecified Tank	1937
618CC	172	NW	Unspecified Tank	1987
619DM	177	NW	Tanks	1985
620DM	182	NW	Unspecified Tank	1892
621DM	182	NW	Unspecified Tank	1931
622CG	192	NW	Tanks	1985
623	198	SE	Unspecified Tank	1891
624	199	N	Unspecified Tank	1891
625CC	207	NW	Unspecified Tank	1987
626DZ	217	SW	Unspecified Tank	1989
627CG	234	NW	Unspecified Tank	1961
628CG	234	NW	Unspecified Tank	1960
629CG	236	NW	Unspecified Tank	1909
630CG	236	NW	Unspecified Tank	1892
631EO	240	SE	Unspecified Tank	1891
632DN	255	SW	Unspecified Tank	1971
633DN	255	SW	Unspecified Tank	1962
634	260	NW	Unspecified Tank	1987
635CP	313	NW	Unspecified Tank	1961
636CP	313	NW	Unspecified Tank	1960
637CP	314	NW	Unspecified Tank	1985
638CP	315	NW	Unspecified Tank	1892
639CP	327	NW	Unspecified Tank	1985
640CP	329	NW	Unspecified Tank	1892
641CP	331	NW	Tanks	1985
642DO	331	N	Unspecified Tank	1931
643DO	331	N	Unspecified Tank	1909
644DO	331	N	Unspecified Tank	1892
645DO	331	N	Unspecified Tank	1937
646	337	E	Unspecified Tank	1891
647CP	350	NW	Tanks	1985
648ET	358	S	Unspecified Tank	1891
649CP	361	NW	Unspecified Tank	1985
650DP	364	N	Unspecified Tank	1976
651DP	364	N	Unspecified Tank	1990
652DP	364	N	Unspecified Tank	1989
653CU	397	NW	Unspecified Tank	1960
654DQ	406	E	Unspecified Tank	1891
655DQ	407	E	Unspecified Tank	1891
656CV	419	NW	Unspecified Tank	1990

657CV	419	NW	Unspecified Tank	1988
658CV	419	NW	Unspecified Tank	1978
659EI	433	W	Tanks	1975
660	445	SW	Unspecified Tank	1981
661DR	446	SW	Unspecified Tank	1996
662DR	446	SW	Unspecified Tank	1981
663DS	450	SE	Unspecified Tank	1962
664DS	451	SE	Unspecified Tank	1961
665	464	N	Unspecified Tank	1891
666	485	S	Unspecified Tank	1931
667	489	NW	Unspecified Tank	1891
668	500	N	Unspecified Tank	1891

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 500m of the search boundary: 114

ID	Distance (m)	Direction	Use	Date
669AA	0	On Site	Electricity Substation	1983
670AA	0	On Site	Electricity Substation	1980
671AA	0	On Site	Electricity Substation	1993
672AA	0	On Site	Electricity Substation	1993
673	0	On Site	Electricity Substation	1986
674DF	0	On Site	Electricity Substation	1975
675DF	0	On Site	Electricity Substation	1988
676M	0	On Site	Gasometer	1909
677M	0	On Site	Electricity Substation	1986
678M	0	On Site	Electricity Substation	1988
679M	0	On Site	Electricity Substation	1975
680W	0	On Site	Gas Works	1909
681Y	0	On Site	Gasometer	1909
682Y	0	On Site	Gas Works	1909
683Y	0	On Site	Gas Works	1892
684W	0	On Site	Gasometer	1891
685W	0	On Site	Gasometer	1892
686W	0	On Site	Gasometer	1909
687Y	0	On Site	Gas Works	1891
688Y	0	On Site	Gasometer	1891
689Y	0	On Site	Gasometers	1909
690Y	0	On Site	Gasometers	1892
691Y	0	On Site	Gasometer	1891