

Ecological Impact Assessment

Goldthorpe Unit D Access
Roundabout



Original Authors: Paul Liptrot.
Update by Julie Riley & Paul
Liptrot

p.liptrot@wildsheffield.com

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PRINCIPAL AUTHORS	CHECKED BY	APPROVED BY
Julie Riley, Paul Liptrot	Jon Goodrick, Paul Liptrot	Jon Goodrick, Paul Liptrot

Field Investigations and Data

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work. Where any data supplied by the client or from other sources have been used it has been assumed that the information is correct. No responsibility can be accepted by Wildscapes CIC and Sheffield and Rotherham Wildlife Trust for inaccuracies in the data supplied by any other party.

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1 Introduction

1. The report was prepared by Paul Liptrot BSc (Hons) GradCIEEM and checked by Jon Goodrick BSc MCIEEM in 2019. It was updated in 2021 by Julie Riley ACIEEM and checked by Paul Liptrot MCIEEM.
2. The report was commissioned by Suzanne Brough on behalf of Barnsley Metropolitan Borough Council (BMBC).
3. The site is referred to as the land surrounding the A635 at Billingley Green, Goldthorpe, Barnsley. The site includes existing roads and paths, roadside grassland, hedgerows and arable fields to the north and south. Carr Dike borders the site to the east.
4. The planned development includes the widening of the road present and creation of a roundabout to allow access to a planned development site.
5. The approximate central grid reference for the site is SE443040. Figure 1 shows the location of the site.

1.1 Purpose of the report

6. This report is intended to inform all interested parties of the potential ecological constraints of the proposed access roundabout at the land surrounding the A635 at Billingley Green, Goldthorpe, Barnsley.
7. The following surveys were undertaken throughout the summer of 2019 to inform the proposed highway improvements.
 - Preliminary Ecological Appraisal (PEA) – including protected and notable species survey and Phase 1 Habitat survey
 - Great crested newt environmental DNA (eDNA) survey
 - Water vole presence/absence survey
8. In 2021 the position of the proposed roundabout was moved eastwards. A walkover survey was undertaken to update the report and to identify and map habitats to the east that fell into the new footprint of the proposals. Trevor Mayne, Barnsley Biodiversity Officer was consulted regarding an update visit and agreed that it was unlikely habitats would have changed significantly since the original survey, and that a walkover check for protected species would be sufficient to update the report.
9. The results of the above surveys are included within Section 4. The purpose of this report is to assess the potential ecological impacts of the proposal and to outline proposed mitigation which will be detailed within the Construction Ecological Management Plan (CEMP).
10. Updates made to the report since Version 01 was produced in 2019 are written in green text.

1.2 Nature of the proposals

11. The proposals are to construct an access roundabout to facilitate a new industrial site to the north of the A635. The access route involves modifying the existing carriageway and the construction of a new roundabout. This will result in the permanent loss of 3113m² of plantation broadleaved woodland, 1473m² of improved grassland (farmland edge), 1623m² arable farmland, 1691m² of roadside amenity grassland, 749m² poor semi-improved grassland road verges, 2m² of tall ruderals and 75m² dense continuous scrub.

12. Construction works will also result in some temporary area habitat losses which will be reinstated with topsoil (therefore where a more ecologically valuable habitat such as woodland or poor semi-improved grassland is being replaced by topsoil, this has been added to the permanent loss figures). This will affect 915m² of improved grassland (farmland edge), 80m² of tall ruderals, 1482m² of arable farmland and 51m² of roadside amenity grassland.
13. The proposals will also result in the total loss of species-poor native hedgerow H06 (334m), the total loss of species-poor defunct native hedgerow H01.1 (87m) and partial losses from hedgerows H09.1, H09.2 and H10 (17.5m), with hedgerow loss totalling 439m. The proposal also has the potential to impact the running water habitat of Carr Dike.
14. It should also be noted that the roundabout will facilitate the loss of a further habitat within the new ES10 Masterplan area to the south, which has not been included in this impact assessment.
15. Wildscapes has been provided with background information detailing the proposed project, such as that shown within Table 1-1 Pre-existing information.

Table 1-1 Pre-existing information

DATE	TYPE	ORGANISATION	TITLE AND REFERENCE NUMBER
No Date	Plan	Barnsley Metropolitan Borough Council	ES10 Acces Title & License Plan
April 2013	Report	Wildscapes CIC	D1A Report Wildscapes
April 2013	Plan	Wildscapes CIC	D1A Report Wildscapes
Oct 2018	Plan	Barnsley Metropolitan Borough Council	A635 Barnsley Road D1 Access (A635) HD/A635.69.1/D1/01RevA
1 st December 2019 – Updated Nov 2021	Report	Wildscapes CIC	Preliminary Ecological Appraisal Goldthorpe Unit D V02
July 2021	Plan	Fore Consulting	Proposed Roundabout A635 Goldthorpe: General Arrangement : 3465.100-SK-001 RevE
September 2021	Document	BMBC & Edward Architecture	Goldthorpe Masterplan Framework Version 2.0
June 2020	Report	Middleton Bell Ecology	Goldthorpe ES10 Preliminary Ecological Appraisal
September 2021	Report	Wessex Archaeology	Barnsley LDP Additional South Yorkshire: Hedgerows Assessment
2021	Briefing Note	Middleton Bell Ecology	Goldthorpe ES10 – Bird Survey and Defra Metric Briefing Note v3

1.3 Survey Validity

16. Survey data is generally only considered valid if it is from the current or previous active season. In some cases, surveys up to three years old may be considered acceptable by consultees if the habitats have not significantly changed in the intervening period. The survey information in this report is considered to be valid for up to 2 years of its publication date.
17. Trevor Mayne, Barnsley Biodiversity Officer was consulted regarding an update visit in 2021 and agreed that it was unlikely habitats would have changed significantly since the original survey, and that a walkover check for protected species would be sufficient to update the PEA report that informs this EcIA.

2 Planning policy and legislation

18. This legal information is a summary and intended for general guidance only. It is recommended that the original documentation is referred to for detailed and definitive information. Web addresses are located in the References and Bibliography section of this report.

2.1 The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2020

19. The Conservation of Habitats and Species Regulations 2017 (as amended) transpose Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (Habitats Directive) into English law, making it an offence to deliberately capture, kill or disturb wild animals listed under Schedule 2 of the Regulations. It is also an offence to damage or destroy a breeding site or resting place of such an animal (even if the animal is absent at the time). This has recently been amended by the Conservation of Habitats and Species Regulations (Amendment) (EU Exit) Regulations 2020 which continue the same provision for European protected species, licensing requirements, and protected areas after the United Kingdom's exit from the European Union.

2.2 Wildlife & Countryside Act 1981

20. The Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way Act (CROW) 2000 and the Natural Environment and Rural Communities Act (NERC) 2006 (which also places a duty on authorities to have due regard for biodiversity and nature conservation) consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC on the Conservation of Wild Birds (Birds Directive), making it an offence to:
- Intentionally kill, injure or take any wild bird or their eggs or nests (with certain exceptions) and disturb any bird species listed under Schedule 1 to the Act, or its dependent young while it is nesting;
 - Intentionally kill, injure or take any wild animal listed under Schedule 5 to the Act; intentionally or recklessly damage, destroy or obstruct any place used for shelter or protection by any wild animal listed under Schedule 5 to the Act; intentionally or recklessly disturb certain Schedule 5 animal species while they occupy a place used for shelter or protection;
 - Pick or uproot any wild plant listed under Schedule 8 of the Act.

2.3 National Planning Policy Framework

21. The National Planning Policy Framework (NPPF) outlines government planning policies and how they should be applied to local authorities (Ministry of Housing, Communities & Local Government, 2021). The framework places an emphasis on sustainable development, encouraging the re-use of land that has previously been developed overusing land that has a higher environmental value and by minimising impacts on biodiversity. The NPPF has three overarching objectives :
- **an economic objective** – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;

- **a social objective** – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities’ health, social and cultural well-being; and
 - **an environmental objective** – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.
22. It also states that to conserve and enhance the natural environment planning policies and decisions should contribute to and enhance the natural and local environment by:
- protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);
 - recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;
 - maintaining the character of the undeveloped coast, while improving public access to it where appropriate;
 - minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
 - preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and
 - remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

2.4 Section 41 Habitats and Species (NERC Act 2006)

23. Section 41 (S41) of the NERC Act 2006 requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under Section 40.

2.5 Local Planning Policy

2.5.1 Barnsley Local Biodiversity Action Plan

24. Barnsley Local Biodiversity Action Plan (2009 – 2012) is under review with an update underway in 2018. Barnsley Biodiversity Trust priorities for habitats largely echo the national priority habitats; those relevant to this report (taken from the Barnsley Biodiversity Action Plan website) include:
25. **Woodlands:** including deciduous woodlands and wet woodland. There are 3637ha of woodland in Barnsley, with five local priority habitat types that include mixed deciduous and broadleaf woodland, and wet woodland.
26. **Hedgerows:** the UK BAP priority habitat (2007), includes all hedgerows with 80% or more of at least one native woody species of tree or shrub, with the best being ancient &/or 'species rich' that is with at least four different native tree or shrub species.
27. **Arable field margins:** this priority habitat consists of field margins designed to benefit key farmland species in arable areas. In-field measures like skylark plots and beetle banks are included in the Local Priority Habitat.
28. **Neutral grassland or lowland meadow:** this is found on richer shale and alluvial soils in lowland pastures and meadows in the Barnsley area. This species-rich grassland may be found in recreational sites, churchyards, roadside verges etc. All **unimproved** and **semi-improved grassland** is important for biodiversity in Barnsley.
29. **Floodplain grazing marsh:** this is wet neutral grassland found in some river floodplains in Barnsley. The combination of grassland and wetland margins or ditches promotes biodiversity.
30. **Lowland fen:** this priority habitat is particularly scarce in Barnsley and remnants amounting to 8ha may be found in the Dearne valley; there are small areas of remnant lowland fen with underlying peat at Gypsy Marsh, Adwick Washlands and Carlton Marsh.
31. The 2009 plan identified Bluebell *Hyacinthoides non-scripta* as the sole local priority plant species. The revised species list for plants has not yet been published on the Barnsley Biodiversity Action Plan website.

2.5.2 Goldthorpe Masterplan Framework

32. Published in September 2021, this framework has been produced under Barnsley's Local Plan Policy ES10 and covers 72.9ha of land directly south of the A635, including part of the proposed roundabout. Relevant ecological requirements for the site within the Masterplan are as follows:
 - a. Protect and enhance biodiversity value on the nearby Old Moor RSPB reserve and ensure that the development avoids impacts or incorporates effective mitigation measures.
 - b. Provide a contribution towards improvements to biodiversity within the Dearne Valley Green Heart Nature Improvement Area.
 - c. Include the creation of a habitat corridor (at least 8m in width) along Carr Dike and a sustainable drainage scheme to ensure that rainwater falling on the site is still able to drain into the Dike aiming to improve water quality.
 - d. Retain the existing woodland and hedgerows on the site periphery.
 - e. Retain the section of hedgerow remaining in the north-west corner of the site.

- f. Safeguard the setting of the Billingley Conservation Area; give consideration to Carr Dike and the connecting unnamed ordinary watercourse which run through the site.

33. Relevant Local Plan policies that need to be adhered to are as follows:

- a. Policy GI1: Green Infrastructure
- b. Policy BIO1: Biodiversity and Geodiversity
- c. Policy GB1: Protection of Green Belt [land to the north of the A road lies within the Green Belt]
- d. Trees and Hedgerows supplemental policy

2.6 Nature Improvement Areas (NIAs)

- 34. Nature Improvement Areas (NIA) were established to create joined up and resilient ecological networks at a landscape scale. They are run by partnerships of local authorities, local communities and landowners, the private sector and conservation organisations with funding provided by the Department for the Environment, Food and Rural Affairs (Defra) and Natural England. Twelve NIAs were announced in 2012.
- 35. The Dearne Valley Nature Improvement Area is one of the twelve NIAs selected in 2012. The aim of the Dearne Valley Green Heart Partnership for the Nature Improvement Area is to help restore and enhance the ecological networks of the river, its floodplain, and its link to habitats on surrounding slopes and hills.
- 36. Policy BIO1 provides specific detail about the Dearne Valley NIA. The proposed roundabout and the Masterplan site both lie fully within the NIA.

3 Methodology

3.1 Desk study

37. Ecological records and non-statutory designated wildlife site information obtained for the 2018 survey investigation undertaken for the Goldthorpe Road Improvement Scheme (Wildscapes, 2018) was utilised for this investigation following advice from Barnsley Metropolitan Borough Council. This includes data from Barnsley Biological Record Centre (supplied by Sheffield Biological Record Centre) and Rotherham Biological Records Centre.
38. The data was filtered in GIS to only include records within 2km of the survey site central grid reference.

3.1.1 Statutory designated wildlife sites

39. Information regarding statutory designated wildlife sites within the local area was requested from the organisations within Table 3-1.
40. The information and designations included within the search were National Nature Reserves (NNR), Local Nature Reserves (LNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Sites of Special Scientific Interest (SSSI), Ramsar Sites, Ancient Woodland and Granted European Protected Species Licences.

Table 3-1. Organisations consulted with regard to designated wildlife sites

DATE CONSULTED	ORGANISATION	RECORDS REQUESTED
14/05/2019 & 20/10/2021	Multi-Agency Geographic Information for the Countryside (MAGIC)	Local Nature Reserves, National Nature Reserves, Ancient woodland, Sites of Special Scientific Interest, Areas of Outstanding Natural Beauty, Special Areas of Conservation, Special Protection Areas or Ramsar sites within a 2km radius of the site

41. In addition to the above resources, online mapping sources including Google Maps were used to view both satellite imagery and maps of the site and surrounding land.
42. The biological records returned within the data search were filtered to exclude records more than 10 years old. Plant and invertebrate records were also filtered to include only species on either the S41 priority species list (JNCC, 2018) or the IUCN Red data list, excluding species classified as of 'Least Concern'. Mammals, reptiles and amphibians were filtered to include S41 species and species included in the Habitat Directive and Wildlife and Countryside Act 1981. Birds were filtered to include species on the UK Birds of Conservation Concern (BTO, 2018).

3.2 Field survey

43. The Preliminary Ecological Appraisal field survey was undertaken in 2019. An update survey was undertaken in 2021. The survey date and personnel can be found in Table 3-2.

Table 3-2: Dates and Personnel

DATE	SURVEY TYPE	SURVEYOR & QUALIFICATIONS
11/04/19, 12/04/19	Preliminary Ecological Appraisal	Paul Liptrot BSc (Hons), GradCIEEM, Senior Ecologist. Class Licence level 4 Reference CL20 - 2018-37087-CLS-CLS.
14/10/2021	Walkover survey	Paul Liptrot BSc (Hons), MCIEEM, Principal Ecologist. Class Licence level 4 Reference CL20 - 2018-37087-CLS-CLS. Julie Riley BA (Hons) MA ACIEEM, Senior Ecologist.

3.2.1 Weather Conditions

Table 3-3 Weather conditions at the time of the survey

SURVEY	DATE	TEMPERATURE (°C)	WIND (BEAUFORT)	NOTES
Preliminary Ecological Appraisal	11/04/19	10	2	No rain
	12/04/19	8	1	No rain
Walkover survey	14/10/2021	14	4	No rain

3.2.2 Habitats

Flora - Phase 1 Habitat Survey

44. A habitat survey was undertaken on the site in accordance with the standard Phase 1 Habitat Survey methodology (JNCC, 2010).
45. Nomenclature follows (Stace, 2010) for vascular plant species and uses the DAFOR scale for relative abundance (D = dominant, A = abundant, F = frequent, O = occasional and R = rare/infrequent).
46. The information collected during the survey was approximately mapped using ground-truthing, OS Master Map data, satellite images and GIS software (QGIS, 2018). The update survey mapped additional areas following the same protocol. Please refer to Appendix A, Figure 1 and Figure 2 for a location plan and Phase 1 Survey map.

3.2.3 Hedgerow Regulation Assessment

47. The hedgerows were assessed using the criteria set out in the Hedgerow Regulations 1997. A standard procedure for local hedgerow surveys in the UK was followed as defined by the Defra (2007) "Hedgerow Survey Handbook". All 'essential assessment elements' were recorded in addition to relevant 'optional assessment elements'.
48. Each hedgerow was measured in GIS. The numbers of woody species and ground flora species within each section were recorded.
49. Hedgerows that are connected to habitats such as ponds, broad-leaved woodland and other hedgerows create wildlife corridors, linking habitats in the wider landscape. Each hedgerow was assessed to see if it was connected to any of these habitats. The following point system was utilised:

- Connected to another hedgerow = 1 point
- Connected to a broad-leaved woodland (over 0.25 hectares) = 2 points
- Connected to a pond = 2 points

50. Other data collated about each hedgerow included:

- Hedgerow height and width
- Percentage of gap
- Hedgerow type (shrubby hedgerow with trees, line of trees and shrubby hedgerow)
- Shape (trimmed & dense, intensively managed, untrimmed, tall & leggy, untrimmed with outgrowths, recently coppiced and recently laid)
- Adjacent land use
- Adjacent to bridleway, footpath or road
- Nutrient enrichment (percentage of nettle, cleavers and docks)
- Hedgerow standard trees present

51. To determine if the hedgerow can be classified as important under the Hedgerow Regulations 1997, each hedgerow was also assessed to see if any associated features were also present, these can be found in Table 3-4 Associated Features.

Table 3-4 Associated Features

ID	FEATURE
i)	Presence of hedge-bank or wall for at least half of the total length
ii)	Presence of a ditch for at least half of total length
iii)	Presence of parallel hedge within 15 metres
iv)	Total gap length less than 10% of total hedgerow length
v)	1 Standard tree* in hedgerow less than 50 metres in length
vi)	2 Standard trees* in hedgerow between 50 metres and 100 metres in length
vii)	2 standard trees* in hedgerow between 50 metres and 100 metres in length
viii)	3 woodland species (see appendix) within 1 metre of hedgerow edge
ix)	4 points worth of connections
* Standard trees require a minimum trunk diameter of 20cm in a single trunk and 15cm if multiple stems are present	

Criteria for Designation as an Important Hedgerow

52. If a hedgerow meets any one or more of the criteria listed in Table 3-5, it indicates that it is an 'important hedgerow' under the Hedgerow Regulations.

Table 3-5 Criteria for an Important Hedgerow

CODE	CRITERIA
A	Marker for pre-1850 parish/township boundary.
B	Marker for pre-1600 estate or manor boundary.
C	Marker for "field system", Pre-Enclosure Act.
D	Scheduled Ancient Monument or Archaeological site.

E	Presence of protected or endangered species (e.g. badger sett).
F	7** woody species (See Appendix 4).
G	6** woody species (including black poplar (<i>Populus nigra</i>), large-leaved lime (<i>Tilia platyphyllos</i>), small-leaved lime (<i>Tilia cordata</i>) or wild service tree (<i>Sorbus torminalis</i>).
H	6** woody species + 3 Associated Features.
I	5** woody species + 4 Associated Features.
J	Adjacent to a public right of way (excludes adopted highways) and has 4** woody species + 2 Associated Features (excluding iii & ix).
<p><i>**The Wildlife and Countryside Act 1981 (as amended) Part 2 Criteria, Wildlife and Landscape 7.(2) Where the hedgerow in question is situated wholly or partly in the county (as constituted on 1st April 1997) of the City of Kingston upon Hull, Cumbria, Darlington, Durham, East Riding of Yorkshire, Hartlepool, Lancashire, Middlesbrough, North East Lincolnshire, North Lincolnshire, Northumberland, North Yorkshire, Redcar and Cleveland, Stockton-on-Tees, Tyne and Wear, West Yorkshire or York (14), the number of woody species stated in paragraphs (a) to (d) of sub-paragraph (1) is to be treated as reduced by one.</i></p>	

Survey Limitations

53. Some species of early flowering spring plants listed as ‘woodland species’ in Schedule 2 of the Regulations may not have been visible at the time of year that the surveys took place. See Appendix 3 Schedule 2 Woodland Species for list of species.
54. No protected, notable or invasive species were recorded within the hedgerows at the time of the surveys. However, this criterion can be assessed through reviewing the findings of detailed protected species surveys carried out at the site by including surveys for great crested newts and roosting bats.
55. The survey includes assessment for the importance of hedgerows under criteria E to J only (wildlife and landscape) and excludes assessment of the hedgerows under criteria A to D (archaeology and history) which is beyond the remit of this study.


3.2.4 Protected and Notable Species Assessment

56. The habitats on site were assessed for their suitability to support any legally protected or notable species including invasive species that may present constraints to the proposed development.
57. Any incidental sightings and evidence of species such as footprints, latrines, feeding remains and nests were noted.

Bats – Habitat Suitability Assessment

58. All bat surveys for the site were carried out in line with the latest guidance provided within Bat survey for Professional Ecologists: Good Practice Guidelines (Collins, 2016), Bat Mitigation Guidelines (Mitchell-Jones, Bat Mitigation guidelines, 2004) and Bat Tree Habitat Key (Andrews, 2016). Surveys were carried out on the 15th April 201 by Paul Liptrot Bat Class Licence level 4 Reference CL20 - 2018-37087-CLS-CLS.
59. As well as utilising standard Phase 1 Survey methodology, an assessment of the potential suitability of the habitats within the site and surrounding area for bats was undertaken, as part of the initial site risk assessment and Preliminary Ecological Appraisal. This included an assessment using the criteria set out in the Bat Conservation Trust Survey Guidelines, as shown in Table 3-6.

Table 3-6 BCT Guidelines for Assessing the Value of Habitats for Bats

Feature	Value
Evidence indicating that a structure/feature is used by bats, such as: <ul style="list-style-type: none"> • Bats seen roosting or emerging/entering a structure/ feature; • Field signs such as droppings, feeding remains or carcasses found; and/or • Bats heard calling or 'chattering' within a roost. 	Confirmed Roost
<ul style="list-style-type: none"> • Site is close to known roosts • Site is connected with the wider landscape by strong linear features that would be used by commuting bats e.g. river/stream valleys or hedgerows • Habitat of high quality for foraging bats e.g. broadleaved woodland, tree-lined watercourses, parkland • Buildings, trees or other structures e.g. mines, caves, tunnels, ice houses and cellars, with features of particular significance for roosting bats • Site is connected with the wider landscape by linear features that could be used by commuting bats e.g. lines of trees and scrub or linked back gardens • Habitat could be used by foraging bats e.g. trees, scrub, grassland or water • Several potential roosts in the buildings, trees or other structures • Isolated site not connected by prominent linear features (but if suitable foraging habitat is adjacent it may be valuable if it is all that is available) • Isolated habitat that could be used by foraging bats e.g. a lone tree or patch of scrub, but not parkland • Small number of potential roosts generally of lower conservation importance e.g. probably not maternity roosts or hibernacula • No features that could be used by roosting bats for foraging, roosting or commuting. 	High Value Habitat  Low Value Habitat

3.2.5 Water voles

Habitat Suitability Assessment

60. The habitats on site were assessed for suitability to support water voles according to subjective criteria. These results were then used to categorise habitat according to suitability for this species. The following habitat factors were taken into consideration:

- Water quality
- Stable/long-term water levels
- Channel dimensions
- Bank type and material
- Vegetation for cover and food sources
- Shading
- Predation and competition
- Habitat management

61. The ditches, marsh areas within primary impact area (with 250m) of site have been classified as follows:
- Evidence of water vole present
 - Suitable for water vole but no evidence found during the survey period; and dry/not suitable
62. Ditches classified as dry/not suitable lacked one or more crucial habitat quality or were dry at the time of the survey. This category does not necessarily indicate ditches that are never used by water voles, they may be used at other times if they contain water.

Presence/Absence Surveys

63. Survey for evidence of water vole followed standard methods adapted from Strachan & Moorhouse (2011). All suitable habitat was systematically and thoroughly searched for signs of the species where access was possible. April - September is a suitable time of the year to survey for water voles as they are active above ground, and latrines are maintained from February through to November by territorial individuals (Strachan & Moorhouse, 2011).
64. Surveys involved an intensive search of the bankside and water-edge habitat, searching for water vole field signs including:
- burrows
 - feeding platforms and evidence of feeding
 - food remains
 - latrines
 - footprints

3.2.6 Great Crested Newts

Environmental DNA Sampling (eDNA)

65. Environmental DNA sampling kits were provided by Fera Science Ltd. Sampling was carried out by Jon Goodrick (GCN Class 2 Licence holder) and Adele Harrison. The samples were taken on 18th April 2019 and collected in accordance with the methods detailed in Biggs et. al. (2014) at Waterbody 1 and 2 (W01 and W02). One sample kit was used per separate water body unless a water body exceeded 1 hectare in area, in which case two sample kits were used. Waterbodies which exceeded 2 hectares were sampled with three sample kits. The sample kits were refrigerated until the analysis was carried out by Fera Science Ltd in accordance with Biggs et al. (2014). Please refer laboratory report provided by Fera Science Ltd in Appendix D.

3.3 Survey Schedule

Table 3-7 Survey – surveyors and dates

SURVEY	DATES	SURVEYORS
Preliminary Ecological Appraisals	11 th and 12 th April 2019	Paul Liptrot
Water Vole Presence/Absence survey	9 th May 2019	Paul Liptrot and Adele Harrison

SURVEY	DATES	SURVEYORS
Water Vole Presence/Absence survey	16 th July 2019	Paul Liptrot and Paul Jarman
Environmental DNA (eDNA)	18 th April 2019	Jon Goodrick and Adele Harrison
Walkover survey checking for water vole signs	14 th October 2021	Paul Liptrot and Julie Riley

4 Baseline Ecological Conditions

66. In this section, the baseline ecological conditions for the site are outlined.
67. The biological records returned from the data search will be discussed within each corresponding species group. A full list of records obtained can be provided upon request.

4.1 Data search

68. 1549 biological records from within the last 10 years were returned from Barnsley Biological Record Centre (supplied by Sheffield Ecology Unit) and Rotherham Biological Record Centre. The data search records are discussed as part of the species assessments below.

4.1.1 Designated sites

69. The Dearne Valley Wetlands SSSI was notified on 13/05/2021. This is a 652 hectare site made up of 22 units comprising large areas of open water and associated wetland and woodland habitat within the catchment of the River Dearne (see Appendix D). It is of special interest for its nationally important numbers and assemblages of breeding and non-breeding birds. The nearest unit is located just over 1km to the southwest of the proposed roundabout, and is linked to the site by the route of the Carr Dike. The site lies within the SSSI Impact Risk Zone.

2 Local Wildlife sites were returned within 2km of the survey site. Please refer to Table 4-1 below. The closet LWS, Bolton-on-Deane Wetland is 1.4km to the south-west. Both of these sites now form part of the new SSSI.

Table 4-1 Non-statutory Designated Sites

SITE ID	SITE NAME	GRID REFERENCE	AREA (HA)	DISTANCE (M)
39	Bolton-on-Deane Wetland	SE 458031	2.5	1451
38	Old Moor and Wath Ings	SE 430023	81.8	1779

4.2 Species and Species Groups

4.2.1 Habitats

Poor semi-improved grassland – Compartment 01

Compartment 01.1

70. Poor semi-improved grassland is present along the southern road verge. The area is approximately 4m wide running adjacent to the hedgerow and woodland present. A c. 1m wide cutting strip is present immediately adjacent to the road, this incorporates 3-4 rows of planted daffodils.
71. There is a mixture of perennial herbs and grasses throughout this habitat. The central area has a greater level of herb to grass ratio with frequent Danish scurvygrass *Cochlearia danica*, creeping cinquefoil *Potentilla reptans*, and yarrow *Achillea millefolium* present but overall the compartment has 70:30 grass to herb ratio.

Compartment 01.2

72. The poor semi-improved grassland or rough grassland present to the west of Carr Dike at the south of the A635 is likely to have more of a tall ruderal structure later in the season.

73. Species present include frequent Yorkshire-fog *Holcus lanatus*, occasional sycamore *Acer pseudoplatanus*, common nettle *Urtica dioica*, hogweed *Heracleum sphondylium*, cleavers *Galium aparine*, lesser celandine *Ranunculus ficaria*, and garlic mustard *Alliaria petiolata* and rosebay willow-herb *Chamerion angustifolium* and cow parsley *Anthriscus sylvestris*. Scattered Himalayan balsam *Impatiens glandulifera* is present along the banks of Carr Dike.

Compartment 01.3

74. Poor semi-improved (rough) grassland is present on the access track south of the A635 leading to the arable field.
75. Species present include occasional cock's-foot *Dactylis glomerata*, dove's-foot crane's-bill *Geranium molle*, perennial rye-grass *Lolium perenne*, yarrow *Achillea millefolium* and white clover *Trifolium repens*.

Compartment 01.4

76. A strip of poor semi-improved (rough) grassland ranging between 10 and 20 metres wide runs along the west bank of Carr Dike to the north of the A635.
77. False oat-grass *Arrhenatherum elatius* is abundant, with frequent creeping thistle *Cirsium arvense* and occasional ribwort plantain *Plantago lanceolata*, sow thistle *Sonchus* sp., hogweed, cock's-foot and small quantities of field rose *Rosa arvensis*, St John's wort *Hieracium* sp., smooth tare *Vicia tetrasperma*, creeping buttercup *Ranunculus repens*, mugwort *Artemisia vulgaris* and meadowsweet *Filipendula ulmaria*. Scattered Himalayan balsam is present along the banks of Carr Dike.

Broadleaved plantation woodland – Compartment 02

78. The broadleaved plantation woodland canopy includes species such as common ash, silver birch, hazel and field maple.
79. The woodland includes varying ground flora. To the west, there is little to no ground flora with the species present consisting of hogweed *Heracleum sphondylium* and Yorkshire fog *Holcus lanatus*. However, the habitat improves to the east with ground-ivy *Glechoma hederacea*, docks *Rumex obtusifolius* and cleavers *Galium aparine* also present. This is possibly due to a thinner canopy.
80. The woodland is estimated to less than 20 years old.

Dense scrub – Compartment 03

81. Small areas of dense scrub are present along the edge of the carriageway to the south, and along sections of Carr Dike. The scrub generally comprises bramble, hawthorn and occasionally young willow *Salix* sp.

Arable – Compartment 04

82. The fields surrounding the A635 to the north and south include arable fields surrounded by hedgerow. The arable fields include wheat and oilseed rape. One triangular field to the east of Carr Dike (north of the A635) is a young plantation of Christmas trees, which has been included as arable as the trees are a crop that will not reach maturity.

Improved grassland & Amenity grassland – Compartment 05

83. The field margin surrounding several of the arable fields includes improved grassland with a 90:10 grass to herb ratio. Species present include frequent Yorkshire-fog *Holcus lanatus* and locally frequent common nettle *Urtica dioica*, occasional perennial rye-grass *Lolium perenne*, cock's-foot *Dactylis glomerata* and hogweed *Heracleum sphondylium*.

84. A large area of pasture grassland in the northeast of the survey site is also included as improved grassland, this area was not accessed but is likely to support a similar range of species.
85. Several species-poor strips of amenity grassland are present along the edges of the A635, these are kept mown and are comprised of similar improved grassland species.

Tall ruderal (with scattered scrub and bankside trees) – Compartment 06

86. This area includes locally dominant bramble *Rubus fruticosus agg.*, locally frequent rosebay willowherb *Chamerion angustifolium* and lesser celandine *Ranunculus ficaria*.

Broadleaved semi-natural woodland (wet woodland) – Compartment 07

87. This section runs along the east of Carr Dike, south of the A635. The species in this area include crack-willow *Salix fragilis* and dominant sycamore *Acer pseudoplatanus*.

Hedgerows

88. Please refer to the Appendix for results of the hedgerow assessment. Generally, very few hedgerows are classified as being important solely on species richness. This is partly because the classification of a hedgerow can usually be subdivided into 'historically important' (criteria A to D) or 'ecologically important', (criteria E to J) and occasionally both.
89. A total of 7 hedgerows and hedgerow units within Areas A and B were subject to survey during the hedgerow assessment in 2019. The return visit in 2021 identified a further 6 hedgerows within the altered footprint of the proposed roundabout. Middleton Bell's 2020 report was consulted regarding hedgerows located to the south of the A635 (H07, H08 and H13) and we concur with their assessments of the hedgerows' importance against the Regulations. Hedgerows H09.1, H09.2, H10 and H12 did not contain sufficient numbers of woody species to warrant further assessment against the Regulations. Hedgerow H11 was not fully accessed, but the portion that falls within the site survey area does not contain sufficient woody species to warrant further assessment against the Regulations.
90. The results of the assessment show that one of the hedgerows surveyed possesses the minimum number of woody species and associated features at the sample points to qualify as important hedgerows (Hedgerow H07).
91. Wessex Archaeology (2021) have carried out research to establish whether the hedgerows within the site meet the criteria A, B, C and D in Section 3.9 to qualify as important hedgerow under Part II Archaeology and History. Their report identifies that the hedgerows we have labelled H03, H08 and H11 are potentially important historic hedgerows .

Hedgerow– H01 (97m) & H01.1 (88m)

92. Hedgerow 01 runs parallel to the A635 to the south in two separate sections. Species present include dominant hawthorn *Crataegus monogyna* and locally dominant common ivy *Hedera helix*. This is a largely defunct hedge that has been absorbed into the plantation woodland.

Hedgerow – H02 (43m)

93. Hedgerow 02 is the eastern boundary of the arable field to the south of the A635 within the survey area. The dominant species present is hawthorn, with occasional ash *Fraxinus excelsior* and rarely occurring elder *Sambucus nigra* also present.

Hedgerow – H03 (236m)

94. Hedgerow 03 is the southern boundary of the arable field to the south of the A635. Similarly to the other hedgerows on the site, the dominant species is hawthorn. Rarely occurring elder, sycamore *Acer pseudoplatanus*, field maple *Acer campestre* and blackthorn *Prunus spinosa* are also present.

Hedgerow – H04 (106m)

95. Hedgerow 04 is the western boundary of the arable field to the south of the A635. The dominant species is hawthorn, with occasional elder present.

Hedgerow – H05 (86m)

96. Hedgerow 05 is the northern boundary of the arable field to the south of the A635. The hedgerow consists entirely of hawthorn.

Hedgerow – H06 (334m)

97. Hedgerow 06 runs parallel to the A635 to the north of the site. The dominant species present is hawthorn.

Hedgerow – H07 (49m)

98. Part of this native species-rich hedgerow falls within the survey boundary, it runs in a north-south direction in between two arable fields. Middleton Bell (2020) have identified this hedgerow as Important under the Hedgerow Regulations 1997.

Hedgerow – H08 (168m)

99. This hedgerow follows the line of a dry ditch to the south of the A635. Hawthorn is dominant, with occasional blackthorn and dog rose and rarely field maple.

Hedgerow – H09.1 (80m) & H09.2 (75m)

100. This double hedge forms the south boundary of the triangular field of Christmas trees, running parallel with the A635. One line of the hedge is at the bottom of a bank running down from the road, the other line is along the edge of the pavement at the top of the bank. The hedges are both comprised of hawthorn.

Hedgerow – H10 (57m)

101. This is a defunct hawthorn hedge with some blackthorn and standing dead wood along the edge of Carr Dike to the north of the A635. It forms part of the west boundary of the triangular Christmas tree field.

Hedgerow – H11 (36m)

102. This hedgerow forms the east boundary of the triangular Christmas tree field and continues to the north out of the survey area (area not accessible). The section accessed is dominated by hawthorn with elder and elm; an older ash tree is present within the hedge line.

Hedgerow – H12 (130m)

103. This hedgerow forms the south boundary of the improved grassland pasture field situated in the northeast portion of the survey site, running parallel to the A635 on its north side. This is dominated by hawthorn with occasional ash saplings.

Hedgerow – H13 (136m)

104. This native species-rich hedgerow runs parallel to the A635 on its south side, forming the boundary between the road and a large arable field. It is located at the bottom of a bank up to the road and comprises hawthorn, elder, hazel, ash, dog rose and field maple, with scattered bracken and common nettle.

Dense bracken

105. A small area of bank between the A635 and Hedgerow H13 is dominated by bracken, with common nettle and scattered shrubs/tree saplings.

Hardstanding (Bare Ground)

106. The survey site also includes areas of hardstanding/bare ground (gravel) associated with the existing carriageway and nearby layby. The botanical interest in this area is limited.

Scattered trees

107. There are scattered trees present along the boundary of the southern side of the carriageway and within the surrounding arable fields to the north and south-west. The trees along the south carriageway comprise of a row of relatively young sycamores and field maples. These trees will offer nesting and foraging opportunities for birds but are however due to their age of relatively low ecological value.
108. The trees within the fields to the north and south-west are more mature/veteran and as such offer high ecological value and should, therefore, be protected during the proposed development.

4.2.2 Plants

- 109. The data search returned no records of S41 priority plant species within the last 10 years within 2km of the survey site.
- 110. The poor semi-improved grassland verge does have a good but limited/localised diversity of common herbs and grasses, however no plants that are listed on the Red Data List or that are considered locally important were recorded during the survey visits.

Invasive species

- 111. Himalayan balsam was recorded in scattered quantities along the course of Carr Dike. No other invasive species were noted.

4.2.3 Invertebrates

- 112. No S41 priority invertebrates were returned within the data search.
- 113. Due to the habitats present on site, it is likely that invertebrates are present. However, it is unlikely that the habitats on-site support a diverse invertebrate assemblage. The veteran trees have the potential to support a range of deadwood invertebrates. However, both of the mature/veteran trees (T02 and T03) are isolated from each other and other veteran trees by arable farmland. So the amount of resource available for deadwood specialist is restricted.

4.2.4 Amphibians

- 114. The data search returned records of great crested newts (GCN), common frogs, common toads and smooth newts within 2km of the survey site. No GCN records returned were from within 1km. However, water bodies suitable for breeding amphibians are present within 250m of the construction zone. It is therefore likely that terrestrial amphibians are present within the vegetated habitats present on site.
- 115. The eDNA sampling returned a negative result from all the ponds sampled. As such, it is reasonably likely that GCNs are not within 500m of the survey site. Therefore, GCNs do not pose any significant constraint to the proposals at this time, and no further survey is required.

4.2.5 Reptiles

- 116. No records of reptiles were returned within the data search (i.e. 2km of the site). However, the survey undertaken to inform road improvement works along the A6195 to the west recorded a small population of grass snake in the local area in the area surrounding Cathill roundabout 1km to the west (Wildscapes, 2018).
- 117. The mosaic of habitats on site is suitable for use by reptiles. However, the extent of suitable habitats is limited. It is, therefore, possible that the site is in use by commuting grass snakes, however, the risk of a significant population being within the construction zone is considered to be minimal.
- 118. Reasonable avoidance measures for the protection of reptiles should, therefore, be implemented as part of the site clearance and construction works.

4.2.6 Birds

- 119. The grid references returned for the bird records were of varying resolutions (i.e. accurate to between 100m and 10km). As such, records accurate to under 1km have been excluded from this assessment.

Please refer to table for the remaining species, their current conservation status and the minimum possible distance of the closest record from the survey site.

120. The data search returned several records for amber listed species within 2km of the site. Please refer to Table 4-2 for a table summarizing the records returned. The closest amber species record was 1.2km from the site.

Table 4-2 Red and amber listed species with 2km

STATUS	S41	SCIENTIFIC NAME	COMMON NAME	TOTAL RECORDS	MIN DISTANCE (KM)*
Bird-Amber	No	<i>Alcedo atthis</i>	Kingfisher	25	1.2
		<i>Anser anser</i>	Greylag Goose	68	1.2
		<i>Bucephala clangula</i>	Goldeneye	4	1.2
		<i>Turdus iliacus</i>	Redwing	32	2.0
		<i>Turdus pilaris</i>	Fieldfare	40	1.9
	Yes	<i>Melanitta nigra</i>	Common Scoter	2	1.2
		<i>Charadrius dubius</i>	Little Ringed Plover	7	1.2
		<i>Chlidonias niger</i>	Black Tern	1	1.2

* Distance dependant on the accuracy of grid references provided within data consultation with BBRC

121. The site and surrounding land have suitability for nesting birds. The woodland and hedgerows offer potential nesting sites for tree-dwelling species and the arable farmland offers suitability for ground-nesting species.
122. The woodland and hedgerows will also offer a foraging resource and potential shelter (roosting) opportunities for a number of species.
123. A briefing note has been produced by Middleton Bell, reporting on bird surveys covering the ES10 Masterplan area to the south of the A635. This note identified that marsh harrier *Circus aeruginosus* was using the ES10 site, with RSPB Old Moor to the southwest holding regional importance for this species as they have successfully bred there. The flight lines recorded were mainly along Carr Dike with regular foraging on site, particularly in rough grassland alongside Carr Dike to the south. It is considered that the ES10 development area may be of up to county level importance to marsh harrier. However, the marsh harrier density map in the briefing note shows that the majority of marsh harrier activity is situated to the south and west of the proposed roundabout area, with no flightlines being recorded within the roundabout area or within a 150m buffer zone around the roundabout. It should be noted that the marsh harrier survey did not focus on land to the north of the A635 and the vantage point for the survey was a considerable distance from the proposed roundabout site.
124. Middleton Bell's briefing note also identified that the ES10 site is of general importance to farmland birds at a local level, and of district level importance for two species, grey partridge *Perdix perdix* and yellow wagtail *Motacilla flava*.
125. During the update survey, four bird kills were noted to the south, just outside the 150m buffer zone; at least one of these was a fox kill but the others appear to have been kills by birds of prey. Three buzzards (possibly a family group) were noted circling over Carr Dike to the north of the A635.

4.2.7 Bats

126. The data search returned roost records for the common pipistrelle *Pipistrellus pipistrellus*, Daubenton's bat *Myotis daubentoni* and noctule bat *Nyctalus noctula* from within the last 10 years. The closest roost

record returned was for a noctule bat circa. 950m to the east of the site. The remaining roost records were over 1.7km from the site.

Habitat suitability – roosting

- 127. The culvert section of the Carr Dike offers negligible suitability for roosting bats.
- 128. Tree 2 and Tree 3 (T02, T03) offer moderate suitability for roosting bats and Tree 1 and Tree 4 (T01, T04) offers low suitability for roosting bats. As such, if any works (felling, pruning etc.) are to be undertaken on these trees as part of the proposals, further survey would be required to confirm the status of roosting bats within these trees. Likewise if any artificial lighting is to be installed within 20m of these trees, further survey or mitigation would be required to protect any bat roosts (if present).

Habitat suitability - foraging and commuting

- 129. Due to the low ecological value of the site, there are low foraging and commuting opportunities available to bats on site. The main features of value in the immediate area would be the hedgerows and plantation woodland, and the stream Carr Dike which may be used by commuting and foraging bats. The hedgerows may connect roosting opportunities within the local area to foraging grounds. Also, the site is currently unlit by artificial lighting which can restrict the movements and behaviour of bats species and as such should be maintained post development.

4.3 Other faunal species and species groups

4.3.1 Badgers *Meles meles*

- 130. No records of badgers were returned with 2km of the survey site.
- 131. No evidence of badgers was recorded during the site survey or the update survey. The site does offer some suitability for sett creation along the northwestern boundary, but the majority of the site is devoid of vegetation cover so is less suitable. The woodland offsite to the north-east, east and west will likely be suitable for sett creation and as such the site could be used by foraging and commuting badgers.

4.3.2 Water Voles

- 132. No records of water voles were returned within the data search. Carr Dike crosses the site from north to south and is considered to offer reasonable suitability for water vole. The Dike is bordered with steep-sided grassed banks and a hawthorn dominated hedgerow on the northern section which becomes lower on the southern side of the A635. The south side habitat mainly comprises of tall ruderal, with a small area of willow dominated semi-natural woodland and small areas of rough poor semi-grassland. The Dike was approximately 0.75 metres deep at its deepest point along the inspected sections at the time of the survey, with the stretch assessed shallowing centrally before and after the culvert.
- 133. Evidence of mink (scats) was recorded in the culvert section of the stream during the presence/absence surveys. Likewise, rat burrows (disused) were noted on the northern section.
- 134. The update survey did not note any signs of water vole along the course of the Dike.
- 135. The evidence suggests that water voles are not present along the section of Dike survey. As such, water voles offer no further constraints to the proposal at this time.

4.3.3 Other mammals

136. The site visit recorded a dead hedgehog on the south-eastern bank of the stream next to the woodland plantation.
137. The habitats on-site offer reasonable suitability for hedgehogs to be present, with plantation woodland and hedgerows present throughout.

5 Impact assessment

5.1 Assessment methodology

5.1.1 Evaluation of ecological features

138. The following criteria have been used to assess the value of any identified receptors within the identified zone of influence. The criteria have been applied to the habitats and species that need to be assessed because they are of biodiversity value rather than because they are legally protected (although it is recognised that there may be overlap).
139. Government advice on wildlife, as set out in NPPF, has been taken into consideration. References have been made to the associated documents, namely the Countryside and Rights of Way Act.
140. Attention has also been given to the objectives of the UKBAP and to local BAPs and species action plans which have now been superseded by Habitats of Priority Importance and S41 Priority Species.
141. In addition to the actual value of habitats and wildlife, secondary (or supporting) value, potential value and social value have been considered. For example, some features that are currently of no particular ecological interest in themselves may nevertheless perform an ecological function, e.g. because they act as a buffer against negative impacts, or because they enable in some other way the effective conservation of a more valuable feature. An example of a feature which is of secondary value is the presence of small pockets of green spaces within an urban environment as the green spaces may create 'stepping stones' and contribute to the dispersal, migration and genetic exchange of wild species (including protected species).
142. Where possible, the potential value of a feature has been recognised. The potential value of a feature is related to the ease by which a feature (such as a habitat) can be altered for example by a change in the management to improve and enhance the feature and possibly achieve biodiversity targets as defined in the UK and Local BAPs.
143. Using the evaluation tools described above, a set of Valued Ecological Receptors has been identified. The value assigned to a receptor determines the geographic scale at which the impact is significant. The ecological receptor is considered valuable (or has the potential to become valuable) on the scale detailed in Table 4-3 Criteria for Determining Value.

Table 4-3 Criteria for Determining Value

RECEPTOR VALUE	DESCRIPTION
International	<p>International importance, plus biodiversity assets such as:</p> <ul style="list-style-type: none">• Internationally (including European) designated sites: Special Protection Area (SPA), Ramsar, Special Area for Conservation (SAC);• A site which meets the criteria for designation as an international site but is not designated;• A significant* population of a European protected species in this geographical region;• A small population of a European protected species not typical of the geographical region. <p>*e.g. a population of bird species representative of more than 1% of the international population.</p>
National/UK	<p>National importance, plus biodiversity assets such as:</p>

RECEPTOR VALUE	DESCRIPTION
	<ul style="list-style-type: none"> Nationally designated sites: Sites of Special Scientific Interest (SSSI), National Nature Reserve (NNR); A site which meets the criteria for designation as a national site but is not designated; A significant* population of a more common and widespread European protected species in this geographical region. A significant population of a protected species under all parts of Schedule 1, 5 or 6 of the Wildlife and Countryside Act 1981 e.g. badger <p>*e.g. a population of bird species representative of more than 1% of the national population.</p>
Regional	<p>Regional importance, plus biodiversity assets such as:</p> <ul style="list-style-type: none"> A good/typical example of a UK BAP Priority Habitat that satisfies all the criteria in the Priority Habitat definition but is in some way slightly enhanced (e.g. presence of a species that is localised in the region) A regularly occurring, locally significant population of a species listed as being nationally scarce
County/ District	<p>County or District importance, plus the biodiversity assets such as:</p> <ul style="list-style-type: none"> Sites of county importance (non-statutory) designated by local authorities or others, including semi-natural ancient woodland greater than 0.25ha, and species equivalents. UK Biodiversity Action Plan (BAP) Priority Habitats as defined by Section 74 of the Countryside and Rights of Way Act 2000 and UK BAP (2007). Significant populations of UK Biodiversity Action Plan Species as defined by Section 74 of the Countryside and Rights of Way Act and the UK BAP (2007).
Local	<p>Local/Parish importance, plus biodiversity assets such as:</p> <ul style="list-style-type: none"> Populations of UK BAP Priority Species which are not considered to be exceptional or of significance in the local geographic area. Areas of habitat which appreciably enrich the habitat resource in the local or parish contexts but are not of substantive biological importance e.g. local green spaces and wildlife corridors within an urban area Habitats and species listed on the Local BAP (but not already listed as UK BAP Priority Habitats and Species)
Within the zone of immediate influence only/ Site	<p>Less than local importance, with very limited biodiversity assets such as:</p> <ul style="list-style-type: none"> Species poor vegetation communities; Typical populations of common and widespread mammal, bird, amphibian and/or reptile species. Habitats which are sub-optimal for use by wildlife because of problems with the structure, species composition and/or very limited in size.
Negative	<p>Presence of species of flora or fauna listed under Schedule 9 of the Wildlife and Countryside Act 1981 or other non-native invasive/injurious species that have potential to have a significant impact on the native flora and fauna and could be considered to have an ecological, commercial or social adverse effect, usually at the local or site level.</p>

5.1.2 Assessment of impacts

144. Assessment of potential ecological impacts resulting from the implementation of the proposed development is based on predicting ecologically significant changes (impacts) to the baseline conditions of the site that are likely to occur.
145. Impacts are predicted based on the potential effects that the proposals would have on those aspects of ecological structure and function on which the identified Valued Ecological Receptors depend. Natural

trends and inherent resilience of a receptor have been considered, and changes will be discussed using the following headings:

- a. Direction (positive/negative): whether the effect will result in net loss or degradation of a Valued Ecological Receptor or whether it will enhance or improve it;
 - b. The magnitude and/or extent of impact;
 - c. Duration (short-or long-term, where short-term is defined and the duration of anticipated activity which results in an effect);
 - d. Reversibility (chance of recovery/replacement within a reasonable timeframe); and
 - e. Timing and frequency: consideration of the timing of events in relation to ecological change. Some effects may be of greater significance if they take place at a certain time of year (e.g. breeding season). The extent to which an effect is repeated may also be of importance.
146. Each ecological receptor has been assessed to determine the likely construction and operational impacts of implementation of the development proposals, to outline any mitigation required and to highlight residual impacts.
147. A precautionary approach has been taken in the prediction of impacts. Where there is any doubt, the impact is given at a higher level.
148. Table 4-4 details the criteria used in the assessment of the magnitude of an identified impact on the identified Valued Ecological Receptors.

Table 4-4 Magnitude of Impact for Ecological Assessment

MAGNITUDE OF IMPACT	DESCRIPTION
Major	The proposed development would cause a large change to existing environmental conditions. This includes major effects on the integrity of large-scale and ecologically significant areas. The land being affected is likely to comprise an internationally designated site (SPA, SAC, SSSI etc.) or key habitats as listed in the UK BAP (lowland meadow, lowland dry acid grassland, standing open waters etc.), as well as support significant populations of statutorily protected species.
Moderate	The proposed development would cause a noticeable change to the existing environmental condition. This category of magnitude includes major effects on a scale that would affect a moderate proportion of an area that is considered to be ecologically important, including designated sites, key habitats, local sites of substantive biological importance (LWSs) but will not affect the overall integrity of the area. Also included here are minor scale effects on protected species.
Minor	The proposed development would cause a small change to existing environmental conditions. This includes major effects on common wildlife habits, common types of semi-natural vegetation and minor but valuable wildlife features in the landscape. Other important but not protected species may experience temporary disturbance and minor effects.
Negligible	The proposed development would cause no discernible change to existing environmental conditions. Temporary or very small-scale damage to common types of semi-natural vegetation or habitat or minor losses of such habitat is included here. This includes minor effects on very common wildlife species.

5.1.3 Significance criteria

149. An ecologically significant impact is defined as one that affects the integrity of a site or ecosystem, or the conservation status of a habitat or species within a geographical area.
150. It must be recognised that there are limitations associated with the scope of any assessment. The relevance of surveys conducted at this stage must be considered at the time of implementation of site-specific proposals. This would be achieved through the projection of current baseline conditions through the provision for an updated survey to refine assessments throughout the development period. This is dealt with in the ecological evaluation (Section 6 of this EclA).
151. The significance has been assessed on the basis of the value of the features and the magnitude of effects, taking into account professional judgement.
152. It is generally the case that no significant effect can occur to features of less than local importance, other than in exceptional circumstances such as where a feature has high social or economic value or the magnitude effect is particularly high.

5.1.4 Calculation matrix

153. When each predicted impact (Positive and Negative) has been assigned a predicted magnitude, value and duration, the following calculation is used to determine the overall net loss/gain of the proposals using the figures in Table 4-5 and Table 4-6.

$$\text{Value} \times \text{Magnitude} \times \text{Duration Multiplier} = \text{Potential Impact}$$

154. The same calculation is then undertaken after the implementation of the outlined mitigation, compensation and enhancement measures detailed in Section 6 to determine the residual effects of the proposals, as detailed in Section 7.

Table 4-5. Impact Calculation

MAGNITUDE	NEGATIVE IMPACTS					POSITIVE IMPACTS				
	Site	Local	Regional	National	International	Site	Local	Regional	National	International
Negligible	0	0	0	0	0	0	0	0	0	0
Minor	-1	-2	-3	-4	-5	1	2	3	4	5
Moderate	-2	-3	-4	-5	-6	2	3	4	5	6
Major	-3	-4	-5	-6	-7	3	4	5	6	7
Major	-4	-5	-6	-7	-8	4	5	6	7	8

Table 4-6. Duration multiplier

	LONG	SHORT
Multiplier	2	1

5.2 Proposals

155. The proposals are to construct an access roundabout to facilitate a new industrial site to the north of the A635. The access route involves modifying the existing carriageway and the construction of a new roundabout. This will result in the permanent loss of 3113m² of plantation broadleaved woodland, 1473m² of improved grassland (farmland edge), 1623m² arable farmland, 1691m² of roadside amenity grassland, 749m² poor semi-improved grassland road verges, 2m² of tall ruderals and 75m² dense continuous scrub.
156. Construction works will also result in some temporary area habitat losses, which will be reinstated with topsoil (therefore, where a more ecologically valuable habitat such as woodland or poor semi-improved grassland is being replaced by topsoil, this has been added to the permanent loss figures). This will affect 915m² of improved grassland (farmland edge), 80m² of tall ruderals, 1482m² of arable farmland and 51m² of roadside amenity grassland.
157. The proposals will also result in the total loss of species-poor native hedgerow H06 (334m), the total loss of species-poor defunct native hedgerow H01.1 (87m) and partial losses from hedgerows H09.1, H09.2 and H10 (17.5m), with hedgerow loss totalling 439m. The proposal also has the potential to impact the running water habitat of Carr Dike.
158. It should also be noted that the roundabout will facilitate the loss of a further habitat within the new ES10 Masterplan area to the south, which has not been included in this impact assessment.

Table 4-7 Habitats area impacted by the proposals

PHASE 1 CODE	PHASE 1 HABITAT	HABITATS - TOTAL AREA IMPACTED (M ²)	HABITATS - TEMPORARY DAMAGE (M ²)	HABITATS - PERMANENT LOSS (M ²)
A2.1	Dense continuous scrub	75	0	75
C3.1	Tall ruderal	82	80	2
J1.2	Amenity grassland	1742	51	1691
B4	Improved grassland	2388	915	1473
J1.1	Arable	3105	1482	1623
A1.1.2	Plantation broadleaved woodland	3113	[881 – but assume not replanted so added to permanent loss]	3113 (2232 + 881)
B6	Poor semi-improved grassland	749	[65 – but assume not reinstated so added to permanent loss]	749 (684 + 65)

Table 4-8 Linear habitats impacted by the proposals

PHASE 1 CODE	PHASE 1 HABITAT	LENGTH (M)
J2.1.2	Species-poor intact hedge	345
J2.2.2	Species-poor defunct hedge	93.5

5.2.1 Designated Sites

159. The effects of the development are unlikely to have a direct impact on any designated sites. However, the site lies within the impact risk zone for a newly designated SSSI, Dearne Valley Wetlands. The LPA is required to consult Natural England on likely risks that fall within the Infrastructure category, namely *"pipelines, pylons and overhead cables. Any transport proposal including road, rail and by water (excluding routine maintenance)"*.
160. The roundabout is an extension of the footprint of an existing A road rather than the creation of an entirely new road. As such, this is likely to represent a **'negligible'** impact on designated sites at a site level in the short and long term, although any advice Natural England provide will need to be followed.

5.2.2 Habitats

Poor semi-improved grassland

Impacts – Habitat Lost

161. 749m² poor semi-improved grassland road verges will be impacted as part of the proposed scheme, being permanently lost as part of the proposals. The quality and extent of the grassland are such that the habitats are of site importance only. However, the habitats do offer intrinsic value and form part of a network of grassland road verges along the carriageway to the east and west.
162. As such, the loss of this habitat represents a **'moderate' significant** impact at site level in the long term.

Broadleaved plantation woodland

Impacts – Habitat Lost

163. The proposed scheme will impact 3113m² of plantation woodland and will result in the permanent loss of this entire area, presuming the temporarily lost areas are not replanted. If the temporarily lost areas are replanted, this would be reduced to 2232m². The plantation woodland is young (under 20 years) but does have the potential to mature into a reasonably valuable small plot of woodland if managed appropriately over an adequate time frame. The wood comprises of a limited diversity of closely planted woody species which has restricted the development of the shrub and ground flora layers. If the current management practice continues, it is unlikely to develop quickly but will eventually mature as a self-contained wood copse.
164. As such, the loss of this habitat represents a **'major' significant** impact at a local level in the long term.

Arable

165. Impacts – Habitat Lost

166. Arable land is generally considered to be of low ecological value. However, it does offer intrinsic value providing social and economic benefits. The biodiversity value of arable land is closely tied to agricultural practices and the level of agricultural intensification. Arable land managed less intensively can provide opportunities for arable weed species which have seen dramatic declines since the increase in intensive management and application of pesticides.
167. As such the loss of this habitat represents a **'minor' significant** impact at a local level in the long term.

Improved grassland

Impacts – Habitat Lost

168. 1473m² of improved grassland will be permanently lost, with 915m² being temporarily lost. Improved grassland is generally considered to be of low ecological value, however, it does offer intrinsic value providing social and economic benefits, and a strip of rough grassland running parallel with a hedgerow can increase foraging and movement opportunities for protected species.

169. The loss represents a **'minor' significant** impact at a site level in the short term.

Tall ruderal (with scattered scrub and bankside trees)

170. **Impacts – Habitat Lost**

171. Tall ruderal habitats are generally common and widespread and are typical of short term transitioning habitats on the fringes of woodland, farmland and grassland. However, due to the arable nature of the majority of the surrounding land, this habitat is relatively rare in a local context. Tall ruderal habitats and plants provide shelter opportunities for invertebrates, mammals, amphibians, reptiles and birds. As well as foraging value opportunities.

172. This represents a **'minor'** impact at a local level in the long term.

Broadleaved semi-natural woodland (wet woodland)

Impacts – no significant effect

173. The area of wet-woodland will not be impacted by the new access route. However, the proposed industrial estate may have a potential impact on this area.

174. This represents a **'negligible'** impact at a site level in the short term.

Hedgerows

175. **Impacts – Habitat Lost**

176. All the hedgerows or parts of hedgerows to be lost as part of the proposals are species-poor and do not qualify as important hedgerows under criteria E to J of the Habitat Regulation Assessment. However, they do form part of a network of hedgerows within the local area and as such may be used by species as corridors in an otherwise limited arable landscape, particularly Hedgerow H06. As such, the loss of a total of 439m of these hedgerows is considered to represent a **'moderate'** impact at a local level in the short and long term.

177. As such, it is recommended that any hedgerows lost are compensated for by replanting species-rich examples of the equivalent length.

Scattered trees

Impacts – no significant effect except for Tree T02: 'moderate' significant impact

178. Most of the scattered field and hedgerow trees highlighted within the PEA will not be impacted by the proposals. This represents a **'negligible'** impact at a site level in the long term.

179. However, Tree T02's root protection zone is likely to fall into the area of temporary land take and could be damaged during construction. If this were the case, or if the tree was deemed necessary to remove, this would create a **'moderate' significant** impact at site level in the long term. Tree T03 is situated 7m away from the edge of the construction zone and could also be impacted.

Running water

180. The construction work has the potential to increase pollution events within the adjacent brook course (Carr Dike).
181. This represents a '**major**' negative impact at a site level in the short term.

5.2.3 Flora

Invasive

Impacts – the spread of invasive species

182. Himalayan balsam was noted on the banks of the Carr Dike during the update survey visit. Without appropriate biosecurity measures, the proposed construction works have the potential to spread invasive species and/or plant and animal diseases.
183. This represents a '**major**' negative impact at a local level.

Priority or Protected Plant Species

Impacts - Loss/ uprooting of plants

184. The works will result in the loss of an assemblage of habitats and plant species. However, no nationally or locally rare plants were recorded on site. Therefore plants do not offer any significant constraint to the proposals at this time.
- This represents a '**negligible**' impact at site level.

5.2.4 Fauna

Amphibians

Potential Impacts – death/injury of terrestrial amphibians

185. Populations of common frog, smooth newt and palmate newt are likely to be present within the water bodies surrounding the site. The closest waterbody to the construction zone is Waterbody 2 112m away.
186. As such, it is expected that terrestrial amphibians will be present with the proposed work zone. Therefore, If appropriate site clearance measures are not used, it is likely that amphibians will be injured or killed during the pre-construction period.
187. This represents a **significant 'major'** negative impact at a local level in the short term.

188. Potential Impacts – Loss/damage to breeding habitat

189. No breeding habitat will be impacted as part of the proposed works.
190. Therefore this represents a '**negligible**' impact at a site level in the short term.

191. Potential Impacts – Loss of foraging and commuting habitat

192. The construction zone is within 112m of a water body 02. As such, terrestrial amphibians are expected to be within the construction zone. Therefore, the loss of the habitats on site is expected to have a '**moderate**' negative impact at a site level in the short term and a '**negligible**' significant effect at a site level in the long term once the roadside vegetation has become established.

Badgers

Potential impacts - Death/injury of individual or groups badgers

- 193. No evidence of badgers has been recorded within the development site as a whole. However, badgers are a mobile species and may become active in the area at a later date.
- 194. Currently, the proposals offer a '**negligible**' impact at a site level (no significant effect).

Bats

Potential Impacts – death/injury of individual or groups of bats

- 195. No potential roosting features (PRF) have been identified within the construction zone. However, Tree T02 has moderate bat roost suitability and is directly adjacent to the construction zone, which could damage the tree and, by extension, cause death or injury to bats that may be roosting within it. Tree T03, which also has moderate suitability, appears to be outside the construction zone but is only 7m away from its edge.

This represents a potential '**moderate**' **significant** impact at a site level in the short term.

Potential Impacts – Loss/damage to foraging and commuting habitat

- 196. The proposed works will result in the loss of plantation woodland, arable and improved grassland which may be used by foraging and commuting bats. However, the habitats are not of sufficient quality and extent to be used by a large or diverse population of bats. However the likely infrequent use by common species could be impacted by habitats lost and the installation of artificial lighting at night (ALAN).
- 197. As such, bats offer a '**minor**' **significant** constraint to the proposals.
- 198. It is recommended that artificial lighting is kept to a minimum and appropriate guidance is followed to prevent unnecessary lighting being installed.

Birds

Potential Impacts – death/injury of individual or groups of birds

- 199. If undertaken in the main breeding period, the proposed vegetation clearance works would present a significant impact on breeding birds and may offer a risk of nest destruction or abandonment.
- 200. This represents a significant '**major**' negative impact at a regional level in the short term.

Potential Impacts – Loss/damage to breeding habitat

- 201. The proposed vegetation clearance will result in the loss of available nesting resource along the carriageway, which has the potential to limit the breeding success of some species.
- 202. This represents a significant long term '**moderate**' negative impact at a site level.

Fish

Potential Impacts – Death/injury of individual or groups fish

- 203. The proposed works have the potential to kill/injure fish populations present within Carr Dike through the increased likelihood of pollution events.
- 204. This represents a significant long term '**minor**' negative impact at a site level.

Reptiles

Potential Impacts – death/injury of individual or groups

- 205. The proposed works have the potential to kill/injure reptiles populations present within the construction zone.
- 206. This represents a significant long term '**major**' negative impact at a local level.

Potential Impacts – Loss/damage to foraging and commuting habitat

- 207. The proposed work will result in the reduction of the net volume of available commuting and foraging habitat within the area. The plantation woodland, poor semi-improved grassland, tall ruderal and dense scrub (totalling 0.40ha) have the potential to be used infrequently by foraging and commuting grass snake. 0.39ha of suitable habitat will be permanently lost as part of the proposals.
- 208. This represents a significant short term '**minor**' negative impact at a local level.

Water voles

Potential Impacts – death/injury of individual or groups

- 209. No water voles were confirmed to be using the area of Carr Brook surveyed. As such, water voles offer **no significant constraint** to the proposals at this time.
- 210. This represents a '**negligible**' impact at a site level in the short and long term.

Hedgehog

Potential Impacts – death/injury of individual or groups

- 211. The habitat on-site offers suitability to be used by hedgehogs, and a dead hedgehog was recorded during the PEA. As such, it is considered likely that hedgehogs will be present within the proposed construction zone. Hedgehog populations have seen massive declines over recent decades. If hedgehogs are using the area, it is likely that the construction and site clearance work could injure or kill individual hedgehogs
- 212. As such, this represents a '**major**' significant impact at a local level.

Potential Impacts – loss/damage to habitat

- 213. The size of habitat loss initially will represent a '**minor**' negative impact at a site level for local hedgehog populations.

6 Recommendations, mitigation, compensation and enhancement measures

6.1.1 Designated Sites

214. As the site sits within an Impact Risk Zone for the newly notified Dearne Valley Wetlands SSSI, Natural England should be consulted and their advice adhered to.

6.1.2 Habitats

215. The proposed scheme will result in the initial loss of 1.12 ha of mixed area habitats and 439m of native hedgerow. Of this, 0.32ha (area) and 439m (length) is considered to be a habitat of priority importance (i.e. plantation woodland, dense scrub and native hedgerow) and 0.07ha offers intrinsic value at a site level.
216. Therefore, it is recommended that the full loss of habitat is compensated for offsite by either habitat creation or management practices. The priority habitats should be compensated for by the creation/management of like for like habitats of higher distinctiveness. All habitats should be created within the local area where possible (i.e. no further than 1km from the development area). Likewise, to ensure a net gain to biodiversity is achieved the habitats of intrinsic value should also be compensated for by habitat enhancement or creation either on-site or off-site with the local area, following a trading up methodology. This could be achieved by incorporating similar or habitats of higher value and distinctiveness into the new proposed industrial unit (ES10) (perferred option) or by managing habitats within the local surrounding land.

6.1.3 Fauna

Amphibians

217. Populations of common frog, common toad, smooth newt and palmate newt are likely to be within the zone of influence.
218. As such, it is **likely** that terrestrial amphibians will be present with the proposed work zone. Likewise, If appropriate site clearance measures are not used, it is expected that amphibians will be injured or killed during the pre-construction and construction period.
219. Therefore, amphibian protection measures will be implemented during site clearance and construction periods. Please refer to the CEMP for further details.

Badgers

220. Badgers are a widespread species that are protected from harm and cruelty by the Protection of Badgers Act (1992).

Mammal protection measures will be put in place to protect badger during the construction period. Please refer to the CEMP for further details.

Birds

221. The habitat on site is considered to offer value to foraging birds.
222. The hedgerow, trees and woodland on site are considered to offer suitable habitat for nesting birds. These features should be retained where possible and compensated for where lost.

223. All vegetation and tree clearance works must take place outside the nesting period. Should work need to be carried out within the nesting period, a suitable method statement for the protection of nesting birds will be put in place. Please refer to the CEMP for details.

Bats

224. Tree T02 (and potentially Tree T03) is located directly adjacent to the work zone, with the root protection zone likely to overlap the construction area. Tree T02 has moderate suitability for roosting bats and should be protected during construction following an appropriate tree protection methodology. Tree T03 also has moderate suitability and as it is only 7m away from the construction zone, a precautionary approach to protecting the tree should be taken.
225. Should Trees T02 or T03 need to be felled or managed for any reason, further surveys will be required to confirm their status for roosting bats. Likewise, if any Artificial Lighting at Night (ALAN) is to be installed within 20m of these trees, further survey would be required to determine if they are used by roosting bats.
226. These surveys should comprise of a combination of Aerial PRF inspection surveys which can be undertaken at any time of year, and nocturnal surveys. The surveys should be designed and informed by the guidance set out in the Bat Habitat Key (Andrews H. , 2018).
227. The proposals should aim to retain these trees if possible. Likewise, no artificial lighting should be installed within 20m of these trees if retained.
228. The hedgerows and woodland have some limited potential to be used by commuting and foraging bats, as such no artificial lighting should be installed which casts light over these areas.

Reptiles

229. The habitat on site is considered to offer value to foraging and commuting reptiles.
230. These features should be retained where possible and compensated for where lost.
231. Site clearance works will be undertaken following a suitable method statement for the protection of reptiles. Please refer to the CEMP for further details.

Water voles

232. The survey confirms that water voles are currently not using Carr Dike. As such, water voles offer no further constraint to the development at this time as the risk can be managed through on-site reasonable avoidance and protection measures and bio-security controls.

Hedgehog/other mammals

233. Habitat clearance and construction works have the potential to kill and/or injure hedgehogs and other mammals. As such, suitable mammal protection measures will be implemented during the site clearance and construction period. Please refer to the CEMP for further details.

6.1.4 Flora

Invasive species

234. Himalayan balsam is located within the course of Carr Dike and grows both along the edge of the water and up the banks. A suitable bio-security and removal protocol is required to manage this invasive species which is listed in Schedule 9 of the Wildlife and Countryside Act.

235. Construction work can easily lead to contamination and spread diseases if suitable bio-security and invasive species protocol is not followed.
236. As such, the appropriate bio-security protocol should be followed to ensure invasive species do not enter the site and nearby water bodies. This includes checking that topsoil brought in to make good after construction is not contaminated by invasive species.

	Impact before Mitigation, compensation and enhancement					Rational and proposed mitigation/compensation/enhancement summary	Impact after mitigation, compensation and enhancement			
Species/habitat	Impact	Direction	Effect	Importance of the ecological feature	Duration of impact		Direction	Effect	Importance of the ecological feature	Duration of impact
Designated Sites	Disturbance	Negative	Negligible	Site	Short term	LWS and other statutory designated site far enough away not to be significantly impacted by the proposed works	No change/Not applicable	Negligible	Site	Short term
	Habitat loss	Negative	Negligible	Site	Long term	LWS and other statutory designated site far enough away not to be significantly impacted by the proposed works	No change/Not applicable	Negligible	Site	Long term
	Impact on SSSI Risk Zone	Negative	Negligible	National	Long term	Site falls within Dearne Valley Wetlands SSSI Impact Risk Zone. NE will need to be consulted but unlikely to be more than negligible impact due to development sitting largely within existing road network.	No change/Not applicable	Negligible	National	Long term
Poor semi-improved grassland	Habitat loss	Negative	Moderate	Local	long term	The creation of greater than 0.07ha of semi-improved grassland of high or moderate local distinctiveness	Positive	Moderate	Local	Long term
Broadleaf Plantation Woodland	Habitat loss	Negative	Major	Site	long term	The creation of greater than 0.32ha of plantation broadleaved woodland of high or moderate local distinctiveness	Positive	Major	Local	Long term
Arable	Habitat loss	Negative	Minor	local	long term	Creation of habitats of greater or equal value with 1km of the site. Ideally with the site or within the proposed new industrial estate	Positive	Minor	Local	Long term
Improved grassland	Habitat loss	Negative	Negligible	Site	long term	No mitigation, compensation or ehancement required	No change/Not applicable	Negligible	Site	Long term
Tall Ruderal and scrub	Habitat loss	Negative	Minor	Local	Long term	Creation of habitats of greater or equal value with 1km of the site. Ideally within the site or within the proposed new industrial estate	Positive	Minor	Local	Long term
Hedgerows	Habitat Loss	Negative	Moderate	Local	long term	Creation of greater than 439m of species-rich hedgerows	Positive	Moderate	Local	Long term
Scattered Trees	Habitat Loss	Negative	Moderate	Site	Long term	Protection of Trees T02 and T03 required during construction process	No change/Not applicable	Negligible	Site	Long term
Invasive Species	Himalayan balsam recorded within Carr Dike	Negative	Major	Site	Long term	Biosecurity and appropriate practices used to present the spread of invasive species	No change/Not applicable	Negligible	Site	Long term
Priority Species	Loss/ uprooting of plants - no priority plants were recorded during the surveys	No change/Not applicable	Negligible	Site	Short term	No mitigation, compensation or enhancement required	No change/Not applicable	Negligible	Site	Short term

	Impact before Mitigation, compensation and enhancement					Rational and proposed mitigation/compensation/enhancement summary	Impact after mitigation, compensation and enhancement			
Species/habitat	Impact	Direction	Effect	Importance of the ecological feature	Duration of impact		Direction	Effect	Importance of the ecological feature	Duration of impact
Amphibians	Death/injury of individual or groups amphibians	Negative	Major	Local	Short term	Amphibian protection measures implemented and appropriate timing constraints adhered during vegetation clearance and construction phases	Negative	Major	Local	Short term
	Loss of breeding habitat	No change/Not applicable	Negligible	Site	short term	No mitigation, compensation or enhancement required	No change/Not applicable	Negligible	Site	Medium term
	Loss of foraging commuting habitat - the habitat to be lost is within 112m of a number of water bodies as such is considered likely to be used by amphibian populations	Negative	Moderate	Site	Medium-term	Creation of habitats of greater or equal value with 1km of the site. Ideally with the site or within the proposed new industrial estate	Negative	Minor	Site	Medium-term
Badgers	Death/injury of individual or groups badgers - the risk to badger is considered Negligible at this stage. However, mammal protection measures are recommended	No change/Not applicable	Negligible	Site	Short term	Reasonable avoidance and mammal protection measures will be followed during the construction period	No change/Not applicable	Negligible	Site	Short term
	Loss of foraging commuting habitat - the size and location of habitats are not considered to not offer any significant constraint to foraging and commuting badgers	No change/Not applicable	Negligible	Site	Short term	Reasonable avoidance and mammal protection measures will be followed during the construction period	No change/Not applicable	Negligible	Site	Short term

	Impact before Mitigation, compensation and enhancement					Rational and proposed mitigation/compensation/enhancement summary	Impact after mitigation, compensation and enhancement			
Species/habitat	Impact	Direction	Effect	Importance of the ecological feature	Duration of impact		Direction	Effect	Importance of the ecological feature	Duration of impact
Bats	Death/injury of individual or groups of bats	Negative	Moderate	Site	long term	Trees T02 and T03, which have moderate PRFs, should be protected from damage during construction.	No change/Not applicable	Negligible	Site	Long term
	Loss of breeding habitat	No change/Not applicable	Negligible	Site	long term	No Potential Roosting Features suitable for breeding are to be impacted by the proposals. As such no mitigation, compensation or enhancement required	No change/Not applicable	Negligible	Site	Long term
	Loss/damage to foraging and commuting habitat	Negative	Minor	Site	long term	The habitats on site are partially lit from the roadside and the extent of habitat change is unlikely to significantly impact foraging and commuting bats. However a best practice approach to minimise Artificial Lighting at Night (ALAN) should be undertaken. Artificial lighting plan required to protect habitats created post development.	No change/Not applicable	Negligible	Site	Long term
Birds	Death/injury of individual or groups of birds or nest abandonment	Negative	Major	Local	Short term	If undertaken in the main breeding period, the proposed vegetation clearance works would present a significant impact on breeding birds and may offer a risk of nest destruction or abandonment. A pre work nesting bird check will be undertaken and appropriate timing constraints and method statement followed	No change/Not applicable	Negligible	Local	Short Term
	Loss of nesting, foraging habitat - post construction period	Negative	Negligible	Site	long term	Habitat will be created in the long term to compensate for the loss of nesting resource.	Positive	Minor	Local	Long term
Fish	Death/injury of individual or groups fish	Negative	Negligible	Site	Long term	The construction work have the potential to increase the likelihood of pollution events within Carr Dike.	Negative	Negligible	Site	Long term
	Loss/damage to breeding habitat	No change/Not applicable	Minor	Site	long term	No mitigation, compensation or enhancement required	No change/Not applicable	Minor	Site	Long term
Hedgehog	Death/injury of individuals or groups	Negative	Minor	Local	long term	Mammal protection measures will be implemented during the construction period.	Negative	Minor	Local	Long term
	Loss/damage to foraging and commuting habitat	Negative	Minor	Local	long term	Approximately 30% of the habitat initially lost will be reinstated following proposed development through road side screening.	Negative	Minor	Local	Long term
Reptiles	Death/injury of individual or groups of reptiles	Negative	major	Local	Long term	Site clearance works to be undertaken following a suitable method statement for the protection of reptiles	Negative	Negligible	Local	Long term

	Impact before Mitigation, compensation and enhancement					Rational and proposed mitigation/compensation/enhancement summary	Impact after mitigation, compensation and enhancement			
Species/habitat	Impact	Direction	Effect	Importance of the ecological feature	Duration of impact		Direction	Effect	Importance of the ecological feature	Duration of impact
	Loss of foraging and commuting habitat	No change/Not applicable	Minor	Local	Short term	The proposed work will result in the reduction of the net volume of available commuting and foraging habitat within the area. The plantation woodland, poor semi-improved grassland, tall ruderal and dense scrub (totalling 0.40ha) and the hedgerows (439m) have the potential to be used infrequently by foraging and commuting grass snake. 0.38ha of suitable habitat and 439m of hedgerow will be permanently lost as part of the proposals. The proposed habitat creation will compensate the loss of this habitat and enhance the site/local area for reptiles in the long term.	Positive	Negligible	Local	Long term
Water voles	Death/injury of individual or groups of water voles	No change/Not applicable	Negligible	Site	Long term	No mitigation, compensation or enhancement required	No change/Not applicable	Negligible	Site	Long term
	Loss of foraging and commuting habitat	No change/Not applicable	Negligible	Site	Long term	No mitigation, compensation or enhancement required	No change/Not applicable	Negligible	Site	Long term

7 Conclusions and recommendations

237. The surveys confirm that water voles and GCN are not currently present within the site or immediate surrounding area. As such, water voles and GCN do not pose any further constraint to the proposals at this time.
238. Trees 01, 02, 03 and 04 offer suitability for roosting bats. Therefore, if these trees are to be impacted/lost by the proposed works, further surveys are required to confirm their status for roosting bats. Likewise, if any Artificial Lighting at Night (ALAN) is to be installed within 20m of these trees, a further survey would be required. The further surveys should comprise of a combination of PRF aerial inspections and nocturnal surveys.
239. As all bat species are negatively affected by light (Eurobats, 2018) (Institute of Lighting Professionals, 2018), and as the site is currently mostly unlit, the current level of lighting should be maintained or ideally reduced as part of the proposals. It is recommended that measures to reduce the impact of ALAN should be considered and adopted as part of the design process. The use of any artificial lighting should be avoided.
240. The proposals will result in the loss of priority habitats including species-poor hedgerows, dense scrub and plantation woodland. These will be compensated for by either habitat creation or habitat management and enhancement within the local surrounding area.
241. A dead hedgehog was recorded during the PEA site visit. As such, it is likely that other individuals use the site and surrounding areas. Mammal protection measures should be adopted during the construction phase. Please refer to the CEMP.
242. A suitably qualified arborist must be appointed to determine the root protection zones of any trees to be affected by works, this is of particular importance with regard to Tree T02 and Tree T03 north of the site.
243. Any site clearance work must take place outside the main nesting bird season (March to August, inclusive). If this is not possible, the site must be inspected by a Suitably Qualified Ecologist ahead of works.

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9 Appendices

9.1 Appendix A - Location Information and survey results

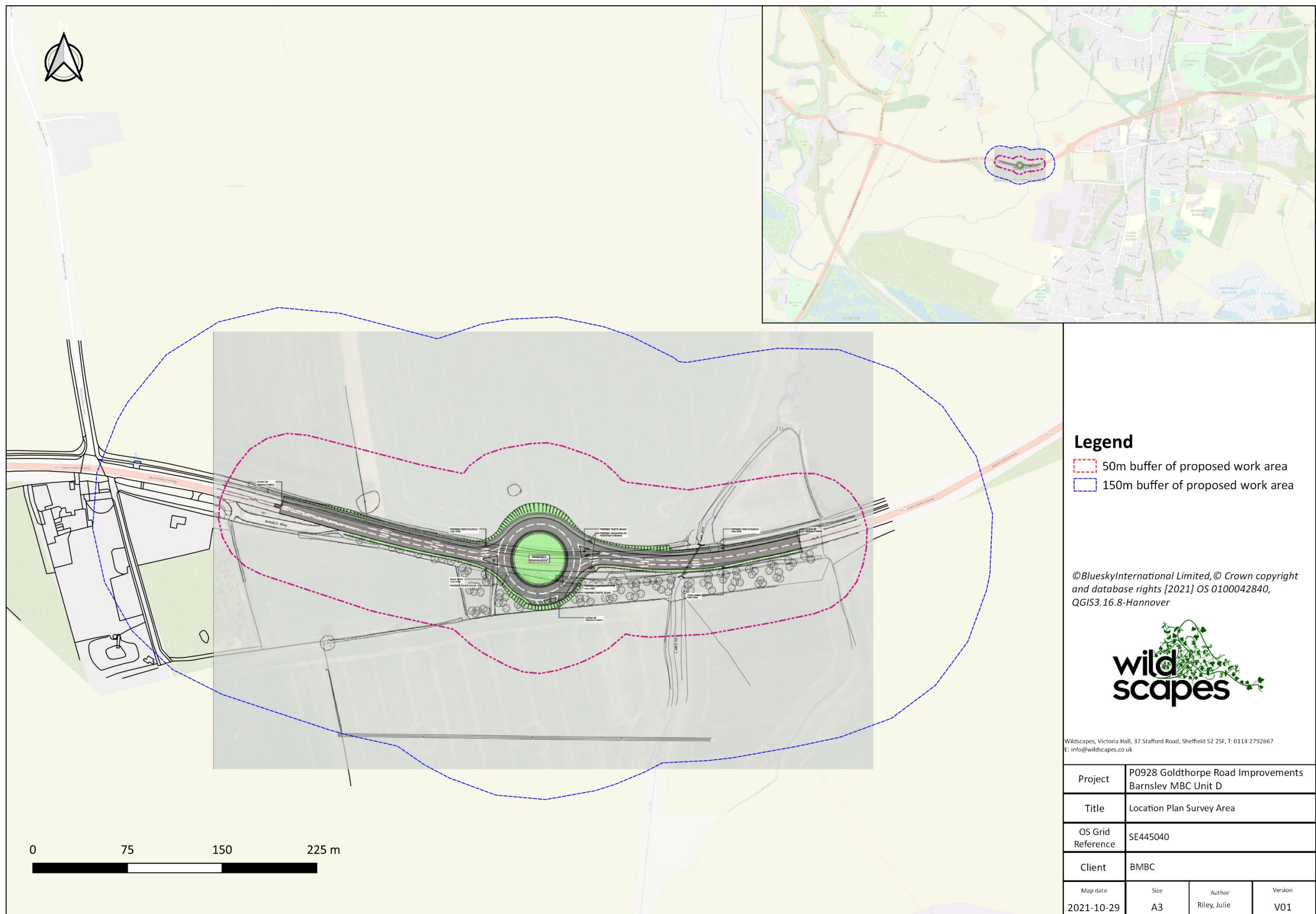


Figure 1 Location Plan Map

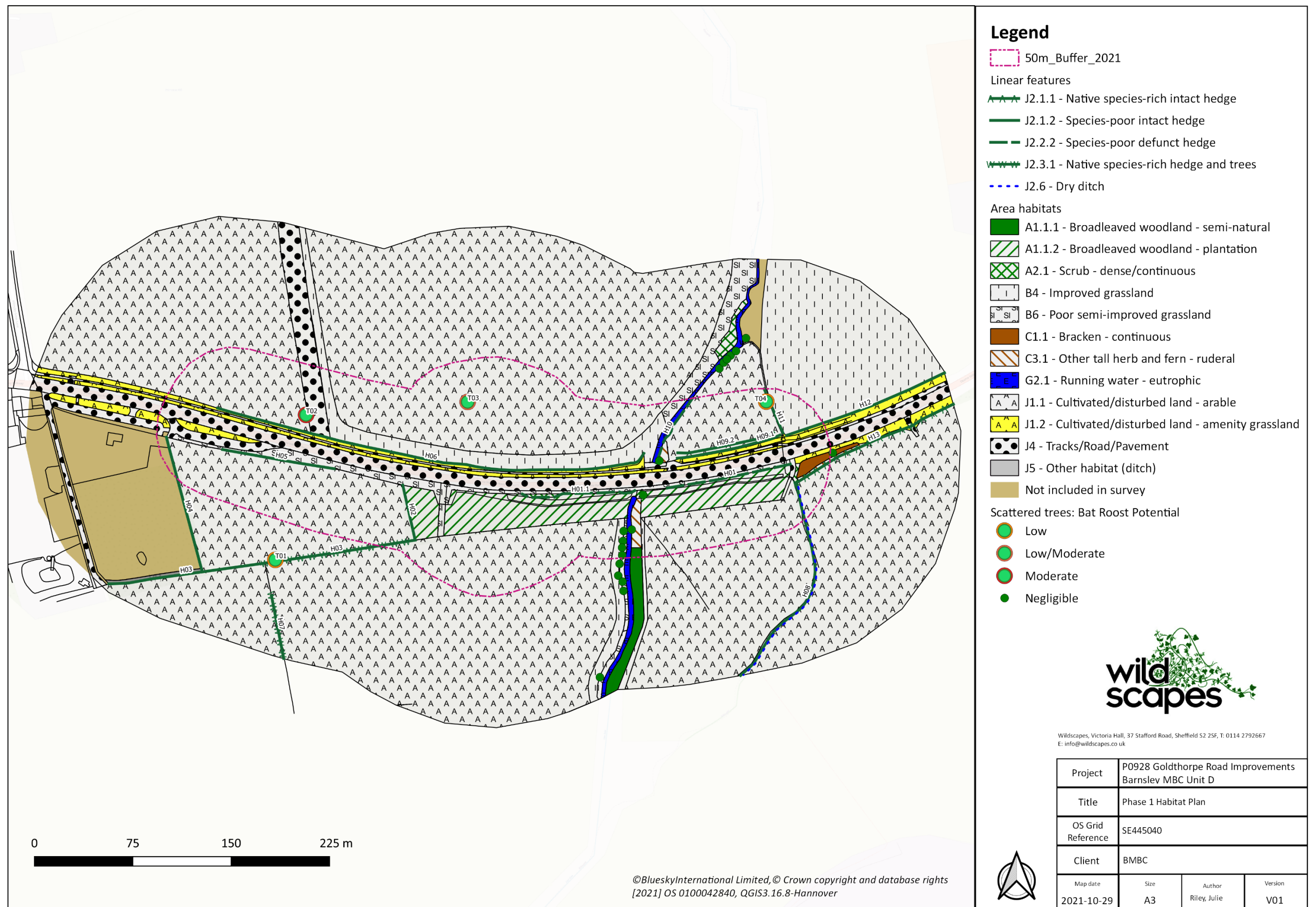
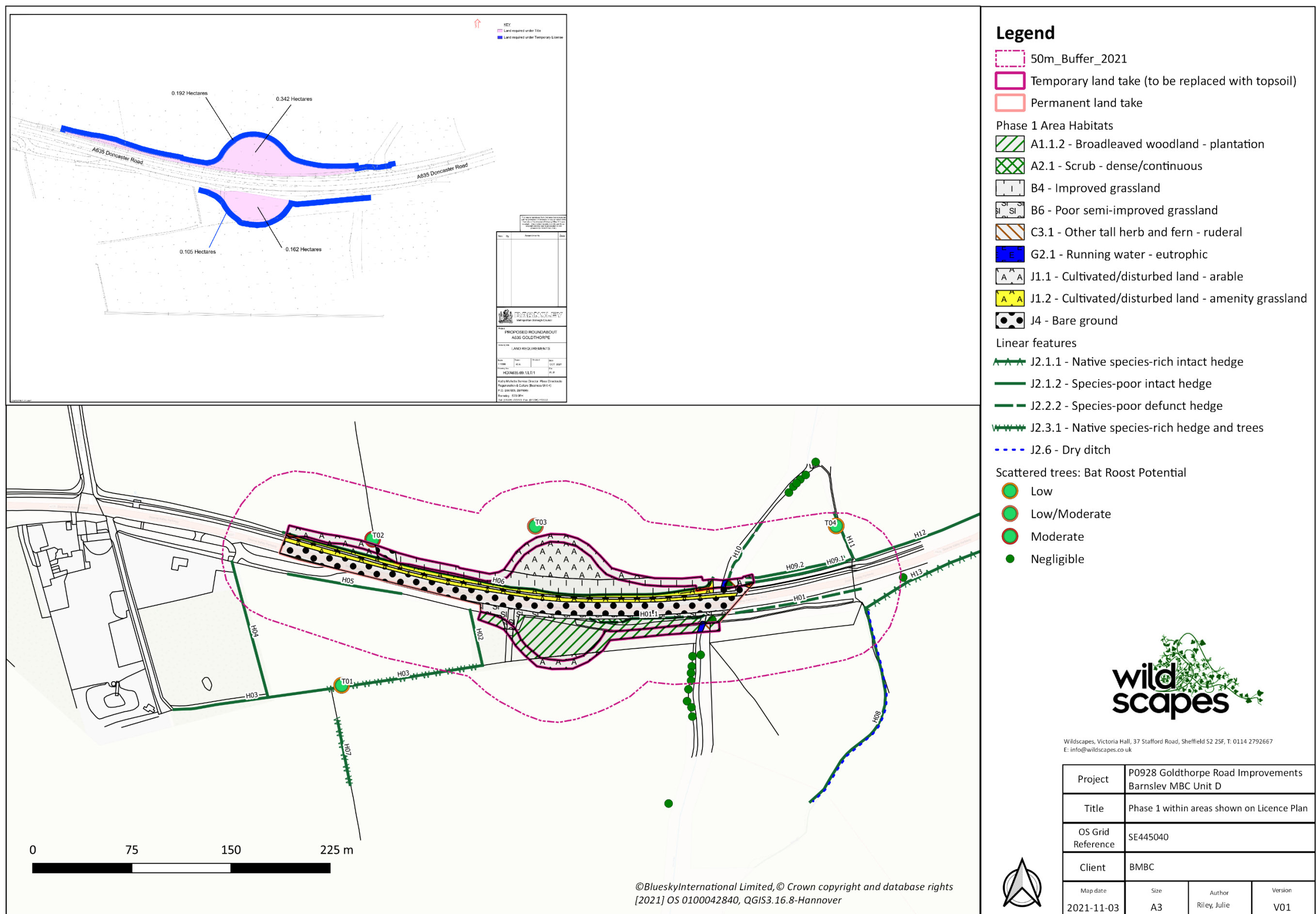


Figure 2 Phase 1 Results Map



9.1.1 Species List

CODE	DAFOR	COMMON NAME	LATIN NAME
C01	R	Alder (sapling)	<i>Alnus glutinosa</i>
C01	R	Broad-leaved Dock	<i>Rumex obtusifolius</i>
C01	LF	Brambles	<i>Rubus fruticosus agg.</i>
C01	LF	Cleavers	<i>Galium aparine</i>
C01	O	Cleavers	<i>Galium aparine</i>
C01	O	Cock's-foot	<i>Dactylis glomerata</i>
C01	R	Common mouse-ear	<i>Cerastium fontanum</i>
C01	LF	Common nettle	<i>Urtica dioica</i>
C01	O	Common ragwort	<i>Senecio jacobaea</i>
C01	O	Common vetch	<i>Vicia sativa</i>
C01	O	Cow parsley	<i>Anthriscus sylvestris</i>
C01	LF	Creeping cinquefoil	<i>Potentilla reptans</i>
C01	R	Creeping thistle	<i>Cirsium arvense</i>
C01	F	Daffodil	
C01	O	Daisy	<i>Bellis perennis</i>
C01	O	Dandelion	<i>Taraxacum officinale agg.</i>
C01	F	Danish scurvygrass	<i>Cochlearia danica</i>
C01	O	Dove's-foot Crane's-bill	<i>Geranium molle</i>
C01	R	Fat-hen	<i>Chenopodium album</i>
C01	R	Fescue sp	<i>fescue species</i>
C01	O	Garlic mustard	<i>Alliaria petiolata</i>
C01	O	Greater plantain	<i>Plantago major</i>
C01	R	Groundsel	<i>Senecio vulgaris</i>
C01	R	Hard-rush	<i>Juncus inflexus</i>
C01	O	Hogweed	<i>Heracleum sphondylium</i>
C01	R	Common knapweed	<i>Centaurea nigra</i>
C01	O	Lesser celandine	<i>Ranunculus ficaria</i>
C01	R	Meadowsweet	<i>Filipendula ulmaria</i>
C01	O	Perennial rye-grass	<i>Lolium perenne</i>
C01	O	Red clover	<i>Trifolium pratense</i>
C01	R	Red dead-nettle	<i>Lamium purpureum</i>
C01	R	Ribwort plantain	<i>Plantago lanceolata</i>
C01	O	Rosebay willowherb	<i>Chamerion angustifolium</i>
C01	R	Greater Stitchwort	<i>Stellaria holostea</i>
C01	R	Spear thistle	<i>Cirsium vulgare</i>
C01	R	Germander speedwell	<i>Veronica chamaedrys</i>
C01	O	Sycamore	<i>Acer pseudoplatanus</i>
C01	O	White clover	<i>Trifolium repens</i>
C01	LF	Yarrow	<i>Achillea millefolium</i>
C01	O	Yorkshire-fog	<i>Holcus lanatus</i>
C02	O	Silver birch	<i>Betula pendula</i>
C02	O	Field maple	<i>Acer campestre</i>
C02	R	Willow sp	<i>Salix species</i>
C02	O	Alder	<i>Alnus glutinosa</i>
C02	LF	Brambles	<i>Rubus fruticosus agg.</i>
C02	O	Dog-rose	<i>Rosa canina</i>
C02	O	Hazel	<i>Corylus avellana</i>
C02	F	Common ash	<i>Fraxinus excelsior</i>
C02	O	Common ash	<i>Fraxinus excelsior</i>

CODE	DAFOR	COMMON NAME	LATIN NAME
C02	O	Field maple	<i>Acer campestre</i>
C02	O	Silver birch	<i>Betula pendula</i>
C02	O	Hawthorn	<i>Crataegus monogyna</i>
C02	O	Alder	<i>Alnus glutinosa</i>
C02	F	Hogweed	<i>Heracleum sphondylium</i>
C02	O	Hazel	<i>Corylus avellana</i>
C02	O	Oak sp.	<i>Quercus sp.</i>
C02	LF	Brambles	<i>Rubus fruticosus agg.</i>
C02	O	Cleavers	<i>Galium aparine</i>
C02	R	broad-leaved dock	<i>Rumex obtusifolius</i>
C02	R	Yorkshire-fog	<i>Holcus lanatus</i>
C02	R	cow parsley	<i>Anthriscus sylvestris</i>
C02	R	Dog-rose	<i>Rosa canina</i>
C02	LF	Ground-ivy	<i>Glechoma hederacea</i>
C02	O	Common ash	<i>Fraxinus excelsior</i>
C02	O	Field maple	<i>Acer campestre</i>
C02	O	Silver birch	<i>Betula pendula</i>
C02	O	Hawthorn	<i>Crataegus monogyna</i>
C02	O	Alder	<i>Alnus glutinosa</i>
C02	O	Hogweed	<i>Heracleum sphondylium</i>
C02	O	hazel	<i>Corylus avellana</i>
C02	O	Oak sp.	<i>Quercus sp.</i>
C02	LF	Brambles	<i>Rubus fruticosus agg.</i>
C02	LF	Cleavers	<i>Galium aparine</i>
C02	R	broad-leaved dock	<i>Rumex obtusifolius</i>
C02	R	Yorkshire-fog	<i>Holcus lanatus</i>
C02	R	cow parsley	<i>Anthriscus sylvestris</i>
C03	D	Bramble	<i>Rubus fruticosus agg.</i>
C03	F	Hawthorn	<i>Crataegus monogyna</i>
C03	R	Willow	<i>Salix sp.</i>
C04	D	Wheat	<i>triticum</i>
C05	O	hogweed	<i>Heracleum sphondylium</i>
C05	R	broad-leaved dock	<i>Rumex obtusifolius</i>
C05	F	Yorkshire-fog	<i>Holcus lanatus</i>
C05	R	Dandelion	<i>Taraxacum officinale agg.</i>
C05	LF	Common nettle	<i>Urtica dioica</i>
C05	R	Spear thistle	<i>Cirsium vulgare</i>
C05	O	Cock's-foot	<i>Dactylis glomerata</i>
C05	O	perennial rye-grass	<i>Lolium perenne</i>
C06	LF	Rosebay willowherb	<i>Chamerion angustifolium</i>
C06	O	Cleavers	<i>Galium aparine</i>
C06	O	Common nettle	<i>Urtica dioica</i>
C06	LF	Lesser celandine	<i>Ranunculus ficaria</i>
C06	O	spear thistle	<i>Cirsium vulgare</i>
C06	LD	Brambles	<i>Rubus fruticosus agg.</i>
C06	O	perennial rye-grass	<i>Lolium perenne</i>
C06	R	broad-leaved dock	<i>Rumex obtusifolius</i>
C07	D	sycamore	<i>Acer pseudoplatanus</i>
C07		Crack-willow	<i>Salix fragilis</i>
H01	D	hawthorn	<i>Crataegus monogyna</i>
H01	LD	Common Ivy	<i>Hedera helix</i>
H01	O	common nettle	<i>Urtica dioica</i>

CODE	DAFOR	COMMON NAME	LATIN NAME
H01	LF	Ground-ivy	<i>Glechoma hederacea</i>
H01	R	sycamore	<i>Acer pseudoplatanus</i>
H01	R	Common ash	<i>Fraxinus excelsior</i>
H02	D	Hawthorn	<i>Crataegus monogyna</i>
H02	O	Common ash	<i>Fraxinus excelsior</i>
H02	O	Cow parsley	<i>Anthriscus sylvestris</i>
H02	O	Cleavers	<i>Galium aparine</i>
H02	O	Perennial rye-grass	<i>Lolium perenne</i>
H02	R	Red dead-nettle	<i>Lamium purpureum</i>
H02	R	Elder	<i>Sambucus nigra</i>
H02	O	Yorkshire-fog	<i>Holcus lanatus</i>
H03	R	Sycamore	<i>Acer pseudoplatanus</i>
H03	R	Elder	<i>Sambucus nigra</i>
H03	D	Hawthorn	<i>Crataegus monogyna</i>
H03	O	Yorkshire-fog	<i>Holcus lanatus</i>
H03	O	Cleavers	<i>Galium aparine</i>
H03	R	Field maple	<i>Acer campestre</i>
H03	O	Cow parsley	<i>Anthriscus sylvestris</i>
H03	O	Perennial rye-grass	<i>Lolium perenne</i>
H03	R	Garlic mustard	<i>Alliaria petiolata</i>
H03	R	Blackthorn	<i>Prunus spinosa</i>
H04	D	Hawthorn	<i>Crataegus monogyna</i>
H04	O	Common nettle	<i>Urtica dioica</i>
H04	O	Yorkshire-fog	<i>Holcus lanatus</i>
H04	O	Perennial rye-grass	<i>Lolium perenne</i>
H04	R	Cock's-foot	<i>Dactylis glomerata</i>
H04	R	Red dead-nettle	<i>Lamium purpureum</i>
H04	O	Cow parsley	<i>Anthriscus sylvestris</i>
H04	F	Garlic mustard	<i>Alliaria petiolata</i>
H04	F	Cleavers	<i>Galium aparine</i>
H04	O	Elder	<i>Sambucus nigra</i>
H05	D	Hawthorn	<i>Crataegus monogyna</i>
H05	O	Cow parsley	<i>Anthriscus sylvestris</i>
H05	R	Wheat	<i>triticum</i>
H05	R	Red dead-nettle	<i>Lamium purpureum</i>
H05	O	Garlic mustard	<i>Alliaria petiolata</i>
H05	O	Cleavers	<i>Galium aparine</i>
H05	R	Dandelion	<i>Taraxacum officinale agg.</i>
H06	R	Elder	<i>Sambucus nigra</i>
H06	R	Comfrey	<i>Symphytum officinale</i>
H06	D	Hawthorn	<i>Crataegus monogyna</i>
H06	O	Cow parsley	<i>Anthriscus sylvestris</i>
H06	O	Common fumitory	<i>Fumaria officinalis</i>
H06	O	Red dead-nettle	<i>Lamium purpureum</i>
H06	O	Yarrow	<i>Achillea millefolium</i>
H06	O	Dandelion	<i>Taraxacum officinale agg.</i>
H06	R	Ribwort plantain	<i>Plantago lanceolata</i>
H06	LF	Common nettle	<i>Urtica dioica</i>
H06	O	Common mouse-ear	<i>Cerastium fontanum</i>
H06	LF	Garlic mustard	<i>Alliaria petiolata</i>
H06	O	Cleavers	<i>Galium aparine</i>
H06	R	Common ash	<i>Fraxinus excelsior</i>

CODE	DAFOR	COMMON NAME	LATIN NAME
H08	D	Hawthorn	<i>Crataegus monogyna</i>
H08	O	Blackthorn	<i>Prunus spinosa</i>
H08	R	Dog rose	<i>Rosa canina</i>
H08	O	Field maple	<i>Acer campestre</i>
H08	R	Hazel	<i>Corylus avellana</i>
H09	D	Hawthorn	<i>Crataegus monogyna</i>
H10	D	Hawthorn	<i>Crataegus monogyna</i>
H10	O	Blackthorn	<i>Prunus spinosa</i>
H11	D	Hawthorn	<i>Crataegus monogyna</i>
H11	O	Elder	<i>Sambucus nigra</i>
H11	R	Elm sp.	<i>Ulmus sp.</i>
H11	R	Ash	<i>Fraxinus excelsior</i>
H12	D	Hawthorn	<i>Crataegus monogyna</i>
H12	O	Ash	<i>Fraxinus excelsior</i>
H13	D	Hawthorn	<i>Crataegus monogyna</i>
H13	O	Elder	<i>Sambucus nigra</i>
H13	R	Hazel	<i>Corylus avellana</i>
H13	O	Ash	<i>Fraxinus excelsior</i>
H13	R	Dog rose	<i>Rosa canina</i>
H13	R	Field maple	<i>Acer campestre</i>
H13	R	Bracken	<i>Pteridium aquilinum</i>
H13	O	Common nettle	<i>Urtica dioica</i>

9.1.2 Hedgerow Survey Results

ITEM	HEDGE REFERENCE NUMBER						
	H01/H1.1	H02	H03	H04	H05	H06	H07
Date surveyed:	12/04/2019	12/04/2019	12/04/2019	12/04/2019	12/04/2019	12/04/2019	12/04/2019
Grid reference: (centre of hedge)	SE4450704051	SE4426304024	SE4415103985	SE4409204030	SE4417504065	SE4426904073	SE4450904075
Hedgerow > 20m in length	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hedgerow > 30 years old	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Total length (m)	174	43	236	106	86	358	82
Total length of gaps (m)	20		10				
% gaps	30%	0	10%	5	10	0	0
Height (m)	4	5	2	3.5	2.5	2.0	1.5
Width (m)	1.5	2.0	2.5	2.5	2.2	2.2	2.0
Hedgerow type	Shrubby hedgerow with trees	Line of trees	Shrubby hedgerow	Shrubby hedgerow	Shrubby hedgerow	Shrubby hedgerow	Shrubby hedgerow
Hedgerow shape	Untrimmed with outgrowths	Untrimmed with outgrowths	trimmed & dense	untrimmed	Untrimmed with outgrowths	trimmed & dense	Trimmed & dense
Mature trees	0	0	Yes (1)	0	0	0	0

ITEM	HEDGE REFERENCE NUMBER						
	H01/H1.1	H02	H03	H04	H05	H06	H07
Adjacent land use	Woodland	Woodland/Arable Farmland	Arable Farmland	Arable Farmland	Arable Farmland	Arable Farmland	Arable Farmland
Adjacent to public right of way	Yes	No	No	No	No	No	No
Protected species present	No- However, potential for nesting birds	No- However, potential for nesting birds	No- However, potential for nesting birds	No- However, potential for nesting birds	No- However, potential for nesting birds	No- However, potential for nesting birds	No- However, potential for nesting birds
Connections score							
Total number of other hedgerows connected to each end of the hedgerow =1 point	0	1	1	1	0	0	1
Connections to a broad- leaved woodland over 0.25ha = 2 points	Yes (2)	Yes (2)	No	No	No	No	No
Connections to a pond = 2 points	No	No	Yes (2)	No	No	No	No
Total connection points	2	2	2	0	0	0	0
No of woody Species	3	2	5	2	1	3	2
Associated features present	-	iv)	ii)	iv)	-	iv)	iv)
Total associated features	-	1	1	1	-	1	1

ITEM	HEDGE REFERENCE NUMBER						
	H01/H1.1	H02	H03	H04	H05	H06	H07
Age/earliest reference date	>30 Years	>30 Years	>30 Years	>30 Years	>30 Years	>30 Years	>30 Years
Important Hedgerow	No	No	No	No	No	No	No
Qualifying Criteria	-	-	-	-	-	-	-

9.2 Appendix C – Photographs

	
Photo 1: Plantation Woodland	Photo 2: Arable
	
Photo 3: Hedgerow H02	Photo 4: Hedgerow H03
	
Photo 5: Arable with Hedgerow H05 in distance	Photo 6: Veteran tree T03
	

Photo 7: Carr Dike	Photo 8: Culvert under road
	
Photo 9: Grassland verge	Photo 10: Hedgerow H08
	
Photo 11: Hedgerow H13	Photo 12: Area of dense bracken
	
Photo 13: Double hedgerow H09.1 & H09.2	Photo 14: Hedgerow H10
	
Photo 15: Hedgerow H11	

9.3 Appendix D – MAGIC map showing SSSI



9.4 Appendix E – GCN Results



DNA Analysis Report - Commercial in Confidence

Customer: Sheffield Wildlife Trust
Address: Victoria Hall
37 Stafford Road
Sheffield
South Yorkshire
S2 2SF
Contact: Adele Harrison
Email: a.harrison@wildsheffield.com
Tel: 01142792667
Report date: 29-Apr-2019
Order Number: GCN19-1017
Samples: Pond Water
Analysis requested: Detection of Great Crested Newt eDNA from pond water.

Thank you for submitting your samples for analysis with the Fera eDNA testing service. The details of the analysis are as follows:

Method:

The method detects pond occupancy from great crested newts (GCN) using traces of DNA shed into the pond environment (eDNA). The detection of GCN eDNA is carried out using real time PCR to amplify part of the cytochrome 1 gene found in mitochondrial DNA. The method followed is detailed in Biggs J., et al, (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

The limits of this method are as follows: 1) the results are based on analyses of the samples supplied by the client and as received by the laboratory, 2) any variation between the characteristics of this sample and a batch will depend on the sampling procedure used. 3) the method is qualitative and therefore the levels given in the score are for information only, they do not constitute the quantification of GCN DNA against a calibration curve, 4) a 'not detected' result does not exclude presence at levels below the limit of detection.

The results are defined as follows:

Positive: DNA from the species was detected.
eDNA Score: Number of positive replicates from a series of twelve.
Negative: DNA from the species was not detected; in the case of negative samples the DNA extract is further tested for PCR inhibitors and degradation of the sample.
Inconclusive: Controls indicate degradation or inhibition of the sample, therefore the lack of detection of GCN DNA is not conclusive evidence for determining the absence of the species in the sample provided.

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DNA Analysis Report - Commercial in Confidence



CustomerReference	Fera Reference	GCN Detection	eDNA Score	Inhibition	Degradation
Waterbody 1 Ponyfield	S19-015936	Negative	0	No	No
Waterbody 2 Ditch	S19-015937	Negative	0	No	No

The results indicate that eDNA for great crested newts was not detected in either of the samples submitted. Analysis was conducted in the presence of the following controls: 1) extraction blank, 2) appropriate positive and negative PCR controls for each of the TaqMan assays (GCN, Inhibition, and Degradation). All controls performed as expected.

This test procedure was developed using research funded by the Department of Environment, Food and Rural Affairs.

Issuing officer: Steven Bryce

Tel: 01904 462 070

Email: e-dna@fera.co.uk

page 2 of 2

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