






**Mirrlees Fields, Stockport**  
***Ecological Assessment Report***

**CONFIDENTIAL REPORT**

August 2021

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**Control sheet**

 www.bowlandecology.co.uk	2 York Street, Clitheroe, Lancashire, BB7 2DL  01200 446777	Unit 2 Dye Works, New Lanark, ML11 9DB  01555 438880
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<b>Client:</b>	MAN Energy Solutions UK	
<b>Prepared by:</b>	<i>Dr Ed Mountford, Associate Principal Ecologist &amp; Jodie Marks, Ecologist</i>	
<b>Checked by:</b>	<i>Jeremy James, Director and Principal Ecologist</i>	
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Signed (Author)  	Signed (QA)  	

**Contents**

Executive Summary ..... 1

1. Introduction ..... 3

2. Methods ..... 4

3. Results ..... 9

4. Evaluation and Impact Assessment ..... 17

5. Recommendations ..... 23

References ..... 29

Appendix A – Legal Information ..... 30

Appendix B – Bat Roost Potential and Habitat Suitability Categories ..... 32

Appendix C – Phase 1 and NVC Habitat Plan ..... 33

Appendix D – Grassland Quadrat Data ..... 34

**.....**

Appendix F – Bat Survey Plan ..... 37

Appendix G – Water Vole Survey Plan ..... 38

Appendix H – Invertebrate Survey Plan ..... 39

Appendix I – Breeding Bird Survey Results ..... 40

Appendix J – Bat Transect and Static Detector Results ..... 42

Appendix K – Bat Tree Assessment Results and Photographs ..... 43

Appendix L – Suitable Native Species for Use in Planting Schemes ..... 50

Appendix M – Biodiversity Net Gain Plan ..... 51

Appendix N – Ecological Constraints and Opportunities Plan ..... 52

## Executive Summary

Bowland Ecology Ltd was commissioned by MAN Energy Solutions UK to produce an Ecological Assessment Report for Mirrlees Fields, an area of land in the mainly residential area of Stepping Hill, Hazel Grove, south-east of Stockport (NGR: SJ 908 874).

Key ecological features, potential impacts, and outline mitigation measures are summarised in the following table:

Ecological Feature	Potential Impact	Further Survey	Outline Mitigation
Lady Brook (SBI)	Pollution	N	CEMP
Broadleaved Woodland (HPI)	Potential loss of habitat.	N	Minimise habitat loss; retain and enhance existing woodland. CEMP/LEMP.
Ponds (HPI)	Pollution	N	CEMP. Creation of new ponds and aquatic features, LEMP.
Habitats- Neutral Grassland	Potential loss of habitat.	N	Enhancement of off-site grassland areas and diversification of retained grassland. LEMP.
Habitats - scattered trees	Direct impact - loss of habitat	N	Retention of and the replacement of trees. CEMP/LEMP.
Roosting and foraging bats	Potential loss of roosting and foraging habitat.	Pre-construction surveys.	Pre-works check and supervised felling of moderate potential trees, timed appropriate to avoid bat active season. Installation of bat boxes within retained woodland and new housing. Implementation of a sensitive lighting scheme during and on completion of construction. CEMP/LEMP.
Other mammals	Direct impacts, loss of foraging and refuge habitat.	N	Make contractors aware of possible presence of small mammals including hedgehog. Remove debris and cover excavations at night. CEMP. Improve habitat connectivity, LEMP.
Breeding Birds	Damage and destroy nests, kill and injure nesting birds. Loss of nesting and foraging habitat.	N	Carry out work outside of nesting season (March – August inclusive) or pre-clearance nesting bird check. CEMP. Planting of native species of trees and the provision of alternative nesting opportunities in the form of nest boxes on mature trees. LEMP.
Amphibians	Direct impacts, loss of refuge habitat.	N	Reasonable Avoidance Measures (RAMS), CEMP.
Invertebrates	Direct impacts, loss of refuge and foraging habitat.	N	Creation of wildflower areas and compensatory grassland habitat. LEMP.
Japanese knotweed, Himalayan balsam	Spread of non-native invasive species	N	Implementation of appropriate control measures following best practice guidance. CEMP.

Overall, the proposed development has sought to avoid and minimise impacts to habitats and species, both in the selection of its location within the wider site and its design. This has involved

retaining and enhancing the most valuable wildlife habitats at the site including semi-natural woodland and areas of more species rich grassland. It is anticipated that the proposals can be sensitively planned and undertaken in a way to mitigate against ecological impacts arising from construction activities, including pollution prevention, pre-commencement ecology checks and careful working methods. These measures would be implemented through a Construction Environmental Management (**CEMP**).

Biodiversity losses resulting from the removal of grassland and (to a lesser extent) woodland habitats will also be appropriately compensated for within the wider site. This includes: improving the quality of extensive areas of retained and existing grassland; woodland management, pond/scrape creation, hedgerow creation; improving wildlife connectivity; invasive species management; and installing a range of bird and bat boxes, including innovative wildlife towers. Taken together the proposed habitat enhancement measures will lead to a **Biodiversity Net Gain** as measured (+10.28%) by the DEFRA metric 2.0 calculator. Created and enhanced habitats and species measures would be managed in line with a detailed in a Landscape and Ecological Management Plan (**LEMP**).

## 1. Introduction

- 1.1 Bowland Ecology Ltd has been commissioned by MAN Energy Solutions UK to produce an Ecological Assessment Report for Mirrlees Fields, an area of land located within the residential area of Stepping Hill, Hazel Grove, south-east of Stockport (NGR: SJ 908 874).
- 1.2 Mirrlees Fields is an area of open space comprising meadows and woodland, with scattered trees, ponds and a small watercourse. Historically, it was sub-divided into several fields and used as arable and pasture; during the 20<sup>th</sup> century it acted as a golf course and sports grounds. Prior to closure in 1986, it was a sporting facility for the adjacent factory owned by Mirrlees Blackstone Ltd, which included a golf course, sports pitches, tennis courts, bowling greens and a club house. Today, Mirrlees Fields is privately owned by MAN Energy Solutions and wraps around their headquarters, which are located to the south-east. The site is also bounded by housing and associated allotments to the north-west; the Stockport-Whaley Bridge railway line to the north-east; and a section of disused railway to the south
- 1.3 This Ecological Assessment Report is submitted alongside an outline planning application with all matters reserved proposing the erection of a residential development for up to 200 dwellings, with associated landscaping, site infrastructure and the provision of new public open space. The proposed development area (approximately 7 ha) is located in the south-western section of the site. No development is proposed for the remainder of the fields which are owned by the applicant.
- 1.4 A Preliminary Ecological Appraisal (PEA) of Mirrlees Fields was undertaken by Brooks Ecological Ltd (2017), along with subsequent surveys of [REDACTED], bats, breeding birds, invertebrates, water voles, and grassland vegetation. Further site visits were undertaken by Bowland Ecology Ltd in 2020. The purpose of the updating visits was to make an up to date assessment of the status of baseline ecological conditions.
- 1.5 The methods and findings of the PEA and additional ecological surveys are included in this report, along with an evaluation/summary of key ecological features, potential impacts, and recommended measures for protected species and to mitigate the ecological impacts of the proposed Mirrlees Fields development.
- 1.6 This report has been produced with reference to British Standard BS42020 'Biodiversity Code of Practice for Planning and Development' and the CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland*.

## 2. Methods

- 2.1 The desk study, Phase 1 Habitat survey and the majority of the protected species surveys areas cover the entire Mirrlees Fields site (the combined red-line and blue-line boundaries). The updated survey for bat roost suitability of trees focussed solely on those trees indicated for removal according to current development and arboricultural plans.

### **Desk Study**

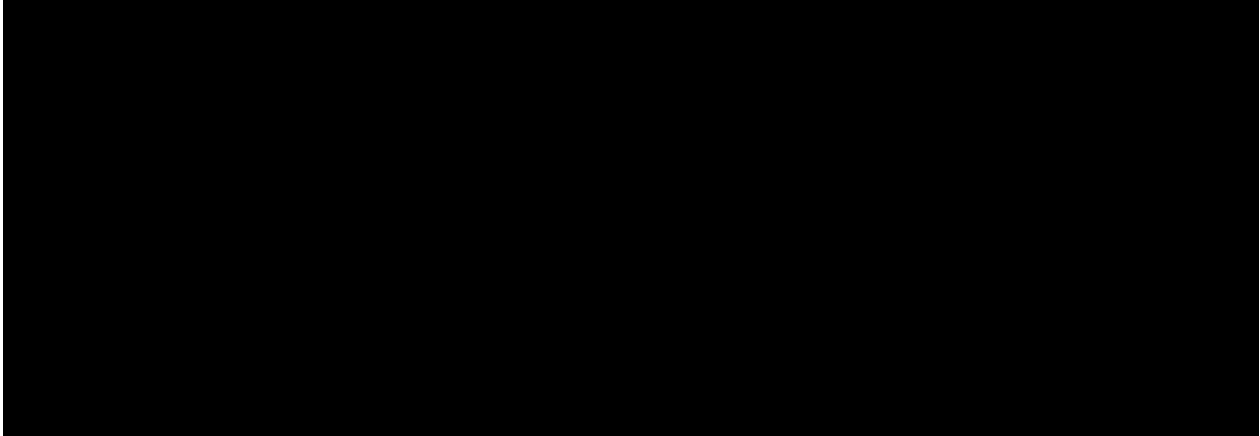
- 2.2 The aim of the desk study was to identify the presence of statutory and non-statutory wildlife sites within the area and any legally protected species or Habitats and Species of Principal Importance (HPI and SPI) for the conservation of biodiversity (Section 41 NERC Act, 2006).
- 2.3 The Multi-Agency Geographic Information for the Countryside (MAGIC) website (<https://magic.defra.gov.uk/>) was reviewed for information on locally, nationally and internationally designated sites of nature conservation importance (statutory sites only) on or within 2 - 10 km of the site.
- 2.4 Local records on and within 2 km for protected species and 10 km for internationally designated sites were obtained following a data search with GMEU (undertaken by Brooks Ecological).
- 2.5 Ordnance Survey (OS) maps and aerial photographs (<http://maps.google.co.uk/maps>) were reviewed to help identify any continuous habitat and any other notable habitats within the surrounding area, together with any ponds within 0.25 km of the site.
- 2.6 Natural England's great crested newt (*Triturus cristatus*) licensing method statement template (Form WML-A14-2 (version December 2015) advises that, for developments resulting in permanent or temporary habitat loss at distances over 0.25 km from the nearest pond, careful consideration should be given to whether a survey is appropriate. Although the species may use suitable terrestrial habitat up to 0.5 km from a breeding pond, in this instance a 0.25 km search radius was considered appropriate due to the small scale of the project (a small site).

### **Preliminary Ecological Appraisal**

- 2.7 The PEA report was produced with reference to British Standard BS42020 'Biodiversity Code of Practice for Planning and Development' and the CIEEM (2013) Guidelines for Preliminary Ecological Appraisal.
- 2.8 The extended Phase 1 habitat survey followed standard methodology (JNCC, 2010 and CIEEM, 2017). The survey covered the whole of the Mirrlees Fields site, including land within both the red-line and blue-line boundaries. All features of ecological significance were target noted. The survey was carried out in June - July 2017 by Brooks Ecological.
- 2.9 This survey methodology records information on the habitats together with any evidence of and potential for legally protected and notable fauna, in particular:
- Assessing the suitability of habitats for other notable and protected species such as nesting birds (including any active or disused nests), reptiles, water vole (*Arvicola amphibius*), otter (*Lutra lutra*), white-clawed crayfish (*Austropotamobius pallipes*), badger (*Meles meles*) and invertebrates;
  - Checking for the most common invasive plant species subject to strict legal control including; Japanese knotweed (*Fallopia japonica*), giant knotweed (*F. sachalinensis*), hybrid knotweed (*F. x bohemica*), giant hogweed (*Heracleum mantegazzianum*), rhododendron (*R. ponticum*, *R. ponticum* x *R. maximum* and *R. luteum*) and Himalayan balsam (*Impatiens glandulifera*);

- assessing the suitability of the habitat for amphibians and for the protected great crested newt.

2.10 Updating site visits were undertaken by Jeremy James, MSc, BSc (Hons), CEcol, CEnv, MCIEEM on 13<sup>th</sup> May 2020 and 13<sup>th</sup> of October 2020. The purpose of the updating visits was to make an up to date assessment of the status of baseline ecological conditions.



### **Bat Survey**

- 2.13 The bat survey aimed to provide evidence of the baseline use of the site by the local bat population, so that an accurate assessment of the potential impacts of development could be made. The scope of the survey was based on an assessment of the habitats present and results of previous surveys undertaken in 2017. It followed best practice guidelines (Bat Conservation Trust (2016) and included transect and remote monitoring surveys from which the following data was collected: (i) the assemblage of bat species using the site and their relative frequency; and (ii) the nature of activity of different bat species, for example foraging, commuting and roosting.
- 2.14 A walked transect was recorded on 18th May 2018, 16th July 2018 and 17th Sept 2018. The route took in a variety of habitats (see Appendix J) and recording involved two separate surveyors, who walked in opposite directions and made regular 'listening stops'. The transects began at sunset and continued up to 2 hours, after which all bats were thought to have emerged and were actively foraging and commuting. During the surveys, invertebrate activity was moderate and weather conditions suitable at each recording (18th May 2018, 14-16°C, dry, cloud cover 20%; 16th July 2018, 16°C, dry, cloud cover 60%; 17th Sept 2018, 16-18°C, dry, cloud cover 90%). Surveyors were equipped with a heterodyne detector and a Titley Scientific Anabat Express, used to track the transect route and aid species identification. Notes taken during the survey were used to produce plans showing the highest areas of bat activity.
- 2.15 Remote monitoring data was collected whilst the walked transects were being recorded. Two static monitoring devices (Wildlife Acoustic SM4's and SMZC's) were deployed in strategic locations, shown in Appendix F. They were left to record overnight between 11-17th May 2018 (7 nights), 10-18th July 2018 (8 nights), and 17-24th September 2018 (7 nights). The data collected was analysed within Kaleidoscope Pro software to identify the bat calls down to species level (except for *Myotis* species). Identification is generally correct using this software, but the results were double checked to ensure accurate analysis. Every effort was made to split *Myotis* calls to species level using analysing calls on Analook software and looking at parameters such as inter-pulse interval, call duration, slope and maximum/minimum/peak call frequency. However, this is often difficult when registrations are short in duration, faint or distorted by cluttered environments. Surveys were directed by Rob Weston BSc (Hons) MSc MIEEM, a Registered Consultant (RC065) under Annex B of

the Bats Mitigation Class License and registered to use the Class Survey Licence WML CL18 (Level 2).

- 2.16 Static monitoring can only reliably provide information on what species of bat are regularly making use of a site. More detailed information on bat activity, such as frequency of bats, nature of activity (foraging, commuting, flight path), etc. can only be gleaned through walked transects. The frequency of calls recorded can, to some extent, suggest whether activity on a site is low, moderate or high, by comparing data collected with that of similar sites. A single registration can account for up to 15 seconds of continuous bat call. Large batches of registrations can be interpreted in several different ways, i.e. a single bat foraging continuously for only an hour can result in many hundreds of registrations being logged; similarly, many hundreds of bats commuting quickly past the detector can result in the same number of registrations.
- 2.17 The updating survey undertaken in May and October 2020 used a visual assessment of potential bat foraging and commuting habitats to make an assessment of any changes to habitats since the surveys in 2018.
- 2.18 Further ground based and aerial inspection of trees for roosting bats was undertaken on the 4<sup>th</sup> September 2020 and the 27<sup>th</sup> October 2020 by Sarah Birtley MBioSci (Hons), ACIEEM and Mark Breaks BSc (Hons) (Bowland Ecology). Surveyors focussed on trees highlighted for removal within the Tree Works Schedule, presented within the Arboricultural Impact Assessment (Urban Green, 2020). The assessment for bat roost suitability was undertaken in line with the British Standard BS8596:2015 'Surveying for bats in trees and woodland – Guide' and Collins (2016). Following the ground based assessment, trees with moderate and above suitability for roosting bats were subject to further survey, aided by tree climbing equipment, torches and an endoscope (Ridgid Micro CA-300). Potential Roost Features (PRFs) were searched for bat field signs, such as bats, bat droppings, urine stains, bat feeding remains (moth wings, insect cases), scratch marks and smoothing of surfaces. The suitability of potential roost features was evaluated based on additional information gained from the aerial inspection, including the internal dimensions and conditions of the PRFs.

### ***Water Vole Survey***

- 2.19 A detailed survey of watercourses was undertaken to assess the status of water vole (or other sensitive riparian fauna) at the site. The location of the watercourses is shown in Appendix G of this report. They were recorded on 24<sup>th</sup> April and 26<sup>th</sup> September 2018, when conditions are considered to be optimal. Standardised methods were utilised (Strachan and Moorhouse 2011), which involved recording and mapping water vole: sightings; tunnel entrances; "lawns"; feeding stations; latrines; waterside paths; runs in vegetation; footprints; and sounds of water vole entering water.
- 2.20 The updating surveys undertaken in May and October 2020 used a visual assessment of watercourse habitats to make an assessment of any changes to habitats and their suitability for water vole.

### ***Breeding Bird Survey***

- 2.21 The survey of breeding birds included three diurnal visits of the site on 10th April 2018, 10th May 2018 and 2nd June 2018. An additional brief walkover visit was made on 14th July 2018. Weather conditions and visibility were good on all visits: cloudy and cool with a light easterly wind and occasional light rain in April; clear, calm, sunny and mild after overnight rain in May; cloudy, mild and dry with light variable wind in June; calm, sunny, warm and dry in July.
- 2.22 Amended visit Common Birds Census (CBC) territory mapping methodology was used to record breeding bird activity. Registrations of all bird species, observed within the site red-line boundary, overflying the site or heard singing and/or calling, were entered onto field

survey maps using standard British Trust for Ornithology (BTO) species and activity codes. The site was walked over to less than 50 m of every point within the red-line boundary and the survey route was reversed accordingly on each visit to alleviate recording bias. Bird registrations within peripheral areas of habitat were also incorporated.

- 2.23 The breeding bird survey visits in April, May and June 2018 were undertaken by John McLoughlin, an experienced ornithologist. The July 2018 walkover survey was undertaken by David Pearce, an experienced consultant ornithologist with 14 years professional experience undertaking ornithological research, bird surveys and monitoring, site and species evaluation, and providing advice on mitigation and habitat enhancement for birds throughout the UK.
- 2.24 The updating surveys undertaken in May and October 2020 used a visual assessment of habitats to make an assessment of any changes in their suitability for breeding birds.

### ***Invertebrate Scoping Survey***

- 2.25 An assessment of invertebrate assemblages and habitats was carried out on 14th May 2018 and 25th August 2018 (Grayson 2018). This involved recording invertebrates using a variety of techniques (see below). The survey aimed to sample a broad range of invertebrates and identify individuals to species-level. It was also necessary to identify any habitats or features of importance if any significant species were found to occur. The timing of sampling event was selected to allow an informed opinion to be made as to the invertebrate value of habitats at Mirrlees Fields. It was not anticipated that any UK Wildlife & Countryside Act Schedule 5 statutorily protected invertebrates would be found or could potentially occur given the habitats and features available. If they were discovered, additional investigation would have been undertaken.
- 2.26 To facilitate sampling and reporting, the site was sub-divided into five compartments: Bramhall North East as Gorse Field (1); Rough Field (2); Outlet (3); Nearer Barley Field (4); and Great Pasture and Pit Field (5). Boundary habitats were included in the results for the five compartments (see Appendix H). For convenience, the survey results from the margins of a track were included in the results for compartments 4 and 5, and the results from the fully-wooded margins of the watercourse were included in those from compartment 1.
- 2.27 Fieldwork techniques were geared towards studying a broad spectrum of invertebrates. The survey methods and protocol were adapted from those recommended by Drake *et al.* (2007). They principally involved recording invertebrates in the field or the collection of invertebrate samples for critical examination. The collecting methods were mainly sweep-sampling using a hand-held net, spot-sampling (principally via a 'pooter' suction device), ground-searching (including looking under stones and other surface debris), and pond-dipping (using a specialized robust small-mesh net). It was not possible to gain access to the two Mirrlees Fields ponds, but other water bodies, such as ditches and temporary pools, were accessible. No light-trapping (using Actinic Light sources) or flight-interception trapping (using vane traps) was carried out, as these activities would only be required if further studies were deemed necessary.
- 2.28 On both recording dates, the entire site was investigated and weather conditions were optimal for recording most invertebrates. Pre-survey visits were made in May and August to ensure late spring-early summer and late summer invertebrate faunas could be satisfactorily covered. The updating surveys undertaken in May and October 2020 used a visual assessment of habitats to make an assessment of any changes in their suitability for invertebrates.

### **Grassland Survey**

- 2.29 The site was surveyed on 6<sup>th</sup> June and 10<sup>th</sup> July 2018 by two highly experienced ecologists (Rob Weston BSc (Hons) MSc, MCIEEM and Peter Brooks BSc (Hons), MA, MCIEEM, CEnv, who had carried out detailed vegetation surveys over many years). Two areas of grassland were identified for surveying; Area A included the large block of grassland in the south west part of the site; Area B include the remaining patches of grassland to the north and east (see Appendix C).
- 2.30 The updating survey undertaken in May 2020 and assessed any changes to grassland habitats since the surveys in 2018.

### **Biodiversity Impact Assessment**

- 2.31 A biodiversity impact assessment for the proposed development area was completed in October 2020. The change in biodiversity is quantified using the Department for Environment, Food and Rural Affairs (DEFRA) Biodiversity Metric (hereafter referred to as the 'Metric'). The Metric (current version 2.0 Biodiversity Metric 2.0 is published as a 'Beta' test version) uses information on on-site and off-site baseline (pre-intervention) habitats and proposed (post-intervention) habitats to calculate the overall change in biodiversity units (Crosher *et al.* 2019a). Individual habitat areas are assigned a score, generated in accordance with the Technical Supplement (Crosher *et al.* 2019b). In-built criteria for baseline habitats comprise habitat area, distinctiveness, condition, strategic significance and connectivity. Post-intervention habitats are also scored based on the above criteria, in addition to the difficulty of creating or restoring habitat and the time taken to reach target condition. Habitat areas were calculated using GIS and a post-intervention plan displays areas of retained, enhanced and creation habitats.

### 3. Results

#### **Statutory and Non-Statutory Wildlife Sites**

- 3.1 The search for nationally or locally designated sites within a 2 km radius and internationally designated sites within a 10 km radius identified a single Local Nature Reserve (LNR), Happy Valley LNR. This is located 1.2 km to the south of the proposed development area and is designated for its woodland, marshy grassland, ponds and streams.
- 3.2 Part of the wider site lies within the SSSI Impact Risk Zone (IRZ) for Cotteril Clough and Lindow Common Site of Special Scientific Interest (SSSI) However, the proposed development does not fall into any of the categories which require consultation with Natural England. Therefore, no further consideration regarding the Impact Risk Zone or SSSI is required.
- 3.3 Four locally designated Sites of Biological Importance (SBI) occur within 2 km of the entire site:
- Chudleigh Close Pond SBI, a fishing lake 0.3 km to the west;
  - Lady Brook SBI, located 1 km to the south-west;
  - Fish ponds at Davenport SBI occur 1.3 km to the south west; and
  - Foggbrook SBI lies 1.9 km to the north east.
- 3.4 The search of MAGIC identified the presence of Lowland Mixed Deciduous Woodland Habitat of Principal Importance (HPI) within the development site boundary.
- 3.5 A review of Ordnance Survey maps and aerial photographs indicates that there are two ponds within the site. The first pond is located along the north-eastern blue-line boundary and the second pond is situated within the red-line boundary, close to the south-western corner of the proposed development area. Two watercourses are also present, of which one flows along the north-west boundary and the northern boundary of the proposed development area. A second watercourse is located along the eastern boundary of the wider site, away from the red-line boundary. Other ditches shown on maps of the site were found to be dry or terrestrialised.

#### **Extended Phase 1 Habitat Survey**

- 3.6 The Phase 1 Habitat plan of the site is presented in Appendix C and includes the locations of the Target Notes (TNs). Plant species nomenclature follows Stace (2010). The updating survey carried out in 2020 confirmed that baseline conditions were similar to previous surveys carried out in 2018. Any notable variation in habitats or species interests between the 2018 and 2020 surveys are described in the following section.

#### **Habitats**

##### Neutral grassland

- 3.7 Neutral grassland covered the majority of the site. Across the whole site, the sward was predominately dominated by common grass species, including common bent (*Agrostis capillaris*), Yorkshire fog (*Holcus lanatus*) perennial rye grass (*Lolium perenne*), crested dog's-tail (*Cynosurus cristatus*), meadow foxtail (*Alopecurus pratensis*) and sweet vernal grass (*Anthoxanthum odoratum*). Forbs made up a considerable part of the community. Frequently these included red clover (*Trifolium pratense*), creeping buttercup (*Ranunculus repens*), meadow buttercup (*Ranunculus acris*), yellow rattle (*Rhinanthus minor*), ribwort plantain (*Plantago lanceolata*), common sorrel (*Rumex acetosa*), lesser stitchwort (*Stellaria graminea*), broad-leaved dock (*Rumex obtusifolius*), bush vetch (*Vicia sepium*) and tufted vetch (*Vicia cracca*). More occasional species included black knapweed (*Centaurea nigra*), spotted/marsh orchids (*Dactylorhiza* sp.), bird's-foot trefoil (*Lotus corniculatus*) and field

horsetail (*Equisetum arvensis*). This type of sward was apparently managed by annual cutting and removal, which had been effective in creating good quality grassland; in places it was relatively forb-rich. Nevertheless, the diversity of forb species was not sufficient for any grassland to qualify under the criteria for Lowland Meadow Habitat of Principal Importance (Natural England 2010).

- 3.8 The composition of the neutral grassland varied according to changes in hydrology, soil type and other factors. Slightly more acidic grassland occurred within the eastern section of the wider site (TN1), where soils were sandier and the grass species finer with fescues (*Festuca* sp.) and bents (*Agrostis* sp.) more conspicuous. A small number of broad-leaved helleborine (*Epipactis helleborine*) plants were found close to the eastern site boundary amongst this vegetation type. Throughout the grassland, wetter areas supported species such as marsh cudweed (*Gnaphalium uliginosum*), redshank (*Persicaria maculosa*), soft rush (*Juncus effusus*) and tufted hair-grass (*Deschampsia cespitosa*), and increased cover of creeping buttercup and creeping bent (*Agrostis stolonifera*). Other, species-poor areas scattered throughout include less managed areas dominated by coarse plants and trampled areas dominated by perennial rye grass (*Lolium perenne*) and greater plantain (*Plantago major*).
- 3.9 Overall, grassland within the proposed development area mainly comprised MG6 *Lolium perenne*-*Cynosurus cristatus* grassland, with some localised pockets of greater diversity (shown as Area A within Appendix C). Areas of better quality grassland were recorded in bands across the northern part of the wider site, which had characteristics of Dry Acid Grassland (U2 *Deschampsia cespitosa* grassland), shown as Area B within Appendix C. Quadrat data is provided in Appendix D.

#### Woodland

- 3.10 Most of the woodland across the whole site was secondary in nature. The oldest stands suggest they may have been planted as part of the old golf course. Canopy species included oak (*Quercus* sp.), goat willow (*Salix caprea*), grey willow (*Salix cinerea*) horse chestnut (*Aesculus hippocastanum*), pine (*Pinus* sp.) and bird cherry (*Prunus avium*). The structure was somewhat poor, with a limited understorey of holly (*Ilex aquifolium*), hazel (*Corylus avellana*), very occasional yew (*Taxus baccata*), and old boundary remnants of hawthorn (*Crataegus monogyna*) and garden privet (*Ligustrum ovalifolium*). The ground flora was relatively sparse, containing species such as male fern (*Dryopteris filix-mas*), enchanter's nightshade (*Circaea lutetiana*), herb bennet (*Geum urbanum*), cleavers (*Galium aparine*) and herb Robert (*Geranium robertianum*).
- 3.11 The woodland appeared to be slightly older in the south-eastern corner of the proposed development area, adjoining the disused railway line (TN2), where there were some older pollard oaks alongside silver birch (*Betula pendula*), and a fern and bracken (*Pteridium aquilinum*) dominated field layer.
- 3.12 Woodland accompanying the watercourse on the western site boundary, adjacent to the proposed development area (TN3), appeared to be the only non-secondary woodland on site. It contained some large oaks and birches (*Betula* sp.), with a better developed understorey with holly, rowan (*Sorbus aucuparia*), hazel (*Corylus avellana*), hawthorn and honeysuckle (*Lonicera periclymenum*), and a field layer which included creeping soft-grass (*Holcus mollis*), climbing corydalis (*Ceratocarpus claviculata*) and raspberry (*Rubus idaeus*).
- 3.13 Towards the north-west corner of the wider site (TN4), a wetter woodland is present, dominated by larger alder (*Alnus glutinosa*) and crack willow (*Salix fragilis*), and a field layer including flote grass (*Glyceria fluitans*), indicative of regular inundation.

### Trees

- 3.14 Beyond the areas of woodland, individual or limited groups of planted trees occurred across the site as a whole. These included recently planted fruit trees (community orchard), recently planted native trees, more established shelter belts of birch, poplar (*Populus* sp.), buddleia (*Buddleia davidii*), hazel, oak and cherry (*Prunus* sp.) against recent development adjacent to the site, and a row of very large hybrid poplars flanking the southern site boundary to the MAN Diesel factory.

### Scrub

- 3.15 Scrub occurred widely where coarser areas of grassland graded into woodland. Characteristic species include bramble (*Rubus fruticosus* agg.), rosebay willowherb (*Chamerion angustifolium*), blackthorn (*Prunus spinosa*), raspberry, creeping thistle and nettle (*Urtica dioica*).

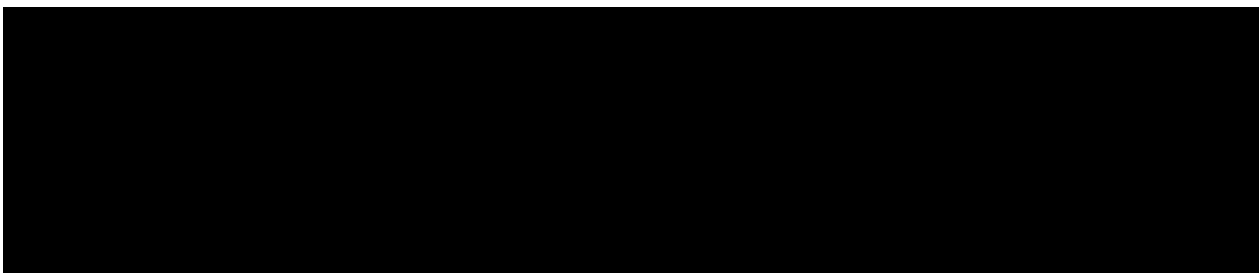
### Ponds and wetlands

- 3.16 Two ponds were recorded within the site as a whole. The first (P1) was a large fishing pond on the north-eastern site boundary, which was regularly used by anglers. It had steep, built-up sides around most of its edges with a 1 m drop in places. The vegetation was largely limited to water lilies (*Nymphaea* sp.) and flag iris (*Iris pseudacorus*). A second, smaller pond (P2) was recorded within woodland in the southern corner of the site, within the proposed development boundary. This was inundated by introduced galingale (*Cyperus longus*), which was concentrated in a large shallow, marshy section of the pond. The pond was partly shaded by surrounding trees, but it did support some floating leaved pond weed (*Potamogeton* sp.).
- 3.17 Evidence of occasional inundation was observed in several other parts of the site, where there was evidence that ponds or ditches had terrestrialised. Here, species such as flag iris, common reed (*Phragmites australis*), redshank (*Persicaria maculosa*), sharp-flowered rush (*Juncus acutifolius*) and soft rush were found. Small distinct depressions within the grassland present to the north seemed likely to be associated with former golf bunkers; some contained small amounts of muddy water, but no distinct wetland vegetation.

### Watercourses

- 3.18 A single, main watercourse was recorded. This arose on the north-western site boundary and flowed to the south-western corner of the site, adjacent to the proposed development area (Appendix C). The channel had been canalised in parts and in places was heavily eroded by walkers and dogs. Elsewhere, it occupied a more natural channel and supported species such as pendulous sedge (*Carex pendula*), hart's-tongue fern (*Asplenium scolopendrium*) and broad buckler-fern (*Dryopteris dilatata*).
- 3.19 A smaller ditch occurred along part of the eastern boundary of the wider site, flowing along an adjacent woodland and roadside. This contained a small flow and was surrounded by woodland and grassland vegetation alongside an adjacent hedgerow and features of introduced garden planting.
- 3.20 Other ditches shown on maps of the site were found to either be dry or terrestrialised.

### **Fauna**





Bats

- 3.25 The search for records of protected and notable species within a 2 km radius of the site returned 17 records of bats, none of which detailed roosts. They included common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*), *Myotis* species, and noctule (*Nyctalus noctula*), the closest being a noctule bat located 200 m from the north-eastern site boundary.
- 3.26 The Phase 1 Habitat Survey recorded a significant amount of tree flanked grasslands, ponds, woodland edges and rides, which provide multiple niches for bat foraging, in all areas of the site. Adjacent railways lines and watercourses connect the site more widely and it appeared likely that bats were commuting through the site. Bat roosting suitability was broadly classified according to the criteria set out by the Bat Conservation Trust (2016) and informed further detailed ground based and aerial tree inspections (see paragraph 3.32 below). There were no buildings present; and tunnels and culverts associated with the western watercourse did not appear to present features other than solid brick or concrete arches with negligible roost suitability.
- 3.27 All bats encountered during the bat transect survey in May 2018 were common pipistrelle, save for a single *Myotis*, likely a Daubenton's (*Myotis daubentonii*) bat, which was identified near to the fishing club pond along the north-eastern boundary. Bats were foraging singly, or occasionally in pairs, around woodland edge habitat throughout the site. Activity was highest across the northern section of the wider site, where old fairways created a complex pattern of woodland edge and around the grown-out hedgerow along Fred Perry Way. Within the proposed development area, bat activity was limited to very occasional records of single common pipistrelles (see Appendix F and Appendix J).
- 3.28 The bats recorded in July 2018 transect survey were all common pipistrelles. Compared to May 2018, activity was lower in the north-west and had increased in the woodland areas to the north-east. Again, activity was primarily associated with the Fred Perry Way corridor and was present sporadically in the southern half of the site (see Appendix F and Appendix J).
- 3.29 The September 2018 bat transect survey also recorded only common pipistrelles. Foraging was recorded mostly around the margins of the site and particularly along railway corridor

to the north-east. Activity within the southern area of the site had increased, but was still relatively low level and focussed on trees around the periphery. See Appendix F for the transect survey plan.

- 3.30 Details of the May, July and September 2018 static bat monitoring results are shown in Appendix F and Appendix J of this report. Table 1 below provides a summary of the registrations: 93% were common pipistrelle, consistent with observations made during the transect surveys; a limited number were attributed to *Myotis* bats (5%) and noctule bats (2%); and only single registrations were attributed brown long-eared and Leisler's bats (summer monitoring, location 1).

Table 1: Static Bat Monitoring Results 2018

Bat species	May	July	Sept	Total
Common pipistrelle	112	116	226	454
Myotis	14	0	10	24
Noctule	10	0	0	10
Leisler's	0	1	0	1
Brown long-eared	0	1	0	1

- 3.31 Numbers of registrations were generally very low. There was a general pattern of higher activity after dusk and before dawn, in line with commonly observed bat activity levels and which may indicate pipistrelle bats roosting in nearby housing. Noctule bat activity was more apparent during the night, suggesting these bats visited the site to forage but probably not for roosting. Apart from the absence of noctule bats in the autumn monitoring, there was no particular seasonal variation in the results.
- 3.32 Following the detailed ground based and aerial assessment of trees carried out in October 2020, the majority of trees within the site subject to removal or pruning were found to be of negligible suitability for roosting bats. Full tree and tree group descriptions and photographs, referenced according to the Arboricultural Impact Assessment (Urban Green 2020), are presented within Appendix . Of the trees surveyed, those assessed as having low suitability for roosting bats comprised T7, trees within the area of G73 and one tree within G9. The two other trees within G9, noted as mature oaks with veteran characteristics, were subject to aerial inspection surveys, with findings detailed in Appendix K. In summary, no evidence of bats was found during the climbing survey, however both trees supported a number of PRFs which are considered to have moderate potential to be used by roosting bats.

#### Water Vole

- 3.33 A single record of water vole was returned from within the 2 km search area. This was from Lady Brook, 1 km to the south west – no further details were given. The location is linked (somewhat tenuously) by a tributary of Lady Brook, which flows out of Mirrlees Fields at the south-western corner, along a green corridor through dense housing.
- 3.34 Flowing water on the site occurs in several discrete channels, which appear to be linked to some degree via culverts. The watercourse habitat recorded during the Phase 1 Survey was of limited value for water voles. There were high levels of disturbance, limited connectivity to other suitable habitat, and only small areas of habitat that provided suitable burrowing and foraging conditions. No evidence of water voles was observed.
- 3.35 The follow-on water vole survey showed that the watercourses at Mirrlees were more natural to the east, occupying channels with relatively steep banks. They were, however, shaded by adjacent woodland and where bordering Barlows Lane South they were impacted by adjacent management. These areas provided marginal habitat for water vole, burrowing being possible, but cover and foraging vegetation were scarce. The small central watercourse, immediately north of the proposed development area, was again heavily shaded and in many parts much affected by trampling by people and dogs. Although there

were some steep earth banks, these tend to be devoid of vegetation, and many parts of the channel were revetted by coursed stone or bag-cast concrete. The lack of significant food and cover and of burrowing opportunities made this area sub-optimal habitat for water vole. The watercourse flowing along the western site boundary, which forms a tributary to Lady Brook, had a slightly wider channel. Although it had engineered banks along much of its length, some sections had more natural earth bank and areas of denser vegetation. This presented better water vole habitat, but was still very disjointed and marginal at best. No physical evidence of water vole or other sensitive or protected riparian species (such as otter) was found during the survey. The droppings and footprints that were discovered were consistent with brown rat (*Rattus norvegicus*).

- 3.36 It was concluded that water vole was likely to be absent from the site (see Appendix G). The engineered and shaded nature of the watercourses provided marginal habitat, which was likely to have been compounded by disturbance from people and dogs. Therefore water vole are no longer considered within this report.

#### Other Mammals

- 3.37 No evidence of hedgehog was found during the Phase 1 Habitat Survey, but the woodland, scrub and grassland areas present throughout the site provide good habitat for this species.

#### Birds

- 3.38 The range of habitats recorded in Phase 1 Habitat Survey meant that the site was likely be of value to a variety of garden/sub-urban birds and, to a lesser extent, woodland species. Some limited suitable foraging habitat might have been present within the ponds and watercourses for kingfisher, which was the only bird species for which records were returned from the search for records within 2 km of the site (it was recorded 1.8 km to the north west of the site).
- 3.39 The three diurnal surveys in April, May and June 2018 survey recorded 36 bird species – see Appendix I. Twenty eight of these showed evidence of breeding behaviour, such as males singing within breeding territories, birds giving territorial calls, adults observed with food for young, and adults observed with recently fledged young or in family groups.
- 3.40 Important breeding bird species recorded included red and amber listed species of conservation concern (red = severe population decline over 25 years/longer term; amber = moderate population decline over 25 years/longer term; as listed in Birds of Conservation Concern 4 (BoCC4) by Eaton *et al.* 2015). Of the 28 species that showed evidence of breeding behaviour, three were red listed species of conservation concern, four were amber listed species of conservation concern, and 20 were green listed species not currently considered of conservation concern. One breeding species, Canada goose (*Branta Canadensis*), was not assessed by BoCC4. No Schedule 1 protected species or rare breeding birds were recorded breeding within the site boundary.
- 3.41 Key breeding bird species recorded on site included, song thrush (*Turdus philomelos*) (5 territories), mistle thrush (*T. viscivorus*) (1 territory) and house sparrow (*Passer domesticus*) (5 pairs), which are all red listed, and dunnock (*Prunella modularis*) (>10 territories) and bullfinch (*Pyrrhula pyrrhula*) (3 territories), which are amber listed. Song thrush territories were widespread across the site and mainly associated with areas of dense scrub and woodland edge habitat. These areas of increased humidity and dampness provide ideal conditions for invertebrates and consequently good foraging opportunities for this species. Dunnock and bullfinch were also associated with these habitats, which provide nesting and foraging opportunities for both species. Mistle thrush was associated with areas of taller trees and utilised open grassland areas for foraging. House sparrow was mainly recorded along the western edge of the site (from adjacent residential housing) and also from scrub bordering the site. Two other amber listed breeding species were recorded: tawny owl (*Strix aluco*) (1 pair) was associated with mature trees; and mallard (1 pair) was present on the pond in the northern part of the site.

- 3.42 The extensive woodland, trees and areas of scrub within the site provided breeding and foraging habitat for a range of more common, green listed breeding bird species. These were well represented throughout the site. The most abundant were wren (*Troglodytes troglodytes*) (> 40 territories), blackbird (*Turdus merula*) (> 25 pairs) and robin (*Erithacus rubecula*) (> 25 territories), with cavity nesting species such as blue tit (*Cyanistes caeruleus*) (> 20 territories) and great tit (*Parus major*) (> 15 territories) also abundant. Summer migrant warbler species were also well represented, with blackcap (*Sylvia atricapilla*) (12 territories) associated with areas of scrub and woodland, and chiffchaff (*Phylloscopus collybita*) (6 territories) mainly recorded from woodland habitat with tall trees and extensive undergrowth. A single nest of Canada goose was recorded on the small pond in the northern part of the site.
- 3.43 There was no evidence that the remaining eight bird species recorded during the surveys were breeding on the site. Grey wagtail (*Motacilla cinerea*), lesser black-backed gull (*Larus fuscus*) and buzzard (*Buteo buteo*) were only recorded over-flying the site. The same applied to swift (*Apus apus*), though it might have been breeding within the eaves of older local housing and using Mirrlees Fields for foraging. The single singing willow warbler (*Phylloscopus trochilus*) in May was most likely a passage migrant. Jackdaw (*Coloews monedula*) and carrion crow (*Corvus corone*) were noted foraging on areas of open grassland and a single adult grey heron (*Ardea cinerea*) was observed on the April visit only. These eight species do not form part of the breeding bird assemblage within the site boundary.

#### Amphibians

- 3.44 No records of amphibians were returned from the search for species records within 2 km of the site. However, the mosaic of woodland and meadows habitats recorded in the Phase 1 Habitat Survey provided an ideal array of foraging opportunities and refugia for amphibians.
- 3.45 Of the two ponds noted during surveys, Pond 2 located within the southern corner was considered the most suitable for amphibian breeding. A further five ponds were found on maps within 500 m of the site. Of these, Ponds 3, 5 and 6 were accessible (Ponds 4 and 7 were on inaccessible private land despite permission being sought). Pond 3 was associated with a modern office block development 220 m east of the southern site boundary. It was connected by a band of trees and a railway line. The margins were flanked by young trees and the pond supported a limited amount of aquatic vegetation, mainly reedmace (*Typha* sp.) and spike rush (*Eleocharis* sp.). Several newts were seen in the centre of the pond; they appeared to be smooth newt based primarily on their size. Pond 5 was located 280 m from the site boundary and was used as angling pond, making it highly unsuited to supporting great crested newts (GCN), although its banks supported some aquatic vegetation and it was potentially of limited value to other amphibians. Pond 6 was 500 m away and immediately flanked by private gardens, meaning that only a partial view of it could be gained. It appeared to have been a historic pond incorporated into the landscaping of the modern houses surrounding it. Some aquatic plant cover was noted, though it may have been stocked with ornamental fish. It was only tenuously connected to the site and an assessment of its capacity to support GCN was considered to not be necessary.
- 3.46 GCN eDNA analysis carried out on Ponds 1, 2 and 3 returned negative results, indicating the species was absent. GCN are therefore not considered further within this report.

#### Invertebrates

- 3.47 The invertebrate survey did not find any statutorily protected invertebrates listed on Schedule 5 of the Wildlife and Countryside Act 1981; any internationally rare and threatened invertebrates listed in The IUCN Red List of Threatened Species; or any JNCC-listed invertebrates (including nationally rare and threatened and nationally scarce species). This was unsurprising, as it seemed unfeasible or extremely unlikely that any such species would occur at Mirrlees Fields.

- 3.48 In addition, no invertebrate SPI were discovered. The expert surveyor noted that, whilst it is quite likely that some of the common and widespread invertebrate SPI (which were listed for research purposes only) could occur at Mirrlees Fields, it is considered extremely unlikely that any significant invertebrate SPI are likely to be present.
- 3.49 The only invertebrates recorded were relatively common or local species. Most of the local species were associated with wetland or woodland-fringe habitats. *Diptera* [flies] were by far the most prolific assemblage, particularly *Syrphidae* [hoverflies] and *Muscoidea* [the group which includes the house fly and its allies]. From an invertebrate viewpoint, the majority of the site consisted of relatively-impooverished meadowland of little invertebrate value. Most of the invertebrate value occurred in the woodland and wetland habitats and associated features; however, even the best examples of these were of no more than secondary importance.

Invasive Species

- 3.50 Two invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act (1981) were recorded during the Phase 1 Habitat Survey: Himalayan balsam and Japanese knotweed. Their approximate locations are shown in Appendix C. Himalayan balsam occurred in low densities in a single location within the wider site, north of the proposed development area. Japanese knotweed was found at two locations along the north-eastern wider site boundary and at one central location, immediately adjacent to the proposed development area.

## 4. Evaluation and Impact Assessment

### *Scheme Proposal*

- 4.1 An assessment of effects on ecological features has been made using the available design and survey information and the professional judgement of the ecologist. This includes a consideration of the relevant legislation (see Appendix A) and planning guidance.
- 4.2 The proposal comprises a residential development for up to 200 dwellings, with associated landscaping, site infrastructure and the provision of new public open space. The development area is located in the south-west section of the site (Appendix C).
- 4.3 The approach to the design of the proposed development has been to avoid and retain the most valuable habitats including woodland and the most species rich areas of grassland. An overview of ecological constraints and opportunities is provided at Appendix N.

### *Statutory and Non-Statutory Sites*

- 4.4 The search for nationally or locally designated sites within a 2 km radius and internationally designated sites within a 10 km radius identified a single site, Happy Valley LNR. Direct impacts to this site from the type of proposed development at Mirrlees can be ruled out, as it located 1.2 km away with a large residential area in between, and the small brook that exits the south-west corner of Mirrlees joins Lady Brook (the stream that flows through Happy Valley LNR) downstream of the reserve boundary (at grid ref SJ8969 8633).
- 4.5 Four locally designated sites (SBI) occur within 2 km of the site. Any development at Mirrlees Fields would not be expected to impact Chudleigh Close Pond, Davenport or Foggbrook SBIs. The closest point to the site boundary of each is respectively 270 m, 1.25 km and 1.75 km; the intervening land is occupied by residential housing and there are no inter-connecting watercourses.
- 4.6 Development at Mirrlees may potentially impact upon Lady Brook SBI, as the small brook that exits the south-west corner of the site is a tributary of Lady Brook. This tributary could carry silt run-off and any other pollutants arising from construction activities.

### *Habitats*

- 4.7 Mirrlees Fields support a sizeable area of semi-natural habitat, including neutral grassland, woodland, trees, scrub, ponds and wetlands, and watercourses. Prior to its current use (private land accessible to the public via footpaths), it was a sporting facility for an adjacent factory. Aerial photographs indicate that when the sports club and grounds closed in 1986, most of the area was covered by grassland used either as playing fields or a golf course. In addition, there were some lengths of relic hedgerow, including a hedgerow that separated the playing field area from the golf course, and which also ran along the lower half of the eastern site boundary – this had been allowed to grow tall and appeared to contain a number of well-grown trees. There were also some scattered smaller trees and shrubs (mainly in the northern section/along boundaries), and some larger trees along the eastern site boundary and in a few locations elsewhere. The site contains many more trees and shrubs today, most of which have grown up over the last 30-40 years. In view of the past uses of the site, only small areas of habitat are relatively mature/old with a relatively high degree of naturalness. This includes some stands of woodland and individual shrubs, mature trees and coppice stools, some of which may be of considerable age.
- 4.8 The small brook across the centre of the site and down the lower part of the north-western boundary, where it has a more natural channel with semi-natural flora (in places it has been canalised and heavily eroded by recreational use), appears to have also originated long

ago. The age and relative naturalness of these features makes them a priority for nature conservation.

4.9 None of the remaining areas of habitat across the site as a whole reach the thresholds required to qualify as Habitat of Principal Importance. Nevertheless, some of them provide additional and complementary habitat that is of local biodiversity value, including:

- Areas of neutral grassland sward across the northern section of the wider site are reasonably rich in forbs and, in places, notable species are present, such as spotted/marsh orchids; in addition, the total area of neutral grassland is relatively large and it shows some valuable variation in composition and structure;
- Remaining areas of woodland;
- Patches of native scrub, which are beneficial to a range of invertebrates, birds, small mammals and other species, also form a valuable ecotone where they fringe adjacent grassland and woodland;
- Individual trees outside of the wooded areas are relatively large, are native species, and/or include suitable habitat for bat roosts and cavity-nesting birds;
- Occasional patches of marshy ground in the north-eastern part of the wider site that support wetland plants and are likely to be beneficial to a range of invertebrates, amphibians and other species;
- Two ponds within the site; and
- A small straight ditch occurs along part of the north-eastern site boundary, along adjacent woodland and hedgerow/roadside, which provides an additional aquatic habitat within a semi-natural setting.

4.10 Overall, the variety of habitats, their semi-natural character and range of associated species, together with the relative scarcity of such sites within the surrounding area, its contribution to local biodiversity networks, and potential to continue to increase in value in the future, makes the Mirrlees Fields site as a whole a significant local biodiversity asset. This applies particularly to the northern section of the site and around the boundaries to the south.

4.11 Potential impacts to habitats can arise during construction and operation. During the construction phase through direct loss, physical damage, severance and pollution (air and water). When operational, likely increases in recreation, disturbance and other pressures from the new housing estate may indirectly impact areas of retained habitat.

4.12 The results of the DEFRA Metric 2.0 calculations are used as a method for assessing impacts to habitats. It should be noted that the Metric is designed to be a practical and consistent approach to help inform decision making, using habitats alone as a proxy for biodiversity. The use of habitat units means that the value of certain species-specific biodiversity gains, such as the installation of artificial bird nest boxes and bat roosting sites detailed below, do not contribute to the Metric's score. Equally, landscaping plans indicate the planting of a number of native hedgerows within the site. However, given that no existing hedgerows will be lost to the proposed development, any new hedgerows cannot be quantified within the current 'Beta' test version of the Metric calculator.

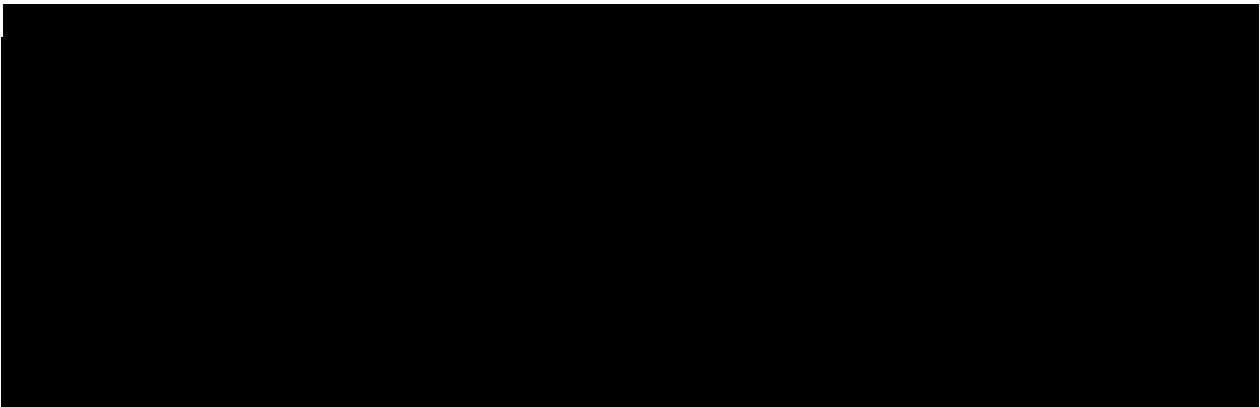
4.13 Table 2 presents the headline results of the Biodiversity Impact Assessment Metric calculation for on-site habitats (within the redline planning application boundary). The value of the biodiversity units for on-site habitats changes from 191.80 (baseline) to 211.52 (post-intervention). Overall, this represents a 10.28% net gain in biodiversity units and is illustrated in Appendix M.

- 4.14 The Metric reflects the loss of a relatively large area (c. 4.41 ha) of neutral grassland in moderate condition (17.64 units). Losses of woodland and scrub habitats are significantly less, totalling 0.3 ha (2.4 units) and 0.39 ha (3.12 units) respectively.
- 4.15 As a result of the decrease in biodiversity units from these habitat losses within the development area, the potential for habitat enhancement within the wider site was considered. Habitat improvements (see Appendix M), aims for woodland enhancement, grassland enhancement, together with a pond and swales, ensuring an overall net-gain in biodiversity (+11.98%).

Table 2: Headline results from the Metric calculation spreadsheet<sup>1</sup>

On-site baseline (units)	On-site post-intervention (units)	Total net unit change	Total net % change (net unit change / on-site baseline units)
<b>191.80</b>	<b>211.52</b>	<b>19.72</b>	<b>+ 10.28</b>

### Species



#### Bats

- 4.18 Observations made during transect surveys and additional monitoring showed that Mirrlees Fields are being used by a standard assemblage of bats. This assemblage is dominated by a relatively small number of common pipistrelles, likely to be roosting in local housing. This is supplemented by very occasional, but regular occurrence of *Myotis* bats (likely to be Daubenton's bats foraging close to Pond 1), occasional foraging by noctule bats in the spring and summer, and very occasional foraging by brown-long eared and Leisler's bats.
- 4.19 Across the site as a whole, bat activity is mostly focussed on the woodland edge habitat, including wooded watercourses and ponds and other wooded peripheries. It is more frequent in the north and east of the site, where there is a mosaic of open and wooded areas. Use of these areas is occasional, sporadic and by single or occasionally two bats. There is some evidence of bats using 'corridors', such as the northern railway line boundary, but even here activity levels are still low.
- 4.20 The assemblage and number of bats recorded is assessed as being of local value. Being a large area of semi-natural habitat in an urban area, the site is likely to be important to a relatively limited, local bat population, which is likely to access it from corridors, such as the

<sup>1</sup> A calculation was also carried out using the recently released DEFRA Metric 3.0 which gave a baseline score of 206.4 units and post intervention score of 247.58 unites. This resulted in a unit change of 41.18 and an overall biodiversity net-gain of 19.95%.

railway line to the north or watercourse to the south, or by flying directly from roosts in nearby housing.

- 4.21 Anticipated impacts to bats arising from the development primarily include disturbance during construction works caused by increased noise, lighting and human presence, as well as direct impacts to roosting bats if present within suitable trees subject to felling or pruning.
- 4.22 Of the trees surveyed, those assessed are having low or moderate suitability for roosting bats that will be potentially impacted (removed or subject to pruning) by the development are:

Tree ref	Bat roost potential
T7	Low
G9 T1	Moderate
G9 T2	Moderate
G9 T3	Low
G73	Low

- 4.23 The loss and modification of suitable foraging habitats and likely increases in disturbance and lighting associated with the new housing estate may also affect foraging and commuting bats.

Birds

- 4.24 The range of habitats present across Mirrlees Fields meant it was likely be of value to a variety of garden/sub-urban birds and, to a lesser extent, woodland species. This was confirmed by the breeding bird surveys, which recorded a high percentage (71%) of more common bird species, and relatively low numbers of breeding bird species of conservation concern. Breeding birds were, nevertheless, widespread. They were mostly recorded within peripheral habitat, in trees, woodland and scrub bordering the railway line and pond in the northern section of the site, from scrub and vegetation along watercourses, and within trees, tree-lines, woodland and scrub elsewhere. Grassland areas provided foraging habitat for several bird species.
- 4.25 The breeding bird assemblage and overall ornithological value of the site is considered to be of local value only. It is typical of sites with a similar range of moderately diverse, semi-natural habitat, and includes few species of conservation concern. However, the assemblage is a significant local biodiversity resource: the range and area of semi-natural habitats across the site provides breeding and foraging habitat for a wide range of bird species; some of the component species, particularly predatory and woodland birds, are likely to have some site dependency; and connectivity across the site from habitat in adjoining gardens within residential housing and fragmented areas of trees and scrub habitat in commercial and industrial sites in the surrounding area.
- 4.26 Impacts on the bird population are likely due to habitat loss and increased disturbance, and particular attention needs to be given the key breeding bird species, which include song thrush, mistle thrush, house sparrow (all red listed bird species of conservation concern), and bullfinch (amber listed bird species of conservation concern). Song thrush and bullfinch breeding territories are mainly associated with areas of dense scrub and woodland edge habitat; mistle thrush is associated with areas of taller trees and open grassland areas for foraging; and house sparrow is mainly found along the western edge (from adjacent residential housing) and scrub bordering the site.
- 4.27 Anticipated impacts from the development on the main ornithological interests primarily include disturbance during construction works caused by increased noise, dust, lighting and human presence, the loss and modification of suitable foraging habitats, and likely increases in disturbance and litter associated with the new housing estate.

Other mammals

- 4.28 Hedgehog was not recorded during the site surveys, but it is likely present and the woodland, scrub and grassland areas represent higher value habitat for hedgehog. This is an SPI under the Natural Environment and Rural Communities (NERC) Act 2006 and should be considered in any development proposals. The NERC Act (2006) places a legal obligation on public bodies in England to have regard to such species which are of the greatest conservation importance whilst carrying out their functions.
- 4.29 The main impact of the proposals is the loss of foraging grassland habitat, in addition to the threat of mortality occurring during the construction phase.

Amphibians

- 4.30 No amphibians were recorded on site, nor were any records returned from within 2 km of the site. However, the mosaic of woodland and meadows provide ideal foraging and refugia habitat for amphibians, and the pond within woodland to the south might be used for breeding. It is quite possible that more common amphibians, such as common frog, common toad and smooth newts, are present. Therefore there is potential for killing and injury of common amphibian species during the construction phase of the development.
- 4.31 No evidence of great crested newt was found, including from eDNA analysis (an excerpt of the results is provided below) of the two ponds on site and another nearby. This indicates that this species is unlikely to be present on site or in the vicinity.

<b>Date sample received at Laboratory:</b>		03/07/2017						
<b>Date Reported:</b>		11/07/2017						
<b>Matters Affecting Results:</b>		None						
<b>RESULTS</b>								
Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates	
33484	KF Stockport, P3	SJ9065187042	Pass	Pass	Pass	Negative	0	
33485	KF Stockport, P4	SJ9087687545	Pass	Pass	Pass	Negative	0	
33486	KF Stockport, P5	SJ9090186928	Pass	Pass	Pass	Negative	0	

Invertebrates

- 4.32 No protected or rare/scarcely/threatened species were found during the invertebrate survey. More significantly, no invertebrate SPI were discovered, and the expert invertebrate surveyor concluded that it was extremely unlikely that any significant invertebrate SPI are present. This was somewhat surprising, given that equivalent surveys of sites similar to Mirrlees Fields would normally be expected to produce at least a few species which have lower-level national conservation status.
- 4.33 Whilst the recorded invertebrate species at Mirrlees are all relatively common or local, the habitats present do some invertebrate value. The grassland areas represent an extensive tract of semi-natural meadowland, which had numerous common grassland invertebrates associated with it. The woodland and individual trees and bushes collectively comprise very useful invertebrate habitat (particularly the woodland margins with dense scrub and ruderal vegetation), and some of the wetland habitats are likely to be of secondary invertebrate

interest (particularly the pond to the south and the seasonally-wet hollowed depression located in the site centre).

Invasive species

- 4.34 Two invasive, non-native plant species listed on Schedule 9 of the Wildlife and Countryside Act (1981) are present within the wider site: Himalayan Balsam and Japanese Knotweed (see Appendix C for approximate locations). The Wildlife and Countryside Act prohibits the introduction into the wild of any species of plant listed on Schedule 9.
- 4.35 Currently invasive species are not present within the proposed development area, however these species may become established on the site in the period between undertaking surveys and commencement of the development. In addition, construction activities that cause ground disturbance can potentially create conditions for the establishment of these species.

## 5. Recommendations

- 5.1 This section provides the required measures to mitigate the impacts of the proposed development. A key element of the National Planning Policy Framework is to minimise impacts to biodiversity and provide enhancements. Paragraph 170 states that ‘Planning policies and decisions should contribute to and enhance the natural and local environment by ... minimising impacts on and providing net gains for biodiversity’. Paragraph 175 also states that ‘when determining planning applications, local planning authorities should...’ encourage “opportunities to incorporate biodiversity improvements in and around developments’.
- 5.2 Key to the protection and enhancement of wildlife as a consequence of the development will be the implementation of: a Construction Environmental Management Plan (**CEMP**) to protect ecological features during construction; and a Landscape and Ecology Management Plan (**LEMP**) to ensure the delivery of ecological mitigation, compensation and enhancement. The LEMP has been designed to take into account the ecological opportunities identified at the site (Appendix N) and the measures that would deliver a measurable Biodiversity Net Gain (Appendix M).

### **Non-Statutory Sites**

- 5.3 To prevent possible impacts to the Lady Brook SBI from run-off, mitigation measures should be taken to prevent silt and any other pollutants from entering any watercourse on site, as detailed in a CEMP. Appropriate pollution control and prevention measures will be applied throughout the construction period. In the absence of any guidance in England it is advised that the information published on the NetRegs website (NetRegs 2018), issued by Scottish Environmental Protection Agency (SEPA) and Northern Ireland Environment Agency (NIEA), is adhered to during the works. The information provided is considered recognised good practice and the most up to date guidance currently provided. Suitable mitigation that can be adopted during site clearance and construction includes:
- Maintaining high standards of housekeeping;
  - Enforcing speed limits on site and dampening down working areas and haul roads in dry periods to prevent dust;
  - Using covered wagons and skips;
  - Storing all materials in a bunded area protected from rainfall and runoff;
  - Vehicle/machinery refuelling at least 10 m from watercourses/drains/ponds and fuel stored in double bunded containers at least 10 m from watercourses/drains/ponds;
  - Drip trays or plant nappies to be used when refuelling and left under stationary machinery;
  - Oil spill kits to be kept on site; and
  - Installation of silt control measures, including silt fencing, cut-off drains and settlement ponds where required.

### **Habitats**

#### Habitats of Principal Importance (HPI)

- 5.4 Habitats of Principal Importance (HPI) at Mirrlees Fields are those that support native semi-natural woodland. Impacts on HPI should be generally avoided or minimised; this has informed selection of the development area, which is dominated by non-HPI habitats. Furthermore, within the red-line boundary, the development plans have sought to minimise woodland loss where possible, with only 0.30 ha of woodland lost and 2.3 ha retained. Where impacts to HPI are unavoidable, appropriate mitigation will be implemented through carefully designed measures.

- 5.5 Measures to ensure the continued protection of retained woodland will be detailed within the **CEMP**. To minimise likely impacts:
- The new housing estate and any associated cycling/pedestrian routes should not extend into or be placed within woodland HPI;
  - Vehicular access roads across woodland HPI should be strictly minimised in number and width;
  - All areas of retained woodland on site and woodland HPI outside of the development boundary should be protected against direct impacts for the duration of the works, with access prohibited for all construction contractors. Where necessary, Root Protection Areas (RPAs) will be established in line with BS 5837: Trees in Relation to Design, Demolition and Construction Recommendations; and
  - Dust, run-off and other pollutants associated with the construction phase and subsequent use of new access roads should be carefully managed to avoid polluting the woodland HPI (see measures outlined above).
- 5.6 In addition, loss of woodland HPI can be compensated for by improving the condition of remaining areas of woodland at Mirrlees. Suitable measures to be set out in the **LEMP** will include:
- Localised planting of appropriate native shrubs,
  - The Introduction of appropriate woodland wildflowers to enhance areas where the ground flora is limited;
  - Implementation of an appropriate cutting/coppicing regime to diversify stand structure;
  - Improving deadwood habitat by retaining cut trees and branches and retaining standing deadwood
  - Recreational use to be managed to prevent excessive trampling and other damage, e.g. using fencing and signage; and
  - Monitoring and clearance of litter or dumped household rubbish or garden waste.
- Neutral grassland
- 5.7 The proposals will result in the loss of neutral grassland habitat. Although the sward in the proposed development area is less species-rich and generally of lower biodiversity value, it has some localised pockets of high diversity and makes a sizable contribution to the total area of grassland. Without mitigation, the loss of this grassland would have a negative impact on biodiversity, which should be minimised and mitigated by:
- Ensuring that all retained areas of grassland outside of the development boundary are protected against direct impacts for the duration of the works, with access prohibited for all construction contractors;
  - Implementing pollution prevention measures, as detailed within paragraph 5.3;
  - Improving the quality of the remaining grassland by adopting an appropriate mowing regime; and
  - Ensuring that measures are taken to enhance the range of plants species in the sward, including sowing or planting of appropriate wildflowers.
- 5.8 Amenity green space within the new housing estate should be sown with appropriate native and ideally locally sourced wildflower and grass mixtures and managed to encourage wildlife. Any recreational use of grassland area in the future should be managed to prevent excessive trampling and other damage.
- 5.9 Compensation for the loss of neutral grassland will also be undertaken through the enhancement of large areas of grassland to the north and north-east of the development boundary. Sowing areas with a native species-rich seed mix, of local provenance will be

carried out and an appropriate management and monitoring regime implemented. All of these measures will be detailed within the **CEMP** and **LEMP**.

### Trees

- 5.10 The proposed layout of the development has sought to minimise tree loss. Trees and tree groups highlighted for removal within the Arboricultural Impact Assessment (Urban Green, 2020) are dominated by single or small clusters of young and early mature trees. However, the proposed access road to the south of the development will impact trees along the woodland edge, due to the associated earthworks.
- 5.11 Retained trees will be protected against direct impacts for the duration of the works, with root protection zones established in line with best practice provided by BS 5837 and the **CEMP**.
- 5.12 To mitigate for losses, compensatory planting and subsequent management of appropriate native trees and shrubs and hedges should be undertaken within the new housing estate (see Appendix L). The measures should be set out in the **LEMP**.

### Ponds

- 5.13 The pond to the south of the site (Pond 2), is of moderate biodiversity value and may be impacted by the development proposals and likely increases in recreation, disturbance and other pressures from the new housing estate. To minimise possible impacts:
- The new access road should be routed as far as is practical away from the pond area;
  - The pond area should be protected against direct impacts for the duration of the works, with access prohibited for all construction contractors;
  - No surface water run-off, dust or other pollutants should be allowed to enter the pond during construction or subsequently from use of the access road;
  - The pond should be screened from the access road by planting of native shrubs; and
  - The pond should be periodically checked for and cleared of any litter or dumped household rubbish or garden waste, and recreational use in the future should be managed to prevent excessive trampling and other damage.
- 5.14 Landscaping plans also include the creation of new ponds, both in the form of temporarily inundated swales throughout the development and ponds managed for wildlife on the edge of the development and within the wider site. The creation and management of ponds should be detailed within a **CEMP** and **LEMP**.

### **Species**

[Redacted]

[Redacted]

- [Redacted]
- [Redacted]

[Redacted]

### Bats

- 5.18 Although the assemblage of species and number of bats is not exceptional and activity is more frequent in the north and east of the site which are exempt from development, the grassy woodland margins, scattered trees, ponds and watercourses within the vicinity of the development area are utilised by foraging bats, and some of the trees offer potential bat roosting capacity.
- 5.19 A **CEMP** will include details of how the construction activities can proceed whilst minimising risk of impacts on bats. This is likely to include the following measures:
- A pre-works survey of moderate suitability trees prior to pruning or felling works (Appendix K). Ecological supervision of tree works will be provided where considered necessary;
  - Felling and pruning of trees will be undertaken between November and March, when bats are considered unlikely to be present (due to the lack of hibernation potential within the trees);
  - Adoption of sensitive lighting during construction, avoiding external lighting of retained woodland areas; and
  - Careful lighting design with respect to the completed development, ensuring areas of marginal bat foraging habitat and created roosting opportunities around the development area are unlit, and that dark areas and corridors are retained to ensure bats can continue to use the site for foraging and commuting.
- 5.20 Details of the compensation measures with respect to bats would be set out in the **LEMP** and would include measures such as:
- The installation of bat boxes on more mature trees appropriate for the species recorded on site; and
  - incorporation of bat friendly features within new houses. These can comprise soffit box access points; gaps under ridge tiles and integrated bat boxes positioned at gable ends.
- 5.21 Provision of new roosting habitat, particularly within the development area will improve wildlife connectivity at the site, as currently this area is an open field that lack structural habitat diversity and bat roosting opportunities.

### Other mammals

- 5.22 Hedgehog is likely to be present on the site. This is an SPI under the NERC Act 2006 and should be appropriately considered in any development proposals. The main impact of the proposals is the loss of foraging grassland habitat, in addition to the threat of mortality occurring during the construction phase.
- 5.23 The **CEMP** will include details of how the works can proceed whilst minimising the risk of impacts on hedgehogs. This is likely to include the following measures:
- A pre-construction check to determine use of the construction site by hedgehogs;
  - As part of the induction advice, all contractors must be made aware of the potential presence of hedgehogs on site; and the protocol should any hedgehogs be encountered within the construction areas; and
  - During works, any trenches or excavations left open over-night will be fitted with a scaffold board or earth ramp providing a means of escape for hedgehogs.

- 5.24 To mitigate the loss of hedgehog grassland foraging habitat, the following measures should be addressed in the **LEMP**:
- Implementing the enhancement measures described above for retained areas of grassland;
  - Ensuring that any existing boundary fencing or proposed fencing for new housing allows for the movement of hedgehogs on and off site and between gardens; and
  - Managing future recreational use of habitat areas to minimise disturbance and damage.

#### Birds

- 5.25 The overall ornithological value of the site is considered to be of local value only, and the redevelopment proposals are focused on the grassland in south-west section of the site, which primarily provides foraging grassland and woodland edge habitat. Even so, impacts on the bird population are likely due to habitat loss and increased disturbance, and particular attention needs to be given the key breeding bird species, which include song thrush, mistle thrush, house sparrow (all red listed bird species of conservation concern), and bullfinch (amber listed bird species of conservation concern). Song thrush and bullfinch breeding territories are mainly associated with areas of dense scrub and woodland edge habitat; mistle thrush is associated with areas of taller trees and open grassland areas for foraging; and house sparrow is mainly found along the western edge (from adjacent residential housing) and scrub bordering the site.
- 5.26 Anticipated impacts from the development on the main ornithological interests primarily include disturbance during construction works caused by increased noise, dust, lighting and human presence, the loss and modification of suitable foraging habitats, and likely increases in disturbance and litter associated with the new housing estate.
- 5.27 The **CEMP** will set out details of how the works could proceed whilst minimising risk of impacts on birds. This is likely to include the following measures:
- Preliminary site works, such as groundworks and unavoidable removal of trees/shrubs, should be completed to avoid disturbance to breeding birds or otherwise include a site breeding bird check to ensure no active nests are present before works commence; and
  - No works will be carried out within 5 m of an identified nest until the young have fledged and are no longer returning to the nest.
- 5.28 Mitigation measures that would need to be detailed in the **LEMP** include:
- Ensuring the loss of marginal bird breeding and foraging habitat around the development area is minimised;
  - Implementing the enhancement measures described above for retained areas of grassland and woodland;
  - Erecting a wide-range of enclosed and open-fronted bird nest-boxes in areas of mature woodland and on isolated trees to provide nest sites for woodland birds;
  - The inclusion of 'wildlife towers', as specified within the landscaping proposals plan, suitable for swifts and house sparrows; and
  - Managing future recreational use of habitat areas to minimise disturbance, trampling and other damage.

#### Amphibians

- 5.29 Although no direct evidence of amphibians was recorded, including from eDNA analysis of great crested newt in the two ponds on site and another nearby, it is quite possible that more common amphibians, such as common frog, common toad and smooth newts, are present and make use of the grassland for foraging and refugia and the pond within woodland to the

south for breeding. The **CEMP** will detail measures to minimise impacts to amphibians during the construction phase, including the following measures:

- Pollution prevention measures with respect to existing ponds and watercourses;
- Vegetation in the construction area will be strimmed prior to commencement of works to a height of 150 mm to encourage displacement of amphibians, followed by strimming to ground level after 48 hours. Short vegetation cover will be retained throughout the duration of works; and
- Any common amphibians encountered during the works will be carefully relocated to an undisturbed location under dense vegetation.

5.30 The proposed woodland and grassland enhancements and wildlife friendly pond and swale creation will provide amphibians with suitable compensatory habitats, managed appropriately in line with the **LEMP**.

#### Invertebrates

5.31 The recorded invertebrate species at Mirrlees are all relatively common or local. Although there are a variety of useful habitats from an invertebrate perspective and impacts will arise from the loss grassland and other habitat areas from the redevelopment, the expert surveyor concluded that the impact of any development on the invertebrate assemblages would be neutral provided that woodland and wetland habitats were retained.

5.32 To mitigate for the loss of invertebrate habitats, the following measures will need to be addressed in the **LEMP**:

- Implementing the enhancement measures described above for retained areas of grassland and woodland; and
- Ensuring future recreational use of retained habitats area is managed to prevent excessive trampling and other damage.

#### Invasive species

5.33 Himalayan Balsam and Japanese Knotweed (non-native plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981) require special treatment. Himalayan balsam was recorded in low densities, away from the proposed development area, and its removal is recommended as a measure to enhance the wider site. Removal of the three areas of Japanese knotweed should be undertaken by a suitably licensed contractor, acting under an Invasive Species Management Plan within the **CEMP** and taking account of the potential for this plant to re-colonise from the railway embankment.

5.34 Updated surveys of both invasive species will inform Management Plans (**LEMP**) and will target the eradication of species from the site.

## References

- Bat Conservation Trust (2016) *Bat Surveys for Professional Ecologists – Good Practice Guidelines*.
- British Standards Institution (2013) British Standard BS42020 '*Biodiversity Code of Practice for Planning and Development*' British Standards Institution, London.
- Bowland Ecology (2020) *Biodiversity Metric 2.0 Mirrlees Fields 11.11.20*.
- CIEEM (2013) *Guidelines for Preliminary Ecological Appraisal*. Chartered Institute of Ecology and Environmental Management, Winchester.
- CIEEM (2017) *Guidelines on Ecological Report Writing*. Chartered Institute of Ecology and Environmental Management, Winchester.
- CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Chartered Institute of Ecology and Environmental Management, Winchester.
- Crosher, I., Gold, S., Heaver, M., Heydon, M., Moore, L., Panks, S., Scott, S., Stone, D. and White, N. (2019a) The Biodiversity Metric 2.0: Auditing and accounting for biodiversity value. User Guide (Beta version, July 2019). Natural England.
- Crosher, I., Gold, S., Heaver, M., Heydon, M., Moore, L., Panks, S., Scott, S., Stone, D. and White, N. (2019b) The Biodiversity Metric 2.0: Auditing and accounting for biodiversity value: Technical Supplement (Beta version, July 2019). Natural England.
- Drake, C. M., Lott, D. A., Alexander, K. N. A. & Webb, J. (2007) Surveying terrestrial and freshwater invertebrates for conservation *evaluation*. Natural England Research Report NERR005. Sheffield: Natural England.
- Eaton, M.A., Aebischer, N.A., Brown, A.F., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A. & Gregory, R.D. 2015. *Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man*. British Birds 108: 708 - 746.
- Grayson, A.(2018) An Invertebrate Scoping Survey of Mirrlees Fields (Stockport). Unpublished report to Brooks Ecological Ltd.
- Greater Manchester Ecology Unit (2016) *Greater Manchester Sites of Biological Importance; Selection Guidelines - 2016 Version 2.0*.
- IEA (1995) *Guidelines for Baseline Ecological Assessment*. Chapman and Hall.
- JNCC (2010) Handbook for Phase 1 Habitat Survey: A technique for environmental audit (reprint). Joint Nature Conservation Committee, Peterborough.
- Natural England (2010) *Higher Level Stewardship Farm Environment Plan (FEP) Manual 3rd Edition*.
- Rodwell, J.S. (ed) (1992) *British Plant Communities Volume 3: Grassland and Montane Communities*. Cambridge University Press.
- Strachan and Moorhouse (2006), *Wolverine Mitigation Handbook*, University of Oxford.

## Appendix A – Legal Information

This report provides guidance of potential offences as part of the impact assessment. This report does not provide detailed legal advice and for full details of potential offences against protected species the relevant acts should be consulted in their original forms.

Species	Legislation	Offences	Notes on licensing procedures and further advice
<b>Species that are protected by European and national legislation</b>			
<b>Bats</b> <i>European protected species</i>	Conservation of Habitats and Species Regulations 2010 Reg 41	Deliberately <sup>1</sup> capture, injure or kill a bat; deliberate disturbance <sup>2</sup> of bats; damage or destroy a breeding site or resting place used by a bat. The protection of bat roosts is considered to apply regardless of whether bats are present.	An NE licence in respect of development is required in England. <a href="https://www.gov.uk/bats-protection-surveys-and-licences">https://www.gov.uk/bats-protection-surveys-and-licences</a> <i>European Protected Species: Mitigation Licensing- How to get a licence</i> (NE 2010) <i>Bat Mitigation Guidelines</i> (English Nature 2004) <i>Bat Workers Manual</i> (JNCC 2004) <i>BS8596:2015</i> <i>Surveying for bats in trees and woodland</i> (BSI, 2015)
	Wildlife and Countryside Act 1981 (as amended) <sup>4</sup> S.9	Intentionally or recklessly <sup>3</sup> obstruct access to any structure or place used for shelter or protection or disturb a bat in such a place.	Licence from NE is required for surveys (scientific purposes) that would involve disturbance of bats or entering a known or suspected roost site.
<b>Birds</b>	Conservation of Habitats and Species (Amendment) Regulations 2012	N/A	Authorities are required to take steps to ensure the preservation, maintenance and re-establishment of a sufficient diversity and area of habitat for wild birds in the United Kingdom, including by means of the upkeep, management and creation of such habitat. This includes activities in relation to town and country planning functions.
	Wildlife and Countryside Act 1981 (as amended) <sup>4</sup> S.1	Intentionally kill, injure or take any wild bird; intentionally take, damage or destroy the nest of any wild bird while that nest is in use or being built; intentionally take or destroy the nest or eggs of any wild bird. <b>Schedule 1 species</b> penalties are liable for these offences involving birds on Schedule 1. Intentionally or recklessly <sup>3</sup> disturb a Schedule 1 species while it is building a nest or is in, on or near a nest containing eggs or young; intentionally or recklessly disturb dependent young of such a species.	No licences are available to disturb any birds in regard to development. Licences are available in certain circumstances to damage or destroy nests, but these only apply to the list of licensable activities in the Act and do not cover development. General licences are available in respect of 'pest species' but only for certain very specific purposes e.g. public health, public safety, air safety. <a href="https://www.gov.uk/wild-birds-protection-surveys-and-licences">https://www.gov.uk/wild-birds-protection-surveys-and-licences</a> <a href="https://www.gov.uk/prevent-wild-birds-damaging-your-land-farm-or-business">https://www.gov.uk/prevent-wild-birds-damaging-your-land-farm-or-business</a>

<b>Great crested newt</b> <i>European protected species</i>	Conservation of Habitats and Species Regulations 2010 Reg 41	Deliberately <sup>1</sup> capture, injure or kill a great crested newt; Deliberate disturbance <sup>2</sup> of a great crested newt; deliberately take or destroy its eggs; damage or destroy a breeding site or resting place used by a great crested newt.	Licences issued for development by NE. <a href="https://www.gov.uk/great-crested-newts-protection-surveys-and-licences">https://www.gov.uk/great-crested-newts-protection-surveys-and-licences</a> <i>European Protected Species: Mitigation Licensing - How to get a licence</i> (NE 2010) <i>Great Crested Newt Mitigation Guidelines</i> (English Nature 2001)
	Wildlife and Countryside Act 1981 (as amended) <sup>4</sup> S.9	Intentionally or recklessly <sup>3</sup> obstruct access to any structure or place used for shelter or protection or disturb a great crested newt in such a place.	Licences issued for science (survey), education and conservation by NE.

<sup>1</sup>Deliberate capture or killing is taken to include "accepting the possibility" of such capture or killing <sup>2</sup>Deliberate disturbance of animals includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or (ii) in the case of animals of hibernating or migratory species, to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species to which they belong. Lower levels of disturbance not covered by the Conservation of Habitats and Species Regulations 2010 remain an offence under the Wildlife and Countryside Act 1981 although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided. Thus deliberate disturbance that does not result in either (a) or (b) above would be classed as a lower level of disturbance. <sup>3</sup>The term 'reckless' is defined by the case of Regina versus Caldwell 1982. The prosecution has to show that a person deliberately took an unacceptable risk, or failed to notice or consider an obvious risk. <sup>4</sup>The Wildlife and Countryside Act (1981) has been updated by various amendments, including the Countryside and Rights of Way Act 2000 and the Natural Environment and Rural Communities Act 2006. A full list of amendments can be found at <http://jncc.defra.gov.uk/page-1377>.

Site Designation	Legislation	Protection	Guidance
<b>Local Sites</b>	There is no statutory designation for Local Sites.	Local Sites are given protection through policies in the Local Development Plan.	Development proposals that would potentially affect a Local Site would need to provide a detailed justification for the work, an assessment of likely impacts, together with proposals for mitigation and restoration of habitats lost or damaged. Further guidance can be found in the National Planning Policy Framework and the accompanying joint Circular (ODPM Circular 6/2005 & Defra Circular 01/2005) to PPS9 for England, which is still valid.

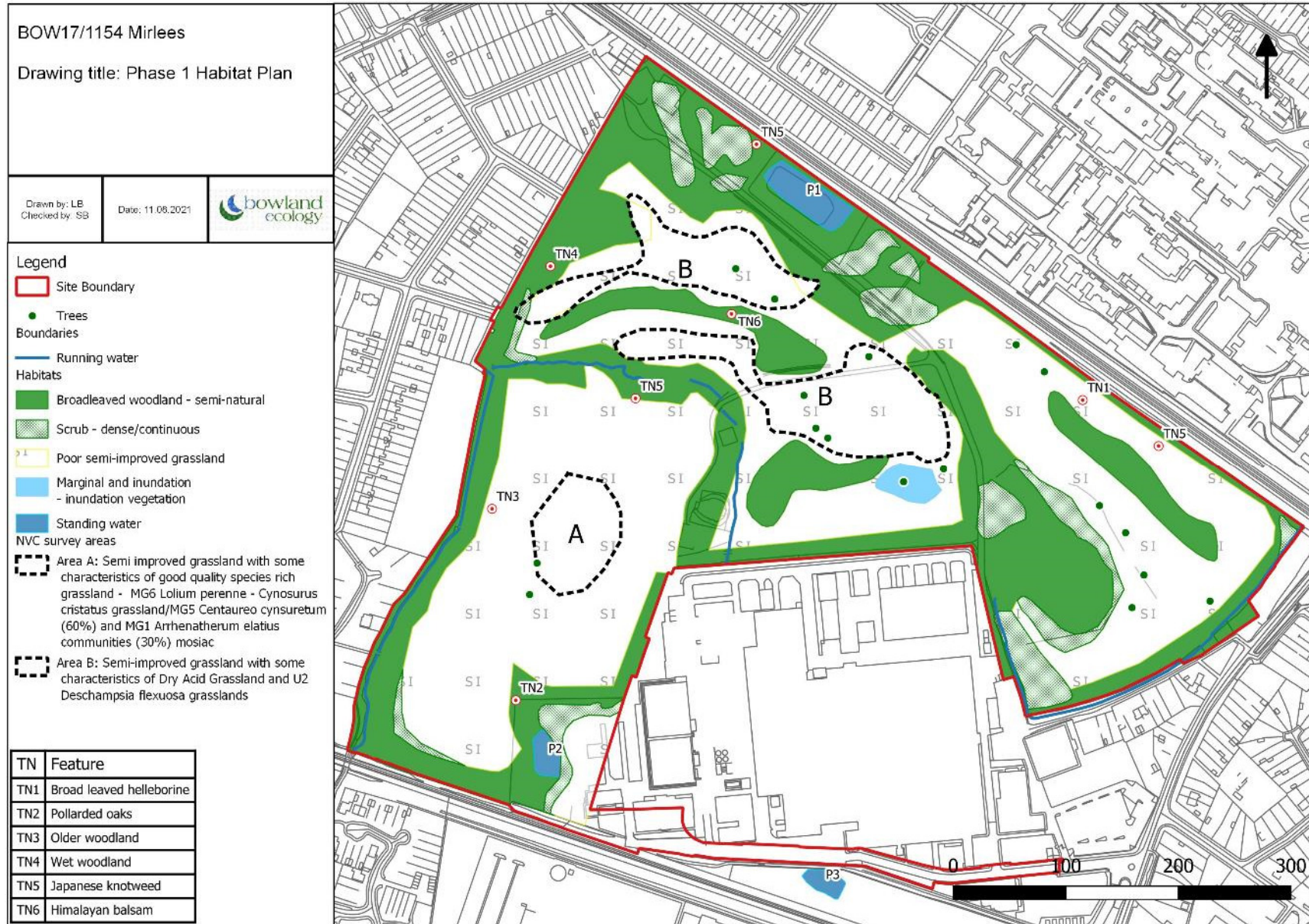
Habitats & Species	Legislation	Guidance
<b>Species and Habitats of Principal Importance for the Conservation of Biodiversity</b>	Natural Environment & Rural Communities Act 2006 S.40 (which superseded S.74 of the Countryside & Rights of Way Act 2000).	S.40 of the NERC Act 2006 sets out the duty for public authorities to conserve biodiversity in England. Habitats and species of principal importance for the conservation of biodiversity are identified by the Secretary of State in consultation with NE, are referred to in S.41 of the NERC Act for England. The list of habitats and species was updated in 2008: <a href="http://webarchive.nationalarchives.gov.uk/20140605090108/http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx">http://webarchive.nationalarchives.gov.uk/20140605090108/http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx</a> The habitats and species listed are not necessarily of higher biodiversity value, but they may be in decline. Habitat Action Plans and Species Action Plans are written for them or are in preparation, to guide their conservation. Ecological impact assessments should include an assessment of the likely impacts to these habitats and species.

## Appendix B – Bat Roost Potential and Habitat Suitability Categories

Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape (Collins, 2016).

Suitability	Description of Roosting Habitat	Commuting & Foraging Habitats
<b>Negligible</b>	Negligible habitat features on site likely to be used by roosting bats	Negligible habitat features on site likely to be used by commuting or foraging bats.
<b>Low</b>	<p>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 habitats to be used on a regular basis or by a larger number of bats (i.e. unlikely to be suitable maternity or hibernation).</p> <p>A tree of sufficient size and age to contain potential roosting features but with none seen from the ground, or feature seen with only very limited roosting potential.</p>	<p>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.</p> <p>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.</p>
<b>Moderate</b>	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions, and surrounding habitat but unlikely to support a roost of high conservation status.	<p>Continuous habitat connected to the wider landscape that could be used by bats for commuting, such as lines of trees and scrub or linked back gardens.</p> <p>Habitat that is connected to the wider landscape that could be used by bats for foraging, such as trees, scrub, grassland or water.</p>
<b>High</b>	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 and surrounding habitat.	<p>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.</p> <p>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.</p> <p>Site is close and connected to known roosts.</p>

## Appendix C – Phase 1 and NVC Habitat Plan



Appendix D – Grassland Quadrat Data

Quadrat data for area of grassland A

Species	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Freq*
<i>Festuca rubra</i> agg.	30	25	2	5	5	5	5	5	10	10	F
<i>Rhinanthus minor</i>	10	10	10	10	2	1	5	0	10	5	F
<i>Plantago lanceolata</i>	10	10	20	15	20	15	10	10	20	20	F
<i>Holcus lanatus</i>	30	25	50	50	2	5	2	5	10	10	F
<i>Anthoxanthum odoratum</i>	1	1	0	1	10	10	10	10	0	0	F
<i>Dactylis glomerata</i>	1	2	5	4	0	0	5	4	5	4	F
<i>Agrostis capillaris</i>	5	5	0	0	2	1	1	2	5	4	F
<i>Arrhenatherum elatius</i>	1	2	1	2	1	2	10	8	0	0	F
<i>Poa trivialis</i>	1	1	0	1	1	0	0	0	2	2	F
<i>Trifolium repens</i>	10	15	0	0	5	4	10	8	0	0	F
<i>Trifolium pratense</i>	5	5	0	0	5	5	10	10	20	10	F
<i>Festuca ovina</i>	0	0	0	0	10	20	10	10	0	0	O
<i>Stellaria graminea</i>	0	0	2	1	0	0	5	4	0	0	O
<i>Cerastium fontanum</i>	0	0	1	1	0	0	5	5	0	0	O
<i>Centaurea nigra</i>	0	0	0	1	5	6	0	0	5	4	F
<i>Scorzoneroideis autumnalis</i>	0	0	0	0	0	0	0	5	5	5	R
<i>Taraxacum vulgare</i> agg.	0	0	0	0	0	0	2	2	0	1	R
<i>Danthonia decumbens</i>	0	0	0	0	2	0	0	0	0	0	R
<i>Senecio jacobea</i>	0	0	0	0	2	0	0	0	0	0	R
<i>Rumex acetosa</i>	0	2	5	0	0	0	0	0	0	0	R
<i>Heracleum sphodylium</i>	0	2	2	0	0	0	0	0	0	0	R
<i>Ranunculus acris</i>	0	0	2	4	0	0	0	0	0	0	R
<i>Hypochaeris radicata</i>	0	0	0	0	0	0	5	5	0	0	R
Bare ground	0	0	0	0	10	5	2	2	20	25	

\* Frequent species (F) occur in more than 5 of ten stops, Occasional (O) occur in 3-4 stops and Rare species (R) in only 1-2.

NVC data for area A

	Q1	Q2	Q3	Q4	Q5	F	
<b>Community constants</b>							
<i>Festuca rubra</i> agg.	6	2	4	4	4	v	
<i>Rhinanthus minor</i>	4	4	3	4	4	v	
<i>Plantago lanceolata</i>	4	5	5	4	5	v	
<i>Holcus lanatus</i>	6	7	3	4	4	v	
<b>Common species</b>							
<i>Arrhenatherum elatius</i>	1	2	3	4		iv	
<i>Trifolium pratense</i>	4		4	4	5	iv	
<i>Anthoxanthum odoratum</i>	1		4	4		iii	
<i>Dactylis glomerata</i>	1	4		4	4	iii	
<i>Agrostis capillaris</i>	4		3		4	iii	
<i>Poa trivialis</i>	1		1		2	iii	
<i>Trifolium repens</i>	4		4	4		iii	
<b>Occasional species</b>							
<i>Festuca ovina</i>			4	5		ii	
<i>Stellaria graminea</i>		3		4		ii	
<i>Cerastium fontanum</i>		1		5		ii	
<i>Centaurea nigra</i>			4		4	ii	
<i>Scorzoneroideis autumnalis</i>				5	5	ii	
<b>Scarce species</b>							
<i>Taraxacum vulgare</i> agg.				3		i	
<i>Danthonia decumbens</i>			1			i	
<i>Senecio jacobea</i>				1		i	
<i>Rumex acetosa</i>		1				i	
<i>Heracleum sphodylium</i>		1				i	
<i>Ranunculus acris</i>		1				i	
<i>Hypochaeris radicata</i>						i	
Quadrat number columns refer to the Domin percentage cover score for each species within each quadrat. The last column in the table is the frequency of occurrence of species in quadrats							
1	Few Individuals;					I	1 – 20%;
2	Several Individuals;					II	21 – 40%;
3	Many Individuals;					III	41 – 60%;
4	4 – 10%;					IV	61 – 80%;
5	11 – 25%;					V	81 – 100%.
6	26 – 33%;						
7	34 – 50%;						
8	51 – 75%;						
9	76 – 90%;						
10	91 – 100%.						

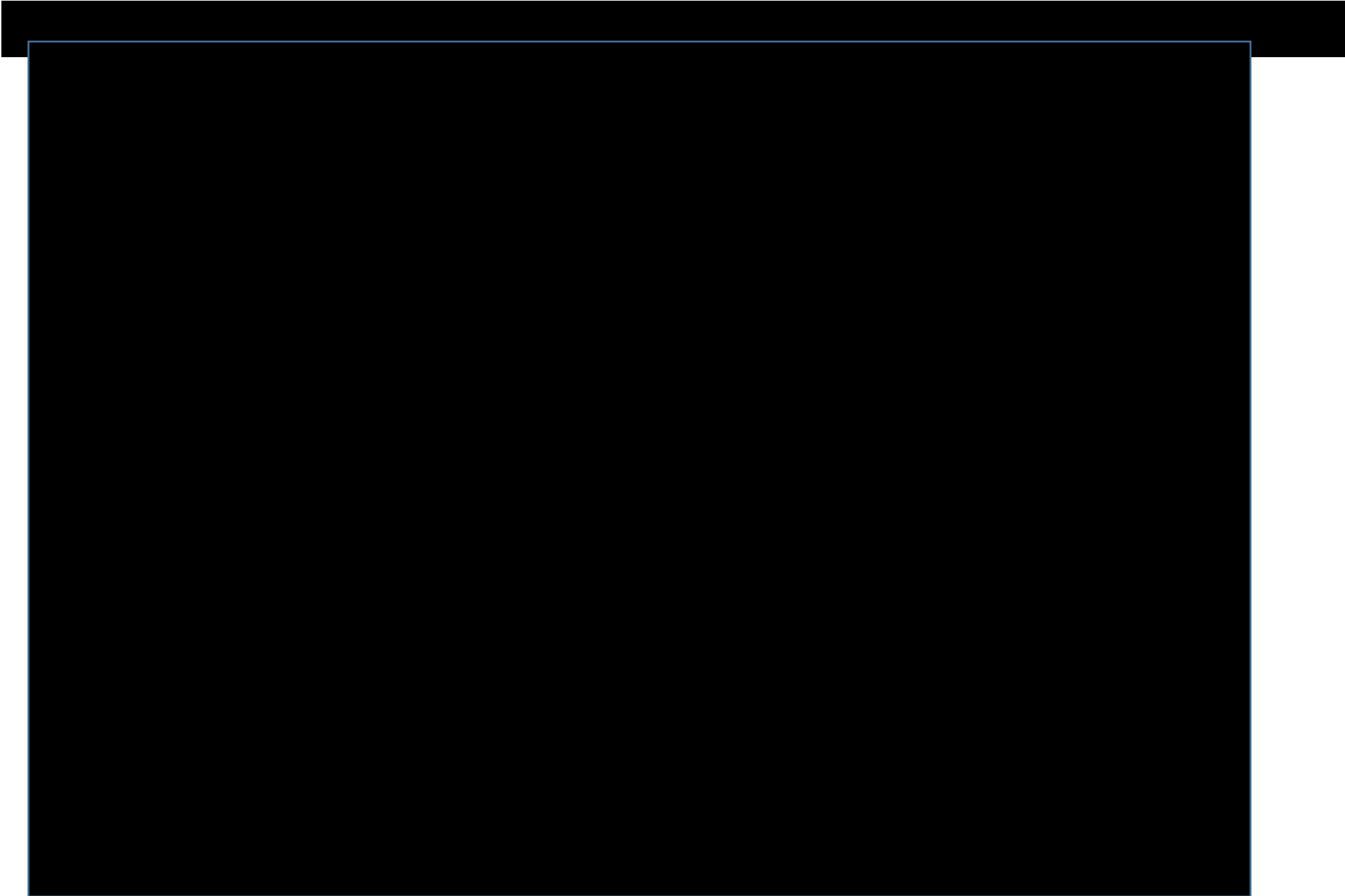
Quadrat data for area of grassland B

Species	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Freq*
<i>Deschampsia flexuosa</i>	20	25	2	2	20	5	10	5	10	10	F
<i>Carex ovalis</i>	10	10	60	55	15	10	0	0	30	30	F
<i>Holcus lanatus</i>	15	10	0	5	30	20	10	10	0	0	F
<i>Agrostis capillaris</i>	60	50	0	0	0	0	30	30	20	30	F
<i>Holcus mollis</i>	0	0	0	0	30	20	10	10	20	10	F
<i>Rhynchospora squarrosa</i>	0	0	0	0	10	10	20	10	10	0	F
<i>Agrostis stolonifera</i>	5	0	0	0	0	0	0	0	0	0	R
<i>Juncus effusus</i>	0	5	0	0	0	0	0	0	0	0	R
<i>Acer pseudoplatanus</i>	0	0	0	1	0	0	0	0	0	0	R
<i>Lolium perenne</i>	0	0	5	0	2	0	0	0	0	0	R
<i>Deschampsia cespitosa</i>	0	0	0	0	0	0	5	2	0	0	R
<i>Galium saxatile</i>	0	0	0	0	0	2	3	2	0	0	O
<i>Rumex acetosa</i>	0	0	0	0	0	0	0	0	0	2	R
<i>Ranunculus acris</i>	0	0	0	0	0	0	0	2	0	0	R
Bare ground	0	0	0	0	0	0	5	0	20	20	

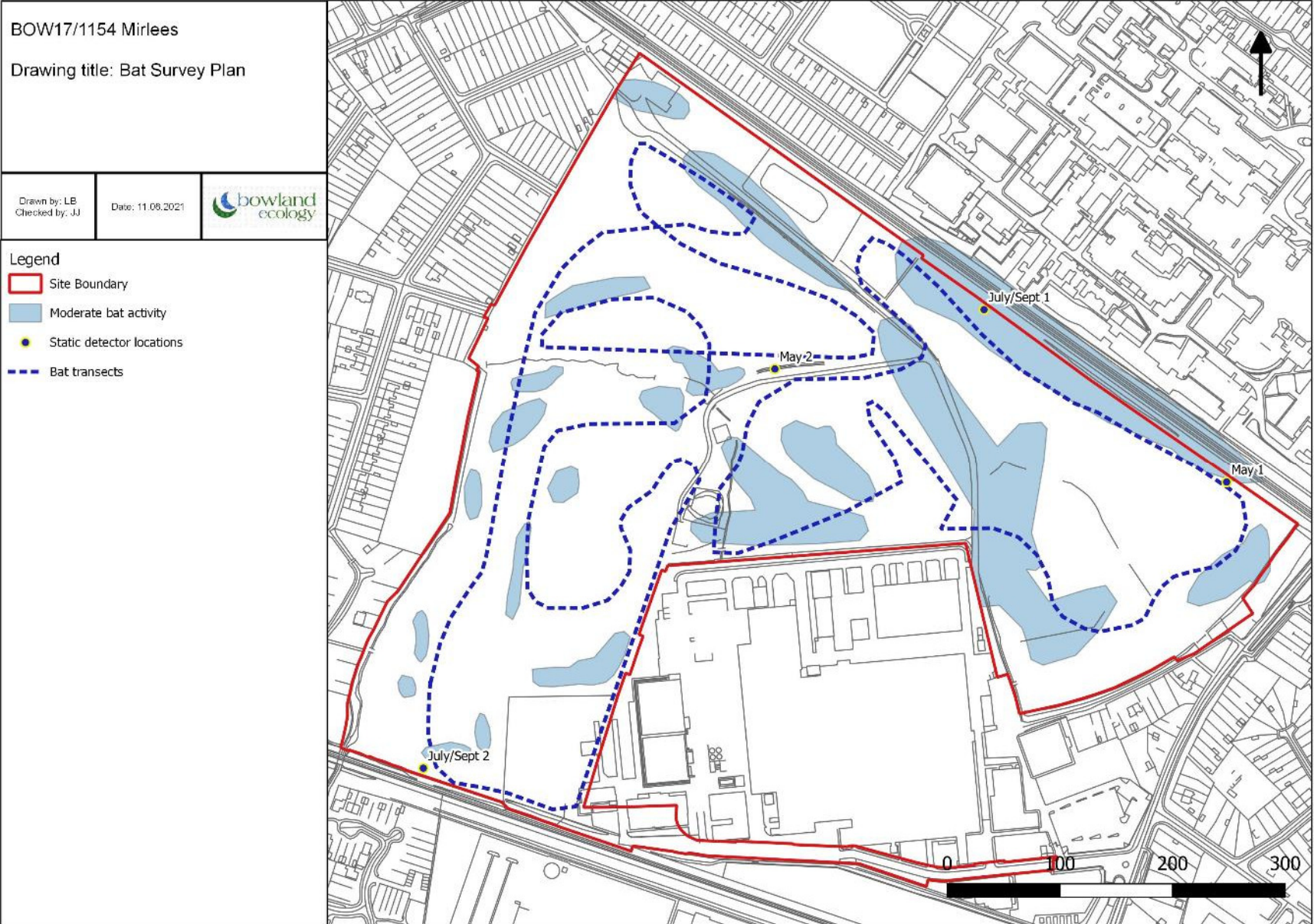
\* Frequent species (F) occur in more than 5 of ten stops, Occasional (O) occur in in 3-4 stops and Rare species (R) in only 1-2.

NVC data for area B

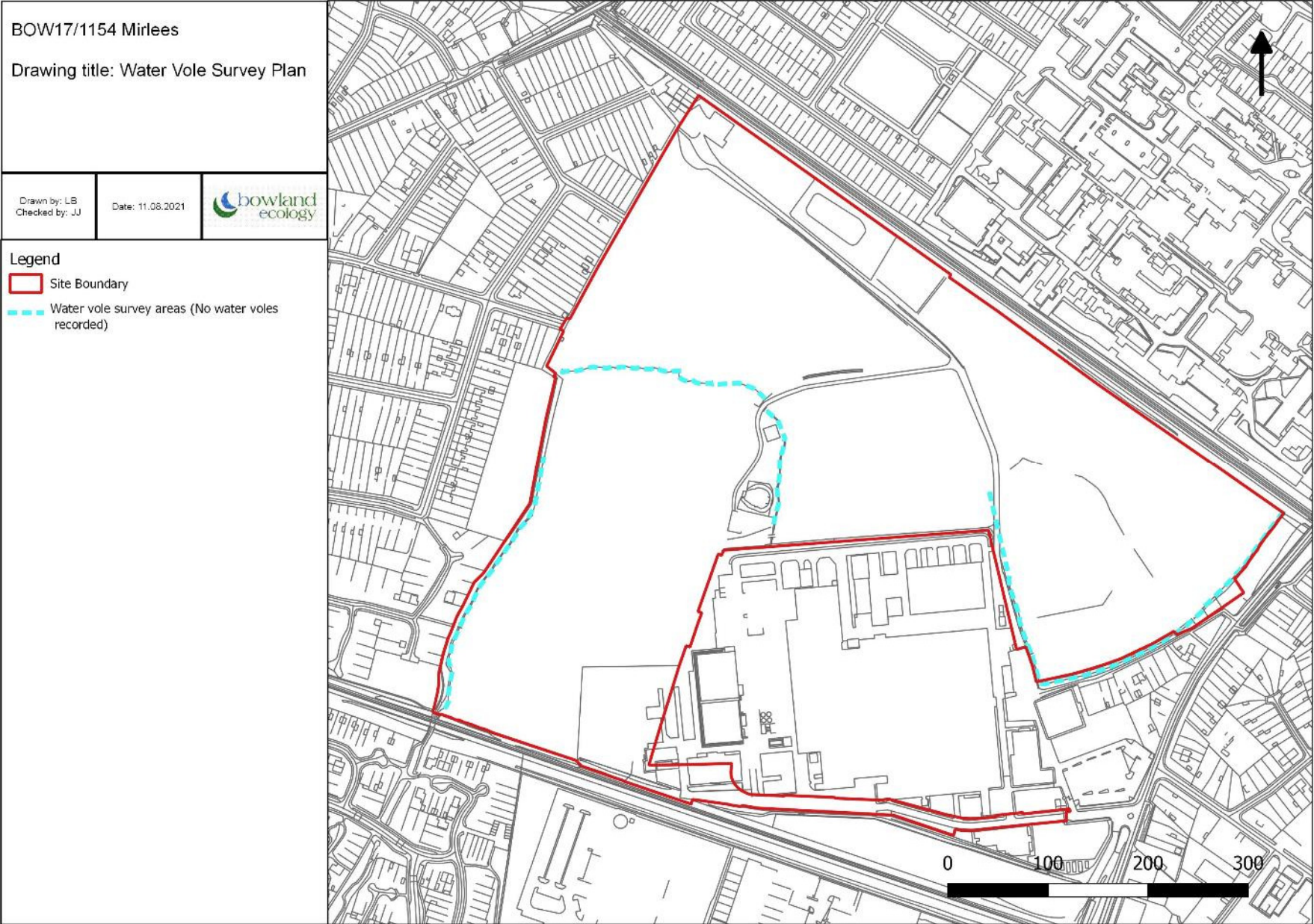
	Q1	Q2	Q3	Q4	Q5	F																																
<b>Community constants</b>																																						
<i>Deschampsia flexuosa</i>	5	3	5	4	4	v																																
<b>Common species m</b>																																						
<i>Carex ovalis</i>	4	8	4		6	iv																																
<i>Holcus lanatus</i>	5		6	4		iii																																
<i>Agrostis capillaris</i>	8			6	6	iii																																
<i>Holcus mollis</i>			6	4	4	iii																																
<b>Occasional species</b>																																						
<i>Rhynchospora squarrosa</i>			4	5		ii																																
<b>Scarce species</b>																																						
<i>Agrostis stolonifera</i>	1					i																																
<i>Juncus effusus</i>	1					i																																
<i>Acer pseudoplatanus</i>		1				i																																
<i>Lolium perenne</i>		3				i																																
<i>Deschampsia cespitosa</i>				4		i																																
<i>Galium saxatile</i>				2		i																																
<i>Rumex acetosa</i>		1			1	i																																
<i>Ranunculus acris</i>		1				i																																
Quadrat number columns refer to the Domin percentage cover score for each species within each quadrat. <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <table border="0"> <tr><td>1</td><td>Few Individuals;</td></tr> <tr><td>2</td><td>Several Individuals;</td></tr> <tr><td>3</td><td>Many Individuals;</td></tr> <tr><td>4</td><td>4 – 10%;</td></tr> <tr><td>5</td><td>11 – 25%;</td></tr> <tr><td>6</td><td>26 – 33%;</td></tr> <tr><td>7</td><td>34 – 50%;</td></tr> <tr><td>8</td><td>51 – 75%;</td></tr> <tr><td>9</td><td>76 – 90%;</td></tr> <tr><td>10</td><td>91 – 100%.</td></tr> </table> </td> <td style="width: 50%; vertical-align: top;"> <table border="0"> <tr><td>I</td><td>1 – 20%;</td></tr> <tr><td>II</td><td>21 – 40%;</td></tr> <tr><td>III</td><td>41 – 60%;</td></tr> <tr><td>IV</td><td>61 – 80%;</td></tr> <tr><td>V</td><td>81 – 100%.</td></tr> </table> </td> </tr> </table>							<table border="0"> <tr><td>1</td><td>Few Individuals;</td></tr> <tr><td>2</td><td>Several Individuals;</td></tr> <tr><td>3</td><td>Many Individuals;</td></tr> <tr><td>4</td><td>4 – 10%;</td></tr> <tr><td>5</td><td>11 – 25%;</td></tr> <tr><td>6</td><td>26 – 33%;</td></tr> <tr><td>7</td><td>34 – 50%;</td></tr> <tr><td>8</td><td>51 – 75%;</td></tr> <tr><td>9</td><td>76 – 90%;</td></tr> <tr><td>10</td><td>91 – 100%.</td></tr> </table>	1	Few Individuals;	2	Several Individuals;	3	Many Individuals;	4	4 – 10%;	5	11 – 25%;	6	26 – 33%;	7	34 – 50%;	8	51 – 75%;	9	76 – 90%;	10	91 – 100%.	<table border="0"> <tr><td>I</td><td>1 – 20%;</td></tr> <tr><td>II</td><td>21 – 40%;</td></tr> <tr><td>III</td><td>41 – 60%;</td></tr> <tr><td>IV</td><td>61 – 80%;</td></tr> <tr><td>V</td><td>81 – 100%.</td></tr> </table>	I	1 – 20%;	II	21 – 40%;	III	41 – 60%;	IV	61 – 80%;	V	81 – 100%.
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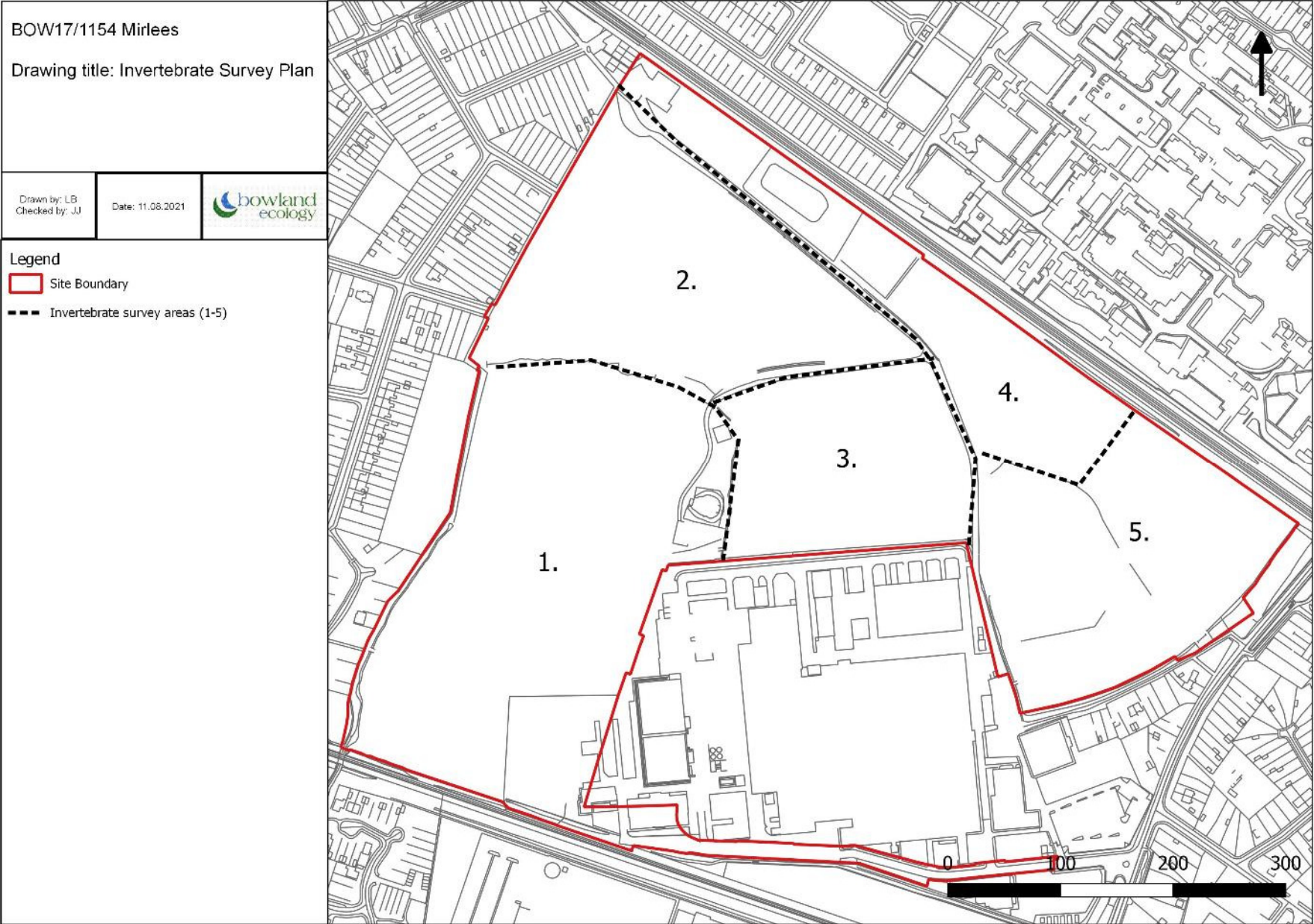
# Appendix F – Bat Survey Plan



# Appendix G – Water Vole Survey Plan



# Appendix H – Invertebrate Survey Plan



## Appendix I – Breeding Bird Survey Results

Table H1: Breeding Bird Status Classification

<b>Possible breeder</b>	Species observed in breeding season in suitable nesting Habitat
	Singing male present (or breeding calls heard) in breeding season in suitable breeding habitat
<b>Probable breeding</b>	Pair observed in suitable nesting habitat in breeding season
	Permanent Territory presumed through registration of territorial behaviour (song etc) on at least two different days a week or more apart at the same place or many individuals on one day
	Courtship and Display (judged to be in or near potential breeding habitat; be cautious with wildfowl)
	Visiting probable Nest site
	Agitated behaviour or anxiety calls from adults, suggesting probable presence of nest or young nearby
	Brood patch on adult examined in the hand, suggesting Incubation
	Nest Building or excavating nest-hole
<b>Confirmed breeding</b>	Distraction-Display or injury feigning
	Used Nest or eggshells found (occupied or laid within period of survey)
	Recently Fledged young (nidicolous species) or downy young (nidifugous species). Careful consideration should be given to the likely provenance of any fledged juvenile capable of significant geographical movement. Evidence of dependency on adults (e.g. feeding) is helpful. Be cautious, even if the record comes from suitable habitat.
	Adults entering or leaving nest-site in circumstances indicating Occupied Nest (including high nests or nest holes, the contents of which cannot be seen) or adults seen incubating
	Adult carrying Faecal sac or Food for young
	Nest containing Eggs
	Nest with Young seen or heard

Table H2: Birds recorded during breeding bird surveys, 2018

BTO code	Species	Scientific Name	Number of Territories		Breeding Status	BoCC	NERC
			Visit 1	Visit 2			
B.	blackbird	<i>Turdus merula</i>	3	4	Probable	Green	
BC	blackcap	<i>Sylvia atricapilla</i>	6	7	Probable	Green	
BT	blue tit	<i>Cyanistes caeruleus</i>		6	Confirmed	Green	
BF	bullfinch	<i>Pyrrhula pyrrhula</i>	1	3	Possible	Amber	
C.	carrion crow	<i>Corvus corone</i>		1	Confirmed	Green	
CH	chaffinch	<i>Fringilla coelebs</i>	2	3	Probable	Green	
CC	chiffchaff	<i>Phylloscopus collybita</i>	3	3	Probable	Green	
D.	dunnock	<i>Prunella modularis</i>		4	Probable	Amber	S41
GO	goldfinch	<i>Carduelis carduelis</i>	1	3	Probable	Green	
GT	great tit	<i>Parus major</i>	2	3	Confirmed	Green	
G.	green woodpecker	<i>Picus viridis</i>		1	Possible	Green	
P.	grey partridge	<i>Perdix perdix</i>	1		Possible	Red	S41
J.	jay	<i>Garrulus glandarius</i>	1		Possible	Green	
K.	kestrel	<i>Falco tinnunculus</i>		1	Non	Amber	
LT	Long-tailed tit	<i>Aegithalos caudatus</i>	2	1	Confirmed	Green	
MG	magpie	<i>Pica pica</i>	1	2	Possible	Green	

MA	mallard	<i>Anas platyrhynchos</i>	1		Possible	Amber	
PH	pheasant	<i>Phasianus colchicus</i>		1	Possible	Green	
RB	reed bunting	<i>Emberiza schoeniclus</i>	2	5	Probable	Amber	S41
RW	reed warbler	<i>Acrocephalus scirpaceus</i>	2	2	Probable	Green	
R.	robin	<i>Erithacus rubecula</i>	9	5	Probable	Green	
S.	skylark	<i>Alauda arvensis</i>	2	2	Probable	Red	S41
SG	song thrush	<i>Turdus philomelos</i>	1	1	Possible	Red	
SD	stock dove	<i>Columba oenas</i>		2	Possible	Amber	
WH	whitethroat	<i>Sylvia communis</i>	2	6	Probable	Green	
WT	willow tit	<i>Poecile montanus</i>		1	Possible	Red	S41
WW	willow warbler	<i>Phylloscopus trochilus</i>	21	20	Probable	Amber	
WP	woodpigeon	<i>Columba palumbus</i>		3	Possible	Green	
WR	wren	<i>Troglodytes troglodytes</i>	7	8	Confirmed	Green	

## Appendix J – Bat Transect and Static Detector Results





Table I1: Bat Transect Results




Visit (Date)	Time	Species Recorded	Notes
Visit 1: 16/05/18	21:34	Noctule	Commuting
	21:36	Noctule	Commuting
	21:41	Noctule	Commuting
	21:52	Noctule	Commuting
	21:49	Common pipistrelle	Foraging
	22:18	Common pipistrelle	Foraging
	22:32	Soprano pipistrelle	Foraging
	22:56	Common pipistrelle	Foraging
	22:34	Myotis bat	Foraging



Table I2: Static Bat Detector Results




Month	Date	Bat species recorded and number of passes per recording period				
		Common pipistrelle	Soprano pipistrelle	Noctule	<i>Myotis sp.</i>	Brown long-eared
Location 1						
May	17/05/2018	15	0	9	7	0
	18/05/2018	22	2	1	12	0
	19/05/2018	42	5	5	15	1
	20/05/2018	22	2	8	8	1
	21/05/2018	14	6	6	9	0
June/July	Detector error, no recordings made					
August	01/08/2018	0	3	17	1	0
	02/08/2018	0	1	7	1	0
	03/08/2018	1	2	8	0	0
	04/08/2018	0	1	3	0	1
	05/08/2018	1	0	14	0	0
September	26/09/2018	0	1	23	3	0
	27/09/2018	0	1	3	3	0
	28/09/2018	0	0	2	3	0






## Appendix K – Bat Tree Assessment Results and Photographs





Tree ref	Description	Photo	Bat roost potential
T1	Category B goat willow located at base of embankment; stem is occluding the concrete fence post. No PRFs present.		Negligible
T2	Category B oak. Early-mature tree with no PRFs present.		Negligible
T3	Category B oak. Early-mature tree with no PRFs present.		Negligible
T4	Category B oak. Early-mature tree with no PRFs present.		Negligible
G5 & G6	Category B oak, birch and goat willow. All young with no PRFs.	N/a	Negligible


T7	<p>Category A mature oak, single stemmed with a cluttered canopy. Shallow wounds are present on several branches, however suitability of all PRFs is negligible to low. Not subject to further aerial inspection. Veteran tree assessment completed.</p>		Low
T8	<p>Category B mature oak by fence line at base of embankment. Shallow linear wound on limb and inspected at ground level. No suitable cavities or other PRFs present.</p>		Negligible
G9 T1	<p>Category A mature oak with an extensive cavity and associated deadwood along the main stem, from ground level to 8 m (possibly caused by a lightning strike). PRFs comprise callous rolls and desiccation crevices. A further aerial inspection was completed.</p> <p><u>PRF: Deadwood</u> Abundant deadwood is present in the canopy and wraps around the living sections of the main stem. Plates of lifted deadwood were inspected, however suitably sheltered cracks and crevices are limited.</p> <p><u>PRF: Small cavities in main stem</u> Two small holes are present in the heartwood of the main stem, which lead to small rounded cavities, extending no more than 10 cm, with entrance dimensions of 5 cm by 5 cm. No bats or evidence of bats found.</p> <p><u>PRF: Callous roll</u> The main PRF is a callous roll present on both edges</p>		Moderate

	<p>of the central cavity. Along the main stem the callous roll features a rounded crevice, providing opportunities for small numbers of roosting bats. No evidence found during the inspection, however the feature is considered to offer moderate suitability for roosting bats.</p>		
<p>G9 T2</p>	<p>Category A mature oak with two PRFs in the canopy identified from ground level. A further aerial inspection was completed.</p> <p><u>PRF: Transverse snap</u> A limb features a transverse snap at 10 m. The associated cavity entrance is 20 cm by 20 cm and extends to 30 cm, forming a spire shaped apex. No bats or evidence of bats was found. A mouse nest was noted; no other competitors were present and the cavity substrates was dry and rough inside.</p> <p><u>PRF: Stripped bark</u> Missing bark is present on the top of a main limb, however no suitability sheltered crevices were observed.</p> <p><u>PRF: Tear-out</u> A tear-out feature located on a main limb was found to</p>		<p>Moderate</p>

	be well-occluded, offering no suitable bat roosting opportunities.		
G9 T3	<p>Category A mature oak with a basal cavity, identified and subject to endoscope inspection from ground level. Considered low suitability overall.</p> <p><u>PRF: Basal cavity</u> The cavity extends upwards to approximately 1.9 metres, narrowing to a wedge shaped apex. The entrance extends from ground level to 0.75 m, tapering from 15 cm wide. A second smaller entrance leads into the same cavity. Internally, the cavity has a dry, dusty substrate with frequent woodlice.</p> <p><u>PRF: Callous roll</u> The callous roll to the right hand side of the cavity entrance is reasonably sheltered and may provide roosting opportunities for single bats.</p>	 	Low
G10	Category B assorted (small trees)	N/a	N/a
G11	Category B oak, birch and goat willow. All young with no PRFs.	N/a	Negligible

G12	Category B oak in southern section of the site. Oaks along edge of woodland and fence line, all young with no PRFs.		Negligible
G12#	Category B oaks in central area of the site. Cluster of young oaks by the track and a single oak in open grassland. All young with no PRFs.		Negligible
G13	Six trees on edge, category B assorted.	N/a	N/a
G22	Six trees, category C, sycamore, alder and birch. No PRFs, bird box with metal plate noted on sycamore to north. Thin ivy cladding present on lower parts of main stems.		Negligible
G23	One birch tree, category C. Young tree with no PRFs present.		Negligible
G28	Two oak trees, category C. Young trees with no PRFs present.		Negligible

<p>T40</p>	<p>Alder by path/culverted stream, category B. No PRFs present.</p>		<p>Negligible</p>
<p>T57</p>	<p>Category C multi-stemmed sycamore located by fence. No PRFs present.</p>		<p>Negligible</p>
<p>G60</p>	<p>Category B oaks with low hanging crowns; no PRFs present.</p>		<p>Negligible</p>
<p>T58</p>	<p>No further oaks in this area offer suitable PRFs.</p>		<p>Negligible</p>

G71	Category C willow, silver birch and hawthorn. No access – not surveyed	N/a	N/a
G73	Category A/B oak, sycamore, hazel, elder and holly. Trees located within dense area. Two oak trees in this area feature split limbs in canopy.		Low

## Appendix L – Suitable Native Species for Use in Planting Schemes

Scientific name	Common Name	Scientific name	Common Name
<b>Large Trees</b>		<b>Large Shrubs</b>	
<i>Alnus glutinosa</i>	Alder	<i>Cornus sanguinea</i>	Dogwood
<i>Betula pendula</i>	Silver birch	<i>Euonymus europaeus</i>	Spindle
<i>Carpinus betulus</i>	Hornbeam	<i>Hippophae rhamnoides</i>	Sea buckthorn
<i>Fagus sylvatica</i>	Beech	<i>Juniperus communis</i>	Juniper
<i>Fraxinus excelsior</i>	Ash	<i>Ligustrum vulgare</i>	Wild privet
<i>Ilex aquifolium</i>	Holly	<i>Rhamnus cathartica</i>	Buckthorn
<i>Pinus sylvestris</i>	Scots pine	<i>Rosa caesia</i>	Hairy dog rose
<i>Populus nigra</i>	Black poplar	<i>Rosa canina</i>	Dog rose
<i>Quercus petraea</i>	Sessile oak	<i>Rosa micrantha</i>	Small-flowered sweet briar
<i>Quercus robur</i>	English oak	<i>Rosa stylosa</i>	Short-styled field rose
<i>Salix alba</i>	White willow	<i>Rosa tomentosa</i>	Harsh downy rose
<i>Salix fragilis</i>	Crack willow	<i>Salix myrsinifolia</i>	Dark-leaved willow
<i>Tilia cordata</i>	Small leaved lime	<i>Salix purpurea</i>	Purple willow
<i>Tilia platyphyllos</i>	Large-leaved lime	<i>Salix aurita</i>	Eared willow
<i>Ulmus glabra</i>	Wych elm	<i>Sorbus leptophylla</i>	Welsh whitebeam
<i>Ulmus minor</i>	small-leaved elm	<i>Viburnum lantana</i>	Wayfaring tree
<i>Ulmus procera</i>	English elm	<i>Viburnum opulus</i>	Gelder rose
<b>Medium Tree</b>		<b>Medium Shrubs</b>	
<i>Betula pubescens</i>	Downy birch	<i>Cytisus scoparius</i>	Broom
<i>Crataegus monogyna</i>	Hawthorn	<i>Rosa agrestis</i>	Small-leaved sweet briar
<i>Populus tremula</i>	Aspen	<i>Rosa arvensis</i>	Field rose
<i>Prunus avium</i>	Wild cherry	<i>Rosa mollis</i>	Soft downy rose
<i>Prunus padus</i>	Bird cherry	<i>Rosa rubiginosa</i>	Sweet briar
<i>Salix caprea</i>	Goat willow	<i>Rosa sherardii</i>	Sherard's downy rose
<i>Salix pentandra</i>	Bay willow	<i>Sorbus anglica</i>	English whitebeam
<i>Salix triandra</i>	Almond willow	<i>Ulex europaeus</i>	Gorse
<i>Sorbus aria</i>	Whitebeam	<i>Ulex gallii</i>	Western gorse
<i>Sorbus aucuparia</i>	Rowan		
<i>Sorbus domestica</i>	Wild service tree		
<i>Taxus baccata</i>	Yew		
<b>Small trees</b>		<b>Small shrubs</b>	
<i>Acer campestre</i>	Field maple	<i>Rosa pimpinellifolia</i>	Burnet rose
<i>Arbutus unedo</i>	Strawberry tree	<i>Ruscus aculeatus</i>	Butchers broom
<i>Buxus sempervirens</i>	Box	<i>Salix herbacea</i>	Dwarf willow
<i>Corylus avellana</i>	Hazel	<i>Salix lanata</i>	Woolly willow
<i>Crataegus laevigata</i>	Midland hawthorn	<i>Salix lapponum</i>	Downy willow
<i>Malus sylvestris</i>	Crab apple	<i>Salix myrsinites</i>	Whortle-leaved willow
<i>Prunus spinosa</i>	Blackthorn	<i>Salix reticulata</i>	Net-leaved willow
<i>Pyrus cordata</i>	Plymouth pear		
<i>Frangula alnus</i>	Alder buckthorn		
<i>Salix cinerea</i>	Grey willow		
<i>Salix viminalis</i>	Osier		
<i>Sambucus nigra</i>	Elder		

### Appendix M – Biodiversity Net Gain Plan



## Appendix N – Ecological Constraints and Opportunities Plan

