

M5 Junction 10 Improvements Scheme

Environmental Statement Appendix 7.1 Phase 1 Habitat Survey TR010063 – APP 6.15

Regulation 5 (2)(a)

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6.15 APPENDIX 7.1 PHASE 1 HABITAT SURVEY

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1. Introduction

1.1. Terms of Reference

- 1.1.1. Atkins, member of the SNC-Lavalin group, was commissioned by Gloucestershire County Council (GCC) to undertake a Phase 1 habitat survey to inform the Environmental Statement (ES) for the M5 Junction 10 Improvements Scheme (hereafter referred to as 'the Scheme').
- 1.1.2. The purpose of the Phase 1 habitat survey was to identify the habitats present within the zone of influence of the Scheme (see section 2.3); provide recommendations to enable compliance with legislation and policy; and, where appropriate, identify the need for avoidance, mitigation, compensation, or enhancement measures.
- 1.1.3. This Technical Appendix summarises the results of the Phase 1 habitat survey, including the methods used, and provides an evaluation of the nature conservation value of habitats within the survey area. This report covers terrestrial habitats only; aquatic habitats are covered in Technical Appendix 7.12 - Aquatic Ecology (application document TR010063 – APP 6.15).
- 1.1.4. This report provides factual information to support the ES, which will accompany the planning application for the Scheme.

1.2. Legislation and Policy

- 1.2.1. Selected habitats are legally protected in England via the designation of the following types of statutory nature conservation site:
 - Special Areas of Conservation (SACs) – these sites support habitats listed in Annex I and/or populations of species listed on Annex II of Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and are protected under the Conservation of Habitats and Species Regulations 2017 (as amended)¹.
 - Special Protection Areas (SPAs) – these sites support internationally important populations and/or assemblages of birds, as defined by Directive 2009/147/EC on the protection of wild birds (the Birds Directive), and are protected under the Conservation of Habitats and Species Regulations 2017 (as amended)¹.
 - Sites of Special Scientific Interest (SSSIs) – these sites support nationally important biological (or geological) interest features and are protected under the Wildlife and Countryside Act 1981 (as amended). Criteria for the selection of biological SSSIs are defined by the Joint Nature Conservation Committee (JNCC)².
 - National Nature Reserves (NNRs) – these are sites which have been established under the National Parks and Access to the Countryside Act 1949 and the Wildlife and Countryside Act 1981 (as amended) due to their national importance for the conservation of wildlife (or geological features). They may receive protection from byelaws made by the appropriate conservation body (Natural England).
 - Local Nature Reserves (LNRs) – these are sites which have been established under the National Parks and Access to the Countryside Act 1949 due to their importance for the conservation of wildlife (or geological features) within the locality. They may receive protection from byelaws made by the local authority.
- 1.2.2. In addition to their legal protections, the site designations listed above also receive protection via the planning system, as prescribed by the National Planning Policy

¹ As amended by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.

² JNCC, Guidelines for selection of biological SSSIs, available from <https://jncc.gov.uk/our-work/guidelines-for-selection-of-sssis/>

Framework (NPPF) 2021³ and Policy SD9 of the Gloucester, Cheltenham, and Tewkesbury Joint Core Strategy (JCS) 2011 – 2031⁴. The NPPF also applies the same level of protection afforded to SACs and SPAs to possible or candidate SACs (pSACs and cSACs), potential SPAs (pSPAs), and listed or proposed Ramsar Sites.

- 1.2.3. Non-statutory nature conservation sites also support a rich diversity of habitats that provide refuges and corridors for wildlife. In Gloucestershire these include areas designated as Local Wildlife Sites (LWS) and Conservation Road Verges (CRV). Habitats within these sites, as well as those that form wildlife corridors and stepping-stones that connect these areas, receive protection via the planning system.
- 1.2.4. The planning system also provides protection for 'irreplaceable habitats' (such as ancient woodland and ancient or veteran trees). The NPPF states that development resulting in the loss or deterioration of such habitats should be refused, unless there are wholly exceptional reasons, and a suitable compensation strategy exists.
- 1.2.5. Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 (as amended) requires the Secretary of State to publish a list of habitats (and species) which are of principal importance for the purpose of conserving biodiversity in England. Habitats listed in accordance with Section 41 of the NERC Act 2006, also known as 'priority habitats', receive protection via the planning system. Section 41 list of priority habitats include the priority habitats previously listed in the UK Biodiversity Action Plan (BAP)⁵.
- 1.2.6. As well as being listed as habitats of principal importance (and thereby receiving protection via the planning system), hedgerows also receive legal protection under The Hedgerow Regulations 1997.
- 1.2.7. The Gloucestershire Local Nature Partnership (GLNP) has identified areas of core woodland habitats, traditional orchards, core open habitats and core wetland habitats across the county and is using these to review the suite of Strategic Nature Areas (SNAs)⁶ to feed into a new Local Nature Recovery Strategy (LNRS) for Gloucestershire. Policy SD9 of the Gloucester, Cheltenham and Tewkesbury Joint Core Strategy 2011-2031 encourages habitat creation and restoration within SNAs.

³ Ministry of Housing, Communities & Local Government (2021). National Planning Policy Framework. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

⁴ Gloucester City, Cheltenham Borough and Tewkesbury Borough (Adopted December 2017) Joint Core Strategy 2011 – 2031. Available from: <https://www.gloucester.gov.uk/media/5441/jcs.pdf>

⁵ <https://jncc.gov.uk/our-work/uk-bap-priority-habitats/>

⁶ <https://naturalcapital.gcerdata.com/>

2. Methodology

2.1. Introduction

- 2.1.1. The term ‘Scheme Boundary’ refers to the Order limits, excluding areas of the Order limits that extend approximately 2 km north and 2 km south of the Scheme alignment, along the M5. In these locations the Scheme Boundary is the Scheme alignment. The Order limits and the Scheme alignment are shown on Figure 7-1A in Appendix A.
- 2.1.2. Within the areas of the Order limits that extend north and south of the Scheme alignment, the only works proposed are the installation of signs in discrete locations, which will require vegetation clearance of up to approximately 20 m² plus some minor trimming back of vegetation up to a distance of 180 m in front of the sign to ensure visibility. These signage locations can be micro sited to avoid/minimise ecological impacts. These small-scale works are consistent with routine highway maintenance works. The results of desk study and field surveys here would not have any bearing on the impact assessment for the Scheme, and these areas have been excluded from assessments to inform the ES. Pre-construction surveys of the discrete signage locations and working with the contractor to micro site locations where appropriate to avoid or minimise ecological impacts will be undertaken and is considered to be proportionate.
- 2.1.3. The Affected Road Network (ARN) refers to the parts of the road network that would be affected by a change in operational traffic levels as a result of the Scheme. LA 105⁷ states that designated habitats (European sites, statutory and non-statutory designated nature conservation sites, nature improvement areas, areas of ancient woodland and veteran trees) within 200 m of the ARN should be included in the air quality assessment. This is linked to potential air quality impacts to habitats as a result of nitrogen deposition from road traffic emissions. The desk study areas described below incorporate this search area. The survey area described below is also aligned with this distance for consistency (even though such designated habitats are not present within 200 m of the Scheme Boundary), as it is considered to be the likely maximum distance over which there would be impacts to terrestrial habitats as a result of the Scheme.

2.2. Desk Study

- 2.2.1. A desk-based data gathering exercise was undertaken to collect relevant habitat information. Details of the various searches, search areas and data sources are provided below.
- 2.2.2. The Natural England website⁸ was reviewed to obtain contextual information on the National Character Area (NCA) in which the Scheme is located.
- 2.2.3. The MAGIC website⁹ was reviewed to identify:
- Statutory designated nature conservation sites within 2 km of the Scheme Boundary, within 200 m of the ARN or with a direct hydrological connection to the Scheme.
 - Priority habitats within 1 km of the Scheme Boundary.
 - Ancient woodland within 1 km of the Scheme Boundary and within 200 m of the ARN.

⁷ Design Manual for Roads and Bridges. LA 105 Air Quality (formerly HA 207/07, IAN 170/12, IAN 174/13, IAN 175/13, part of IAN 185/15). Online: 10191621-07df-44a3-892e-c1d5c7a28d90 (standardsforhighways.co.uk).

⁸ <http://publications.naturalengland.org.uk/category/587130> [Accessed 10/08/22].

⁹ Defra. c2022. Magic Map Application. [Online]. [Accessed 10/08/22]. Available from: <https://magic.defra.gov.uk/MagicMap.aspx>

- 2.2.4. The Woodland Trust's Ancient Tree Inventory website¹⁰ was reviewed to locate records of ancient and veteran trees within 1 km of the Scheme Boundary and within 200 m of the ARN. In addition, the arboricultural report for the Scheme (which is appended to Chapter 9 - Landscape, in Technical Appendix 9.4 (application document TR010063 – APP 6.15)) was reviewed to identify veteran trees within 200 m of the Scheme Boundary.
- 2.2.5. Gloucestershire Centre for Environmental Records (GCER) was contacted on 11 September 2019, 21 April 2021 and 14 July 2022 to obtain the following:
- Non-statutory designated nature conservation sites within 1 km of the Scheme Boundary and within 200 m of the ARN.
 - Recent¹¹ records of protected and notable¹² plant species within 1 km of the Scheme Boundary.
 - Recent records of invasive non-native plant species¹³ within 1 km of the Scheme Boundary.
- 2.2.6. Historic and recent aerial imagery was reviewed using Google Earth Pro (version 7.3.3) to supplement and refine the boundaries between habitats that were noted in the field and to characterise habitats that could not be accessed during the field survey (see Section 2.6).
- 2.2.7. The collected site and habitat information was also reviewed to determine if any Groundwater Dependent Terrestrial Ecosystems (GWDTE) are present within the zone of influence of the Scheme, in accordance with LA 113¹⁴.

2.3. Survey Area

- 2.3.1. The extent of the Phase 1 habitat survey was based on the zone of influence of the Scheme for this particular ecological receptor. It included all land within the Scheme Boundary and a 200 m buffer extending out in all directions from the Scheme Boundary where permitted and safe access allowed.
- 2.3.2. At the time the initial surveys in 2019 were undertaken, there were a number of Scheme options under consideration. This report only considers the survey data collected within 200 m of the current Scheme, hereafter referred to as the Phase 1 Habitat Survey Area. The Phase 1 Habitat Survey Area totals approximately 520 ha in area and is shown in Figure 7-1A in Appendix A.

2.4. Field Survey

- 2.4.1. The Phase 1 habitat surveys were led by suitably experienced ecologists who are members of the Chartered Institute of Ecology and Environmental Management (CIEEM) and considered competent to undertake Phase 1 habitat survey in accordance with the CIEEM competency criteria¹⁵.
- 2.4.2. The initial Phase 1 habitat survey of the Survey Area, excluding the M5 motorway verges, was undertaken in May and September 2019 once permitted access was available. The Phase 1 habitat survey of the M5 motorway verges within the Scheme alignment was undertaken in September and October 2021. A Phase 1 habitat validation survey was

¹⁰ Woodland Trust. 2019. Ancient Tree Inventory - Woodland Trust. [Online]. [Accessed 10/08/22]. Available from: <https://ati.woodlandtrust.org.uk/>

¹¹ Records of observations within the last 10 years.

¹² Notable plant species in this context comprise those which are listed in accordance with Section 41 of the NERC Act 2006 as species of principal importance for the purpose of conserving of biodiversity in England; and species which are nationally scarce or rare.

¹³ As listed on Schedule 9 to the Wildlife and Countryside Act 1981 (as amended).

¹⁴ Highways England (2020). Design Manual for Roads and Bridges LA 113 Road drainage and the water environment (formerly HD 45/09). (March 2020, version 1) Online: [d6388f5f-2694-4986-ac46-b17b62c21727](https://www.standardsforhighways.co.uk/d6388f5f-2694-4986-ac46-b17b62c21727) (standardsforhighways.co.uk)

¹⁵ CIEEM, (2022). Competency Standard for Preliminary Habitat Survey. Available from: <https://cieem.net/wp-content/uploads/2022/05/Preliminary-Habitat-Survey-Competency-Standard-May-2022.pdf>

undertaken in May and June 2022 to determine whether any of the baseline conditions had changed significantly since the 2019 surveys. The validation surveys covered land within the Scheme Boundary only, as it was considered appropriate to focus the survey effort on the habitats that would be directly affected, within the temporary and permanent land take areas for the Scheme. In addition, three areas of orchard and one area of diverse grassland within 200 m of the Scheme Boundary were proposed to be surveyed to ensure a diverse range of habitats were covered during the validation surveys, providing an indication of whether any baseline conditions have changed significantly since 2019.

- 2.4.3. The survey involved a walkover of the Phase 1 Habitat Survey Area to record the habitats present and any other features of interest (e.g. presence of protected and notable plants and invasive non-native plants). Habitat classification was undertaken in accordance with the Joint Nature Conservation Committee (JNCC) Phase 1 habitat survey methodology¹⁶. Habitats were recorded on base maps of the Phase 1 habitat Survey Area along with target notes to describe the characteristic plant species and any habitats/features of interest. Plant names recorded followed Stace (2019)¹⁷. In order to efficiently characterise the nature conservation value of the habitats within the very large survey area, built-up areas (e.g. buildings, hardstanding, and private gardens) were generally not recorded in detail during the field survey.
- 2.4.4. During the Phase 1 habitat validation survey in May and June 2022, habitats were recorded using the UK Habitat (UKHab) classification system¹⁸ in conjunction with the JNCC habitat classification. The UKHab classification is required to inform the Biodiversity Net Gain (BNG) assessment, which is a requirement of the Scheme. The results of the BNG assessment are provided in Technical Appendix 7.18 (application document TR010063 – APP 6.15).
- 2.4.5. A National Vegetation Classification (NVC) survey was undertaken in June 2022 of the two areas of unimproved neutral grassland within the Scheme Boundary in accordance with the JNCC NVC methodology¹⁹. These two areas of grassland were identified during the Phase 1 habitat validation survey.
- 2.4.6. The field survey did not include a systematic search of the Phase 1 Habitat Survey Area for invasive non-native plant species. However, the locations of such species were recorded where they were encountered.

2.5. Assessment

- 2.5.1. The terrestrial habitat and plant species resource has been valued in a geographical context.
- 2.5.2. The evaluation is based on the information gathered from the desk study and field surveys. It broadly following the framework provided in LA 108²⁰, but also draws on a number of other resources (in particular the Guidelines for the selection of biological SSSIs²¹, Gloucestershire Key Wildlife Sites Handbook²² and Gloucestershire

¹⁶ JNCC (2016). Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit [Online]. Available at: <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

¹⁷ Stace, C. (2019) New Flora of the British Isles (4th edition). C&M Floristics.

¹⁸ Butcher, B., Carey, P., Edmonds, R., Norton, L. and Treweek, J. (2020) The UK Habitat Classification User Manual Version 1.1 at <https://ukhab.org>. UKHab is the classification system that Biodiversity Metric 3.0 predominantly uses for area-based habitats.

¹⁹ Rodwell, J.S. (2006) NVC Users' Handbook Volume 3, JNCC, Peterborough, ISBN 978 1 86107 574 1.

²⁰ Highways England (2020). Design Manual for Roads and Bridges. LA 108 Biodiversity (formerly Volume 11, Section 3, Part 4 Ecology and Nature Conservation and IAN 130/10). (March 2020, version 1). Online: https://www.standardsforhighways.co.uk/dmr/search?discipline=SUSTAINABILITY_AND_ENVIRONMENT.

²¹ Jefferson, R.G., Smith, S.L.N. & MacKintosh, E.J. 2019. Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 3 Lowland Grasslands. Joint Nature Conservation Committee, Peterborough.

²² Available from: <https://www.gloucestershirewildlifetrust.co.uk/wildlife/local-wildlife-sites> Accessed: 06/07/2022

Conservation Road Verges Site Register²³) and accepted criteria²⁴ (e.g. diversity, rarity, and naturalness), as well as professional judgement. Where the evaluation has deviated from LA 108, this is fully justified.

2.6. Limitations

- 2.6.1. GCER does not hold exhaustive records of all the plant species that occur within a given area. Therefore, the absence of records for a particular species does not demonstrate that the species is absent. Similarly, the Woodland Trust's Ancient Tree inventory is not an exhaustive list and other ancient and veteran trees may be present in the area. These limitations have been factored into the assessment, which does not rely solely on desk study data.
- 2.6.2. The Phase 1 habitat validation surveys in 2022 did not cover the full Phase 1 Habitat Survey Area, but targeted areas within the Scheme Boundary only. In addition, previously identified valuable habitats within 200 m of the Scheme Boundary; orchards and an area of semi-improved neutral grassland likely managed as a hay meadow, were also part of the 2022 survey scope. Therefore, the data from the areas outside of the Scheme Boundary, excluding the small areas of valuable habitat identified above, is from 2019. A validation exercise has been undertaken to assess the change in habitats in 2022 compared to 2019 (Technical Appendix 7.17, application document TR010063 – APP 6.16). This has concluded that the habitats surveyed in 2019 and again in 2022 have not changed significantly. This indicates that the Phase 1 Survey Area habitats have also not changed significantly and so the habitat data from outside of the Scheme Boundary remains valid.
- 2.6.3. Access was not permitted to some parts of the Phase 1 Habitat Survey Area, which precluded a walkover of these areas. Areas that could not be accessed during the survey are shown in Figure 7-1A in Appendix A. These areas where access was not permitted total 60 ha and are approximately 11.53% of the overall Phase 1 Habitat Survey Area. Aerial imagery (available in Google Earth Pro (version 7.3.3)) was reviewed to estimate the broad habitat types in the areas that were not surveyed. The following broad habitats have been identified from aerial imagery (it is acknowledged that these cannot be confirmed using aerial imagery alone): agricultural grassland/cultivated land (49.68%); residential gardens (34.12%); roadside/verge (15.29%); waterbody (0.80%) and woodland (0.11%). The majority of the area that was not surveyed is located at least 50 m from the Scheme Boundary and is unlikely to be subject to direct impacts. The absence of field survey data for this area, most of which won't be directly affected and approximately 83.80% of which is likely to be of negligible/low biodiversity importance (agricultural grassland/cultivated land and residential gardens), is not considered to pose a significant constraint to the assessment.
- 2.6.4. In the 2022 validation surveys, two of the orchards and the diverse grassland within 200 m of the Scheme Boundary were not surveyed as access was not granted. However, as stated above, the validation exercise concluded that overall the Phase 1 Survey Area habitats have not changed significantly, therefore the 2019 habitat data for these areas remains valid.
- 2.6.5. The unimproved neutral grassland identified along a section of the A4019 verge was not subject to NVC survey as it had recently been cut and had a very short sward. As a result, a number of plant species would likely not have been recorded which would be a significant limitation to the result of the NVC survey. However, it was still possible to identify the Phase 1 habitat type present, which was the principal objective of the survey, and this is therefore not considered to be a significant constraint.
- 2.6.6. Phase 1 habitat surveys are limited by factors which affect the presence/visibility of plants and the appearance of habitats, such as the time of year, recent management (e.g. mowing) and the weather. Furthermore, the aim of the survey was to identify and record

²³ GCC/GWT/GCER v2.4. 2022. Available from: https://www.gloucestershire.gov.uk/media/6565/crv-register-v2_4-2022.pdf

²⁴ Set out in Ratcliffe, D.A (1977). A Nature Conservation Review. Cambridge University Press.

habitats and, therefore, did not include systematic recording of all plants observed within the Phase 1 Habitat Survey Area. The surveys have not, therefore, produced a complete list of plants and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future.

- 2.6.7. Due to land access permissions being granted at separate times, the Phase 1 habitat survey was undertaken during two different seasons within the year. Most of the initial Phase 1 Habitat Survey Area was surveyed in mid-late May 2019, which is an optimal time of year for Phase 1 habitat survey, and a relatively small (approximately 13 ha) part of the Phase 1 Habitat Survey Area was surveyed in late September 2019. The M5 verges (approximately 9.5 ha) were surveyed in late September / early October 2021. While some plant species are less conspicuous/less easily identifiable in late September / early October compared with May, it was still possible to identify the observed habitats based on the visible species present. Furthermore, the Phase 1 habitat validation / UKHab surveys were undertaken in May and June 2022, which is an optimal time of year for Phase 1 habitat survey. These covered some of the 13 ha that was surveyed in late September 2019 during the initial Phase 1 habitat survey, therefore partly mitigating the associated limitation. Therefore, this limitation does not pose a significant constraint to the results or assessment.

3. Results

3.1. Desk Study

3.1.1. Designated sites are shown on Figure 7-1B in Appendix A.

National Character Area Context

3.1.2. The Scheme is located within the Severn and Avon Vales NCA²⁵. This is an open agricultural landscape, dominated by the lower valleys of the rivers Severn and Avon. Woodland is sparse but traditional orchards are widespread. The area also contains important concentrations of lowland meadow and floodplain grazing marsh. The otherwise flat vale landscape is punctuated in places by Cotswold outliers, such as Bredon Hill.

Designated Sites within 2 km of the Scheme Boundary

3.1.3. There is one statutory designated nature conservation site within 2 km of the Scheme Boundary: Coombe Hill Canal SSSI, the north-east end of which is located approximately 1.9 km north-west of the Scheme Boundary (see Figure 7-1B in Appendix A). Coombe Hill Canal SSSI consists of a 3.7 km stretch of disused canal flanked by ditches, neutral grassland, scattered scrub and trees, an area of inundation fen and a withy bed²⁶. The site is of special interest for its assemblages of nationally rare and scarce invertebrates and nationally scarce plants. It is one of the most important known wetland sites for these features within Gloucestershire.

3.1.4. There is one unconfirmed, or potential, non-statutory designated LWS within 1 km of the Scheme Boundary: Hayden Sewage Treatment Works, located approximately 680 m south of the Scheme Boundary (see Figure 7-1B in Appendix A). The site is of interest because of the birds and hedgerows it supports.

Designated Sites within 200 m of the ARN

3.1.5. There are seven non-statutory designated nature conservation sites within 200 m of the ARN:

- Norton (A38) Conservation Road Verge – a wide band of dwarf elder (*Sambucus nigra*), with rough grassland, tall herb and hedgerow.
- Pegmore Farm, The Leigh 'Meadow 2' potential LWS – a diverse wet meadow grassland.
- Cotswold Farm, The Leigh Conservation Road Verge – a stand of dwarf elder within tall herb and rank grassland, with encroaching scrub and tree saplings.
- Tewkesbury Nature Reserve potential LWS – a nature reserve important to the local community.
- Tewkesbury Railway Line (Disused) LWS – an area with invertebrate interest, specifically glow worm.
- Walton Cardiff Ponds LWS – an area with amphibian interest, specifically great crested newt.
- Hayden Sewage Treatment Works unconfirmed/potential LWS (described in paragraph 3.1.4 above).

3.1.6. There are no other statutory or non-statutory designated nature conservation sites within 200 m of the ARN.

²⁵ <http://publications.naturalengland.org.uk/publication/1831421?map=true&category=587130> [Accessed 10/08/21]

²⁶ An area where willow is grown for coppicing.

Designated Sites with Hydrological Connections to the Scheme Boundary

- 3.1.7. All of the watercourses that are crossed by the Scheme Boundary flow into the River Severn, at least 7.5 km downstream. From the nearest confluence point, where the River Chelt joins the River Severn, just upstream of Wainlode Cliff, the Severn Estuary is a further 40 km downstream.
- 3.1.8. The Severn Estuary is designated as a SAC, SPA, Ramsar Site and SSSI. It supports the following features of nature conservation importance:
- Estuarine habitats, including estuaries; mudflats and sandflats not covered by seawater at low tide; Atlantic salt meadows; sandbanks, which are slightly covered by seawater all the time; and reefs.
 - Populations of sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), twaite shad (*Alosa fallax*), Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*), Allis shad (*Alosa alosa*) and European eel (*Anguilla Anguilla*).
 - >4% of the British overwintering population of Bewick’s swan (*Cygnus columbianus bewickii*).
 - Significant wintering populations of curlew (*Numenius arquata*), dunlin (*Calidris alpina alpina*), pintail (*Anas acuta*), redshank (*Tringa totanus*) and shelduck (*Tadorna tadorna*).
 - Significant passage population of ringed plover (*Charadrius hiaticula*).
 - Regular assemblages of over 20,000 wildfowl, which qualify the site as a wetland of international importance.
- 3.1.9. There are no other statutory or non-statutory designated sites for nature conservation within the desk study area.

Priority Habitats

- 3.1.10. Priority habitats (as mapped by Natural England) identified during the desk study within 1 km of the Scheme Boundary are detailed in Table 3-1 below and shown in Figure 7-1C in Appendix A.

Table 3-1 - Priority Habitat records within 1 km of the Scheme Boundary

Priority habitat type	Approximate nearest distance and direction from the Scheme Boundary
Deciduous woodland	Within Scheme Boundary
Traditional orchard	Within Scheme Boundary
Open mosaic habitat on previously developed land	180 m north
Coastal and floodplain grazing marsh	680 m west

Ancient Woodland and Ancient/Veteran Trees

- 3.1.11. There are no ancient woodlands within 1 km of the Scheme Boundary or within 200 m of the ARN. However, there is one record of an ancient or veteran tree within 1 km of the Scheme Boundary; a common yew (*Taxus baccata*) 950 m east of the northern extent. The arboricultural survey report for the Scheme was reviewed which identified one veteran ash (*Fraxinus excelsior*) tree in a hedgerow within the southern quadrant (see Paragraph 3.2.3) of the Scheme. These are shown on Figure 7-1C in Appendix A. There are no recorded ancient or veteran trees within 200 m of the ARN.

Protected and Notable Plant Species

- 3.1.12. There are no records of protected plant species within 1 km of the Scheme Boundary.
- 3.1.13. There is one record of a black poplar tree (*Populus nigra*) located over 800 m west of the Scheme Boundary on the Boddington Estate. Black poplar is one of Britain's rarest trees and is identified by GCER as being a Key Gloucestershire Species.

Invasive Non-Native Plant Species

- 3.1.14. There are no records of invasive non-native plant species within 1 km of the Scheme Boundary.

3.2. Field Survey

Overview

- 3.2.1. The Scheme is located within a low-lying, mainly agricultural landscape to the north-west of Cheltenham. The Phase 1 Habitat Survey Area was dominated by arable fields, improved grasslands, and poor semi-improved grasslands (see Figure 7-1A in Appendix A). The dominant arable and grassland habitats were interspersed with pockets of other terrestrial habitats of greater nature conservation value, including broadleaved and mixed woodland, traditional orchard, and semi-improved neutral grassland.
- 3.2.2. These habitats exist either side of the M5 motorway, which runs south west to north east, and the A4019, which runs north west to south east. The Phase 1 Habitat Survey Area is also bisected by the River Chelt, which flows through the area from east to west.
- 3.2.3. There was some variation in the relative abundance of the dominant habitat types across the Phase 1 Habitat Survey Area:
- The northern 'quadrant' (north-west of the M5 and north-east of the A4019) was dominated by improved grassland pasture fields, mainly grazed by cattle.
 - The eastern quadrant (south-east of the M5 and north-east of the A4019) was dominated by large arable fields, with a network of sheep-grazed improved grassland pasture fields to the north.
 - The southern quadrant (south-west of the A4019 and south-east of the M5) was dominated by large arable fields to the north (see Figure 3-1) and silage/pasture fields in the south.
 - The western quadrant (north-west of the M5 and south-west of the A4019) was dominated by large arable fields.
 - The 'A4019 corridor', which extends south-east from the Scheme towards Cheltenham, was dominated by small, improved grassland pasture fields (grazed by sheep or horses) and residential gardens to the south-west of the A4019. To the north-east of the A4019 there was primarily a mix of large arable fields, small areas of improved and semi-improved grassland, residential gardens and tall ruderal / scrub vegetation associated with derelict horticultural nurseries.
- 3.2.4. Details of the approximate total area of each habitat type recorded within the Phase 1 Habitat Survey Area is provided in Table 3-2, whilst the approximate lengths of each hedgerow habitat type is provided in Table 3-3. For comparison, the corresponding UKHab habitat type is also listed. The distribution of these habitats is shown on Figure 7-1A in Appendix A.



Figure 3-1 - View north across arable fields in the southern quadrant towards the M5 motorway (the line of trees is associated with the River Chelt)

Table 3-2 - Breakdown of habitat areas within the Phase 1 Habitat Survey Area shown in hectares (and as a percentage of the total survey area)

JNCC Phase 1 habitat type	UKHab habitat type ²⁷	Total area (ha) (% of total survey area in brackets)
Unimproved neutral grassland	g3a Lowland meadows	0.17 (0.03)
Semi-natural broadleaved woodland	w1f Lowland mixed deciduous woodland	0.52 (0.10)
Traditional orchard	g3c Other neutral grassland 21 Traditional orchards ²⁸	3.76 (0.72)
Arable	c1 Arable and horticulture	242.80 (46.67)
Improved grassland	g4 Modified grassland	70.50 (13.55)
Poor semi-improved grassland	g3c6 Lolium-Cynosurus neutral grassland	30.44 (5.85)
Semi-improved neutral grassland	g3c Other neutral grassland	29.71 (5.71)
Other tall ruderal	g3c Other neutral grassland 16 Tall herb ²⁸	3.70 (0.71)
Plantation mixed woodland	w1h Other woodland; mixed	5.64 (1.08)

²⁷ Recorded to appropriate UKHab level most relevant to corresponding Phase 1 habitat type.

²⁸ Field habitat recorded to which a secondary code is added.

Plantation broadleaved woodland	w1g Other woodland; broadleaved	7.99 (1.54)
Plantation coniferous woodland	w2c Other coniferous woodland	0.44 (0.08)
Dense/continuous scrub	h3d Bramble scrub/h3f Hawthorn scrub/h3h Mixed scrub	5.04 (0.97)
Scattered scrub	g3c Other neutral grassland 10 Scattered scrub ²⁸	0.46 (0.09)
Broadleaved parkland/scattered trees	g3c Other neutral grassland 11 Scattered trees ²⁸	1.90 (0.36)
Ephemeral/ short perennial	g3c Other neutral grassland 12 Scattered bracken ²⁸	0.37 (0.07)
Introduced shrub	h3h Mixed scrub 48 Non-native ²⁸	0.52 (0.10)
Amenity grassland	g4 Modified grassland	6.81 (1.31)
Building/bare ground/hardstanding	u1b Developed land; sealed surface/u1e Built linear features/u1d Suburban, mosaic of developed, natural surface	48.17 (9.26)
Standing water	r1a Eutrophic standing water 19 Ponds (Priority Habitat)	0.51 (0.10)
Running open water	r2b Other rivers and streams	0.79 (0.15)
Area surveyed by aerial photograph interpretation	N/A	Agricultural grassland/ cultivated land: 29.81 ha (5.73) Residential garden: 20.47 (3.93) Roadside/ verge: 9.17 (1.76) Woodland: 0.07 (0.01) Waterbody: 0.48 (0.09)

Table 3-3 - Breakdown of hedgerow lengths within the Phase 1 Survey Area shown in kilometres

JNCC Phase 1 habitat type	UKHab habitat type ²⁷	Total length (km)
Native species-rich hedge and trees	Native species rich hedgerow with trees/ Native species rich hedgerow with trees - associated with bank or ditch	2.93
Native species-rich intact hedge	Native species rich hedgerow/ Native species rich hedgerow - associated with bank or ditch	2.53
Species-poor hedge and trees	Native hedgerow with trees/ Native hedgerow with trees - associated with bank or ditch	9.80
Species-poor intact hedge	Native hedgerow/ Native hedgerow -associated with bank or ditch	16.10
Species-poor defunct hedge	Native hedgerow/ Native hedgerow -associated with bank or ditch	1.66

Irreplaceable habitats

Veteran tree

3.2.5. One veteran tree, an ash within a hedgerow in the southern quadrant, was identified within the Phase 1 Survey Area during the arboricultural survey as shown in Figure 3-2 below and Figures 7-1A and 7-1C in Appendix A (the arboricultural survey is appended to Chapter 9 - Landscape, in Technical Appendix 9.4 (application document TR010063 – APP 6.15)).



Figure 3-2 - Native hedgerow with trees, including a veteran tree in the southern quadrant

Terrestrial Priority Habitats

- 3.2.6. Descriptions of the priority habitats recorded within the Phase 1 Habitat Survey Area are provided below.

Unimproved Neutral Grassland (Lowland Meadow)

- 3.2.7. Two plots of unimproved neutral grassland were recorded in the Phase 1 Habitat Survey Area. The first was recorded along a roadside verge in Stanboro Lane (see Figure 3-3) which is in the northern quadrant of the Scheme, and the second in a verge along the A4019 corridor west of the current M5 J10 in the western quadrant (see Figure 3-4). These two plots of unimproved neutral grassland have been classed as 'Lowland meadow' Priority Habitat²⁹.
- 3.2.8. The Stanboro Lane verge had a diverse botanical assemblage and is associated with a defunct hedge bank. It was approximately 2 m wide and extended along the lane for approximately 170 m. The grassland most closely approximates to a highly species rich NVC community: MG1c *Arrhenatherum elatius* grassland *Filipendula ulmaria* sub-community. False-oat grass (*Arrhenatherum elatius*) and meadowsweet (*Filipendula ulmaria*) were abundant, whilst species indicative of rich grassland communities were also present such as lady's bedstraw (*Galium verum*), meadow vetchling (*Lathyrus pratensis*), bulbous buttercup (*Ranunculus bulbosus*), burnet-saxifrage (*Pimpinella saxifrage*) and germander speedwell (*Veronica chamaedrys*). Tor-grass (*Brachypodium rupestre*) was also a locally abundant plant across a few places in the sward, and this species together with a number of other species found are calcicoles. The exceptionally rich range of taxa is an indication of habitat continuity and the presence of species such as common gromwell (*Lithospermum officinale*) indicate the overall habitat quality.
- 3.2.9. The unimproved neutral grassland plot on a section of the A4019 verge had a diverse botanical assemblage with lowland meadow indicator species present such as common knapweed (*Centaurea nigra*), common bird's-foot-trefoil (*Lotus corniculatus*), meadow vetchling, wild parsnip (*Pastinaca sativa*), bulbous buttercup, oxeye daisy (*Leucanthemum vulgare*), and red clover (*Trifolium pratense*). The width of the verge varied between 1 and 5 m, and it extended for approximately 220 m.
- 3.2.10. False-oat grass, false brome (*Brachypodium sylvaticum*), and red fescue (*Festuca rubra*) were the three most abundant grass species within the plot. The grassland most closely approximates to the NVC communities MG1d *Arrhenatherum elatius* grassland *Pastinaca sativa* sub-community and MG1e *Arrhenatherum elatius* grassland *Centaurea nigra* sub-community; false-oat grass grasslands where, respectively, wild parsnip and common knapweed are widespread components of the vegetation.

²⁹ Maddock, A. (ed) (2008) *UK BAP Priority Habitat Descriptions - Lowland Meadows*. Online: <https://data.jncc.gov.uk/data/f0553254-1d47-474a-98e5-37fa163a28b5/UKBAP-BAPHabitats-29-Lowland-Meadows.pdf>
Assessed: 10/08/22



Figure 3-3 - Unimproved neutral grassland on Stanboro Lane verge



Figure 3-4 - Unimproved neutral grassland on A4019 verge

Semi-natural Broadleaved Woodland (Lowland Mixed Deciduous Woodland)

- 3.2.11. There was one copse of semi-natural broadleaved woodland within a large arable field at the southern end of the Phase 1 Habitat Survey Area (see Figure 3-5). It had a fairly open

canopy dominated by mature pedunculate oak trees, with occasional ash. The dense understorey was dominated by blackthorn (*Prunus spinosa*) and hawthorn (*Crataegus monogyna*) with occasional hazel (*Corylus avellana*), field maple (*Acer campestre*), and elder. The field layer included abundant common nettle (*Urtica dioica*), cleavers (*Galium aparine*), and greater burdock (*Arctium lappa*).

- 3.2.12. Due to being a semi-natural woodland in southern England that is likely a NVC W8 community, this woodland meets the lowland mixed deciduous woodland priority habitat criteria³⁰.



Figure 3-5 - View north-east towards a copse of mature broadleaved semi-natural woodland in southern quadrant

Traditional Orchard

- 3.2.13. There were several pockets of traditional orchard in varying condition. One of the largest and most intact was located at Hayden Hill Fruit Farm (towards the southern end of the Survey Area; see Figure 3-6), where there was one poor semi-improved pasture field containing numerous mature fruit trees, many with rot hole features. Another notable example was located at Stanboro Lodge (just north of the A4019, in the northern quadrant). Here there was a mosaic of amenity grassland, coarse poor-semi-improved grassland, semi-improved neutral grassland and dense scrub containing scattered mature fruit trees, many of which were moribund. A further example was at Millhouse Farm, where there was a field of poor semi-improved grassland containing eight overmature fruit trees.
- 3.2.14. These three areas of traditional orchards (as shown on Figure 7-1A in Appendix A) meet the criteria for the priority habitat type: traditional orchard³¹. They broadly align with the traditional orchard areas shown on the MAGIC website, and on Figure 7-1C in Appendix A, although there are some slight differences in extent. The Phase 1 Habitat Survey map

³⁰ Maddock, A. (ed) (2008). *UK Biodiversity Action Plan Priority Habitat Descriptions – Lowland Mixed Deciduous Woodland*. Online: <https://data.jncc.gov.uk/data/2829ce47-1ca5-41e7-bc1a-871c1cc0b3ae/UKBAP-BAPHabitats-30-LowlandMixedDecWood.pdf> [Accessed: 21/09/21]

³¹ Maddock, A. (ed) (2008). *UK Biodiversity Action Plan Priority Habitat Descriptions – Traditional Orchards*. Online: <https://data.jncc.gov.uk/data/2829ce47-1ca5-41e7-bc1a-871c1cc0b3ae/UKBAP-BAPHabitats-56-TraditionalOrchards.pdf> [Accessed: 21/09/21]

(Figure 7-1A in Appendix A) is considered to be more accurate as it is based on detailed field surveys.

- 3.2.15. One area, just south of the A4019 at Uckington, is mapped as priority habitat: traditional orchard on the MAGIC website (as shown on Figure 7-1C in Appendix A). However, it is not considered to meet the criteria for this priority habitat type, as the fruit trees and surrounding grassland are too intensively managed and historic aerial imagery on Google Earth shows that the fruit trees were planted between 1999 and 2005. It is mapped as broadleaved plantation woodland.



Figure 3-6 - View south across traditional orchard at Hayden Hill Fruit Farm

Hedgerows

- 3.2.16. The fields across the study area were typically bordered by species-poor native hedgerows. The hedgerows generally ranged in condition from tightly flailed lines of hawthorn and/or blackthorn to tall, unmanaged treelines, with the most frequent tree species including ash, pedunculate oak and crack willow (*Salix euxina*). One ash located in a hedgerow was categorised as a veteran tree (see Paragraph 3.2.5 and Figure 3-2). Some of the hedgerows were also associated with ditches, several of which were wet at the time of the surveys. Approximately 33 km of hedgerows were present within the Phase 1 Habitat Survey Area.

- 3.2.17. A specific hedgerow survey has been undertaken to enable a more detailed assessment of the hedgerows within the Phase 1 Survey Area. The Hedgerow Survey Report (Technical Appendix 7.2, application document TR010063 – APP 6.15) provides more information on this assessment and identifies 121 hedgerows out of 129 as consisting predominantly (i.e. 80% or more cover) of at least one woody UK native species, which is the requirement to meet the hedgerows priority habitat criteria³².

³² Maddock, A. (ed) (2008). *UK Biodiversity Action Plan Priority Habitat Descriptions – Hedgerows*. Online: <https://data.jncc.gov.uk/data/ca179c55-3e9d-4e95-abd9-4eb2347c3b6/UKBAP-BAPHabitats-17-Hedgerows.pdf> [Accessed: 21/09/21]

Terrestrial Non-priority Habitats

- 3.2.18. Descriptions of the non-priority habitats recorded within the Phase 1 Survey Area are provided below.

Arable

- 3.2.19. Arable fields were the most dominant habitat type across the Phase 1 Habitat Survey Area. There were arable fields in the eastern, southern, and western quadrant, as well as along the A4019 corridor. The four crops recorded being grown were wheat (see Figure 3-7), barley, maize, and a grass ley.



Figure 3-7 - Wheat field in the southern quadrant

Improved Grassland

- 3.2.20. The improved grasslands (see Figure 3-8) were typically dominated by perennial ryegrass (*Lolium perenne*), soft-brome (*Bromus hordeaceus*), cock's-foot (*Dactylis glomerata*), meadow foxtail (*Alopecurus pratensis*) and Timothy (*Phleum pratense*), with abundant creeping buttercup (*Ranunculus repens*) and white clover (*Trifolium repens*). There were patches dominated by common nettle. Occasional species included broad-leaved dock (*Rumex obtusifolius*), creeping thistle (*Cirsium arvense*), yarrow (*Achillea millefolium*) and common chickweed (*Stellaria media*).



Figure 3-8 - View east across improved grassland fields in the eastern quadrant

Poor Semi-improved Grassland

- 3.2.21. The poor semi-improved grasslands (see Figure 3-9) were characterised by a more diverse range of grasses than the improved grasslands, and typically included abundant false oat-grass (*Arrhenatherum elatius*), rough meadow-grass (*Poa trivialis*), and meadow foxtail; frequent perennial rye-grass, cock's-foot and soft-brome; and occasional smooth meadow-grass (*Poa pratensis*) and Yorkshire-fog (*Holcus lanatus*). There was also a greater diversity and abundance of forbs, typically including frequent cow parsley (*Anthriscus sylvestris*), common vetch (*Vicia sativa*), red clover, white clover, creeping buttercup, common mouse-ear (*Cerastium fontanum*), hogweed (*Heracleum sphondylium*) and common chickweed, with patches of abundant common nettle. Sward structure was also more variable; ranging from a uniform, close-grazed sward in some locations to a tall, coarse sward in others.
- 3.2.22. The poor semi-improved grasslands have been assessed against the relevant priority habitat criteria³³ and do not meet it due to the relatively low species richness.

³³ Maddock, A. (ed) (2008) *UK BAP Priority Habitat Descriptions - Lowland Meadows*. Online: <https://data.jncc.gov.uk/data/f0553254-1d47-474a-98e5-37fa163a28b5/UKBAP-BAPHabitats-29-Lowland-Meadows.pdf> [Accessed: 10/08/22]



Figure 3-9 - View north across poor semi-improved grassland fields in the southern quadrant

Semi-improved Neutral Grassland

- 3.2.23. Semi-improved neutral grassland was found along the A4019 corridor and in all four quadrants of the Phase 1 Habitat Survey Area. In this grassland type the botanical diversity was greater than that typically found within the poor semi-improved grassland described above, yet not as high as would be expected within an area of unimproved neutral grassland.
- 3.2.24. The characteristics and management of the habitats within this category varied from one plot to the next, and included silage fields, fields grazed by horses and cattle (see Figure 3-10), roadside verges, arable field margins, and unmanaged gardens. False-oat grass typically dominated these plots with red fescue, Yorkshire-fog, rough meadow-grass, meadow foxtail, Timothy and cock's-foot also abundant. Frequently recorded forbs included red clover, common vetch, ribwort plantain (*Plantago lanceolata*), meadow buttercup (*Ranunculus acris*), common mouse-ear, and common bird's-foot-trefoil (*Lotus corniculatus*).
- 3.2.25. The semi-improved neutral grasslands have been assessed against the relevant priority habitat criteria³³ and do not meet it due to the insufficient frequency of lowland meadow indicator species and relatively low species richness.



Figure 3-10 - View south across small field of semi-improved neutral grassland pasture between the A4019 and the River Chelt

Other Tall Ruderal

- 3.2.26. There were several pockets of other tall ruderal habitat scattered across the Phase 1 Habitat Survey Area. These were located along the A4019 corridor at the derelict horticultural nurseries, along the banks of the River Chelt (see Figure 3-11), and along the M5 verges. Common nettle typically dominated these areas, with creeping thistle, spear thistle (*Cirsium vulgare*), bramble (*Rubus fruticosus* agg.), false-oat grass, greater burdock (*Arctium lappa*), garlic mustard (*Alliaria petiolata*) and hogweed typically abundant.



Figure 3-11 - Other tall ruderal habitat along the bank of the River Chelt

Broadleaved, Coniferous, and Mixed Plantation Woodland

- 3.2.27. Within the Phase 1 Habitat Survey Area, this habitat was mainly found alongside the M5, although there were a number of other woodland copses located away from the motorway (see Figure 3-12). These comprised an area of broadleaved plantation woodland extending west of the motorway along the A4019 as well as three additional areas of broadleaved and mixed plantation woodland further north within the northern quadrant; an area of broadleaved plantation woodland at the edge of the Survey Area in the western quadrant; a small area of broadleaved plantation woodland close to the A4019 in the southern quadrant; small areas of coniferous and broadleaved plantation woodland associated with the derelict horticultural nurseries in the eastern quadrant. The canopy was typically dominated by ash, with frequent horse-chestnut (*Aesculus hippocastanum*), pedunculate oak, sycamore (*Acer pseudoplatanus*) and Scots pine (*Pinus sylvestris*) in places. Occasional canopy species included alder (*Alnus glutinosa*), aspen (*Populus tremula*), beech (*Fagus sylvatica*) and silver birch (*Betula pendula*). Understorey diversity was variable between locations, being completely dominated by hawthorn in some places, while others typically included a mix of occasional cherry (*Prunus* sp.), field maple, elder, crab apple (*Malus sylvestris*), hazel and hornbeam (*Carpinus betulus*). The field layer typically included abundant common nettle, common chickweed, cleavers and grasses, such as rough meadow-grass, false brome and hairy-brome (*Bromopsis ramosa*); frequent dock species (*Rumex* spp.), lords-and-ladies (*Arum maculatum*), cow parsley and wood avens (*Geum urbanum*); and locally dominant bramble and common ivy (*Hedera helix*).
- 3.2.28. Ten of these areas are mapped as priority habitat: deciduous woodland on the MAGIC website (as shown on Figure 7-1C in Appendix A). However, they are not considered to

meet the criteria for this priority habitat type³⁴, as the priority habitat description indicates that it is associated with semi-natural woodland rather than plantation woodland.



Figure 3-12 - Cope of broadleaved plantation woodland in the northern quadrant dominated by semi-mature ash trees

Dense/Continuous Scrub

- 3.2.29. There were several plots of dense/continuous scrub across the Phase 1 Habitat Survey Area, in particular along the M5 verge, on both northbound and southbound sides. In addition, there were also two plots of scattered scrub, both located along the southbound M5 verge. The scrub condition and species composition vary greatly from bramble dominated scrub, hawthorn dominated scrub (see Figure 3-13), to mixed scrub. The woody species typically found within the scrub plots include hawthorn, blackthorn, dogwood (*Cornus sanguinea*), ash, elder (*Sambucus nigra*), cherry sp., alder, sycamore, whilst forbs such as common nettle, creeping thistle, spear thistle, and hogweed were also abundant.

³⁴ Maddock, A. (ed) (2008). *UK Biodiversity Action Plan Priority Habitat Descriptions – Lowland Mixed Deciduous Woodland*. Online: <https://data.jncc.gov.uk/data/2829ce47-1ca5-41e7-bc1a-871c1cc0b3ae/UKBAP-BAPHabitats-30-LowlandMixedDecWood.pdf> [Accessed: 21/09/21]



Figure 3-13 - Hawthorn scrub along A4019 corridor

Boundary Features and Trees

- 3.2.30. Aside from trees within field boundaries and areas of woodland/orchard, lines of trees and individual trees within fields, along riverbanks, and road verges were recorded infrequently within the Phase 1 Habitat Survey Area. None of these were veteran or ancient trees, but some were mature or over-mature, with deadwood features (see Figure 3-14).



Figure 3-14 - View north towards a moribund over-mature ash tree at Butler's Court

Other Terrestrial Habitats

- 3.2.31. Buildings, hardstanding, and private gardens were typically excluded from the Phase 1 habitat survey (see Section 2.4). However, it is important to note that such features are present within the Phase 1 Habitat Survey Area.
- 3.2.32. There were numerous buildings (and associated gardens), which were mostly located along the A4019 corridor, in particular at Stanboro Lane, Withybridge Gardens, Uckington and Homecroft Drive. There were also several other clusters of farm buildings and residential properties, mostly in the southern quadrant. These include farms at Butler's Court and Withybridge, and various properties at Hayden and along the B4634.
- 3.2.33. There were areas of hardstanding associated with most of the buildings mentioned above. In addition, the existing roads comprise a substantial area of hardstanding, most notably the M5 motorway (including the existing Junction 10 slip roads), the A4019, the B4634, and Withybridge Lane.
- 3.2.34. Although making up only a very small proportion of the Phase 1 Habitat Survey Area, the mosaic of habitats found at the derelict horticultural nurseries along the north side of the A4019 (at Stanboro Lane and Uckington) are a notable habitat feature. They comprise complex patchworks of unmanaged coarse grassland, coniferous plantation woodland, young fruit trees, ephemeral/ short perennial, amenity grassland, tall ruderal, and scrub, interspersed with various types of temporary and permanent structure, hardstanding and debris (see Figure 3-15).
- 3.2.35. None of the other terrestrial habitats meet priority habitat criteria.



Figure 3-15 - View north across a mosaic of habitats at one of the derelict nurseries at Uckington

Aquatic Habitats

- 3.2.36. Although aquatic habitats are not detailed and assessed within this report, a summary of the main aquatic habitats within the Phase 1 Habitat Survey Area is provided as follows:
- The River Chelt, which flows west across the Scheme, south of the A4019 (see Figure 3-16).
 - An unnamed tributary of the River Chelt, which flows north-west across the Scheme, to the south of the River Chelt, and connects with the River Chelt at Boddington (west of the Phase 1 Habitat Survey Area).
 - An unnamed tributary of Leigh Brook, which flows north-west across the Scheme, north of the A4019, and connects with Leigh Brook near Coombe Hill (north-west of the Phase 1 Habitat Survey Area).
 - Several wet ditches associated with field boundaries.
 - Five ponds (plus one waterbody identified from aerial photography).
 - A moat.
- 3.2.37. Rivers and ponds are both listed as priority habitats in accordance with Section 41 of the NERC Act 2006 (as amended). Further information on these aquatic habitats is provided in the Aquatic Ecology Report (Technical Appendix 7.12, application document TR010063 – APP 6.15), with further details of the ponds and moat are also provided in the Great Crested Newt Survey Report (Technical Appendix 7.11, application document TR010063 – APP 6.15).



Figure 3-16 - View east along the River Chelt, east of Withybridge

Invasive Non-Native Plant Species

3.2.38. The following invasive non-native plant species were recorded and are shown on Figure 7-1D in Appendix A:

- Himalayan balsam (*Impatiens glandulifera*) – adjacent to B4634 at Hayden and within the woodland on the west side of the M5, next to the River Chelt culvert. Also recorded on the River Chelt upstream of the Phase 1 Habitat Survey Area, south of Uckington, and in the hedgerow south of the A4019 between Withybridge Lane and the layby.
- Cotoneaster (*Cotoneaster* sp.³⁵) – in a bank of introduced shrub planting between Withybridge Gardens and the A4019.
- Rhododendron (*Rhododendron ponticum*) – within mixed plantation woodland between the M5 off slip and the A4019 at Junction 10.
- Variegated yellow archangel (*Lamium galeobdolon* subsp. *Argentatum*) – within the verges of south-eastern end of Stanboro Lane.

³⁵ Precautionary identification for the purpose of this assessment as one of the five cotoneaster species which are listed on Schedule 9 of the Wildlife and Countryside Act 1981 as invasive non-native plant species.

4. Evaluation

4.1. Introduction

4.1.1. The importance values of the designated sites and irreplaceable habitats identified during the desk study and terrestrial habitats within the Phase 1 Survey Area are provided below. The evaluation of aquatic habitats within the Phase 1 Survey Area is provided in the Aquatic Ecology Report (Technical Appendix 7.12, application document TR010063 – APP 6.15).

4.2. Designated Sites

4.2.1. In accordance with the evaluation guidance provided in Table 3.9 of LA 108³⁶, the designated sites identified during the desk study have each been ascribed an importance value based on their respective levels of designation, as set out below:

- Severn Estuary SAC – International importance.
- Severn Estuary SPA – International importance.
- Severn Estuary Ramsar Site – International importance.
- Coombe Hill SSSI – National importance.
- Non-statutory designated nature conservation sites – County importance.

4.3. Irreplaceable habitats

4.3.1. In accordance with the evaluation guidance provided in Table 3.9 of LA 108, the veteran ash tree in the hedgerow within the southern quadrant of the Scheme Boundary, and the veteran common yew tree identified within 1 km of the Scheme Boundary, have been ascribed a value of National importance.

4.4. Priority Habitats

4.4.1. The lowland mixed deciduous woodland priority habitat and traditional orchard priority habitats identified within the Phase 1 Habitat Survey Area have been ascribed a value of County importance. This evaluation deviates from the guidance provided in Table 3.9 of LA 108, which indicates that priority habitats should be ascribed a value of National importance. The reason for this deviation is that the habitats in question are all small, isolated examples of habitat types that are fairly common in the wider region and are not particularly notable examples of these habitat types. The lowland mixed deciduous woodland and the traditional orchards were assessed against the Gloucestershire Local Wildlife Site criteria³⁷ and do not meet the minimum thresholds. The lowland mixed deciduous woodland and traditional orchards are considered to be of County importance as opposed to Local by virtue of their inclusion on the Section 41 list of habitats of principal importance for conservation of biodiversity in England.

4.4.2. The traditional orchard habitat at Stanboro Lane was surrounded by a mosaic of other habitats including amenity grassland, poor semi-improved grassland, semi-improved neutral grassland and scrub. These habitats immediately surrounding the traditional orchard are also included in the valuation of County importance, as together they combine

³⁶ Highways England (2020). Design Manual for Roads and Bridges. LA 108 Biodiversity (formerly Volume 11, Section 3, Part 4 Ecology and Nature Conservation and IAN 130/10). (March 2020, version 1). Online: https://www.standardsforhighways.co.uk/dmrb/search?discipline=SUSTAINABILITY_AND_ENVIRONMENT_

³⁷ Gloucestershire Key Wildlife Sites Handbook. Available from: <https://www.gloucestershirewildlifetrust.co.uk/wildlife/local-wildlife-sites> [Accessed: 06/07/2022]

to function as a complex habitat mosaic of greater value than isolated patches of the individual habitats (referred to as the Stanboro Lane orchard habitat complex).

- 4.4.3. The lowland meadow priority habitats identified within the Phase 1 Habitat Survey Area during the field surveys have also been ascribed a value of County importance. This evaluation deviates from the guidance provided in Table 3.9 of LA 108, which indicates that priority habitats should be ascribed a value of National importance. The reason for this deviation is that for the lowland meadow on the Stanboro Lane verge the area is very small (0.07 ha) and isolated. The habitat most closely associates with NVC community MG1c, which is a grassland type within the SSSI lowland grassland selection guidelines³⁸ list of high-value habitats eligible for selection. However, the lowland meadow area is less than the minimum size of 0.5 ha stated in the selection guidelines.
- 4.4.4. The Stanboro Lane verge was assessed against the criteria for the selection of Local Wildlife Sites and Conservation Road Verges³⁹ in Gloucestershire. The NVC community MG1c is not listed as one of grassland NVC types as part of the minimum habitat selection threshold. Therefore, from this interpretation of the current criteria it does not qualify as a Local Wildlife Site in Gloucestershire. It also does not meet the criteria to be selected as a Conservation Road Verge because it only contains nine species from Table 1 provided in Criteria 1. A site is selected if it supports 10 or more of the species listed in Table 1 or supports a red data book, nationally scarce, near threatened, Gloucestershire/UK priority species, local wildlife site species, county rarity, legally protected species or mature black poplars, which the Stanboro Lane verge does not.
- 4.4.5. The lowland meadow on the A4019 verge is also small (0.1 ha) and does not fulfil all the criteria within the SSSI lowland grasslands selection guidelines. The verge was assessed against the criteria for the selection of Local Wildlife Sites and Conservation Road Verges in Gloucestershire. It did not meet the criteria for designation as a Local Wildlife Site, however, it contained 10 species from Table 1 in Criteria 1, so fulfils the criteria of the Gloucestershire Conservation Road Verges³⁹, which is a designation of County importance.
- 4.4.6. The network of priority habitat hedgerows identified within the Phase 1 Habitat Survey Area have been ascribed a value of Local importance. Although primarily species-poor, the hedgerow network adds to the value of the terrestrial habitat features through the provision of ecological connectivity, combining with the strips of plantation woodland, motorway verge habitats and riverside habitats to form a network of habitat corridors through an otherwise ecologically impoverished landscape. A detailed evaluation of the hedgerow network is provided in the Hedgerow Survey Report (Technical Appendix 7.2).

4.5. Non-Priority Terrestrial Habitats

- 4.5.1. The terrestrial habitats recorded within the Phase 1 Habitat Survey Area were dominated by arable fields and poor-quality grassland (improved and poor semi-improved grassland), with large areas of hardstanding and buildings associated with roads and built up areas and sparsely distributed, small areas of priority habitats (evaluated above, including lowland mixed deciduous woodland, lowland meadow, traditional orchard and hedgerows) and non-priority habitats (semi-improved neutral grassland, plantation woodland, scrub, scattered trees and amenity grassland).
- 4.5.2. While aquatic habitats are evaluated separately to terrestrial habitats in Technical Appendix 7.12 – Aquatic Ecology Survey (application document TR010063 – APP 6.15), the proximity of the terrestrial habitats to aquatic habitats and the connectivity provided by the aquatic habitats is considered to enhance the overall value of the terrestrial habitats present.

³⁸ Jefferson, R.G., Smith, S.L.N. & MacKintosh, E.J. 2019. Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 3 Lowland Grasslands. Joint Nature Conservation Committee, Peterborough.

³⁹ GCC/GWT/GCER v2.4. 2022. Available from: https://www.gloucestershire.gov.uk/media/6565/crv-register-v2_4-2022.pdf

4.5.3. In a number of locations, patches of semi-improved neutral grassland, plantation woodland, scrub and scattered trees were present adjacent to one another. Small areas of other, lower value habitat types, including amenity grassland, tall ruderal, poor semi-improved grassland, buildings, bare ground, hardstanding and private gardens, were often present as well. Together, they form complex habitat mosaics, with the small areas of lower value habitat types combining to function as an area of greater value than the isolated patches of the individual habitats. These habitat complexes are described below and are all considered to be of Local importance. This aligns with the evaluation guidance provided in Table 3.9 of LA 108, which defines habitat features of Local importance as:

4.5.4. “Areas of habitat considered to appreciably enrich the habitat resource within the local context including features of importance for migration, dispersal, or genetic exchange”.

- A4019 habitat complex – A mosaic of habitats was present to the north of the A4019, east of Uckington at the derelict horticultural nurseries. This area comprised unmanaged semi-improved neutral grassland, coniferous plantation woodland, young fruit trees, ephemeral/ short perennial, amenity grassland, tall ruderal, and scrub, interspersed with various types of temporary and permanent structure, hardstanding and debris.
- Moat Lane habitat complex – An area of standing water, scattered trees, woodland, mature residential gardens and semi-improved neutral grassland was located immediately south of Moat Lane, to the south of the A4019.
- M5 Junction 10 and motorway embankments habitat complex – The dominant habitat types within and immediately surrounding the junction included broadleaved and mixed plantation woodland. Woodland extended along the motorway verges, interspersed with areas of scrub and semi-improved neutral grassland. The woodland extended beyond the embankments in some locations, particularly to the south of the junction, on the east side of the motorway to the north and south of the River Chelt, and just south of the Withybridge Gardens properties. This habitat complex also includes the broadleaved plantation woodland between the A4019 and Stanboro Lane, the semi-improved neutral grassland and mixed plantation woodland north of Stanboro Lane and the mature residential gardens along Withybridge Gardens.
- B4634 habitat complex – An area of scattered trees, amenity grassland, semi-improved neutral grassland and mature residential gardens was present immediately south of the B4634, to the west of the Link Road.

4.5.5. Areas of arable habitat and improved grassland are ascribed a value of less than local importance, given their species-poor and homogeneous nature. Similarly, small, isolated areas of scattered trees, semi-improved neutral grassland, amenity grassland, poor semi-improved grassland, buildings, bare ground, hardstanding, ephemeral/short perennial and private gardens, where they are located outside of the habitat complexes described above, are ascribed a value of less than local importance.

4.6. Summary

4.6.1. The evaluation of terrestrial habitat features is summarised below in Table 4-1.

Table 4-1 - Evaluation summary

Terrestrial habitat feature	Importance
Severn Estuary SAC	International
Severn Estuary SPA	International
Severn Estuary Ramsar Site	International
Coombe Hill SSSI	National
Hayden Sewage Treatment Works unconfirmed, or potential LWS	County

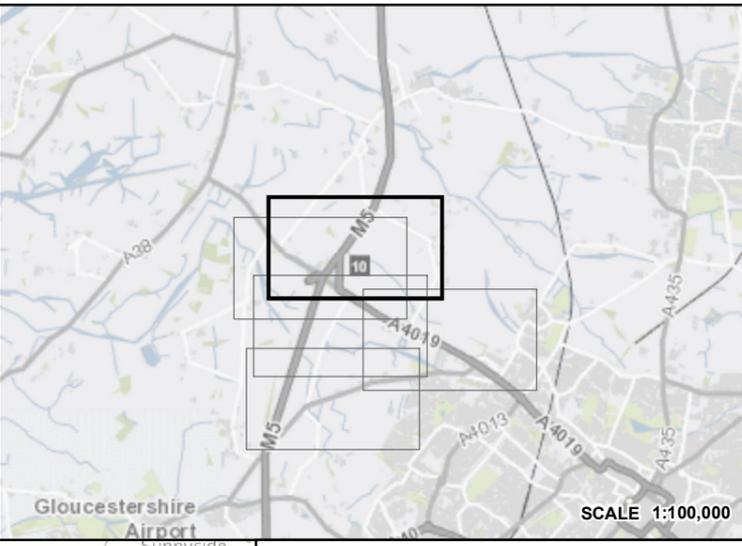
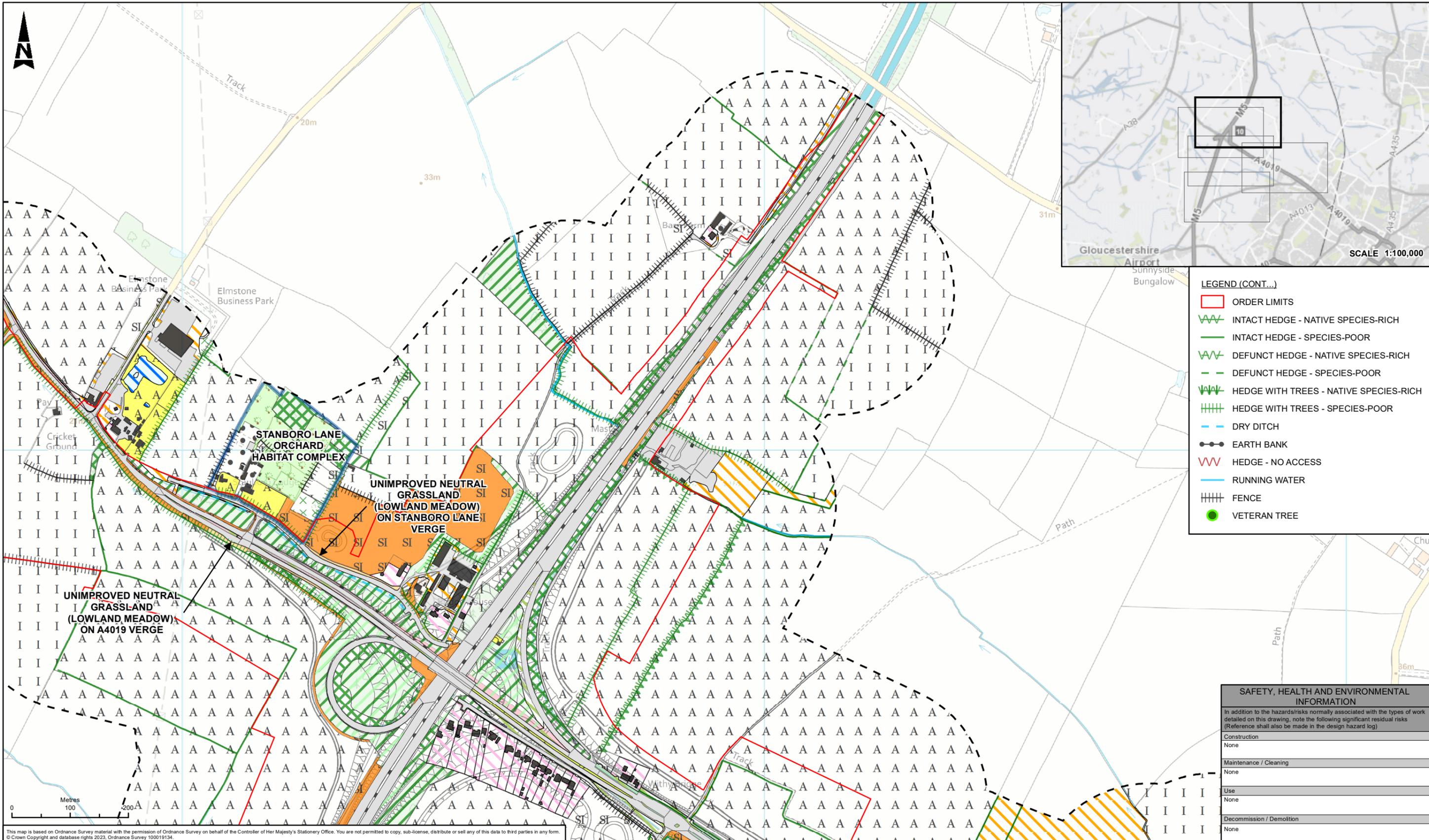
Norton (A38) Conservation Road Verge	County
Pegmore Farm, The Leigh 'Meadow 2' potential LWS	County
Cotswold Farm, The Leigh Conservation Road Verge	County
Tewkesbury Nature Reserve potential LWS	County
Tewkesbury Railway Line (Disused) LWS	County
Walton Cardiff Ponds LWS	County
Veteran ash tree (irreplaceable habitat)	National
Lowland mixed deciduous woodland priority habitat	County
Traditional orchard priority habitat	County
Stanboro Lane orchard habitat complex	County
Lowland meadow priority habitat	County
Hedgerow priority habitat	Local
A4019 habitat complex	Local
Moat Lane habitat complex	Local
M5 Junction 10 and motorway embankments habitat complex	Local
B4634 habitat complex	Local
Other terrestrial habitats – arable, improved grassland and small, isolated areas of scattered trees, semi-improved neutral grassland, amenity grassland, poor semi-improved grassland, buildings, bare ground, hardstanding, ephemeral/short perennial and private gardens, where they are located outside of the habitat complexes	Less than local

Appendices



Appendix A – Schedule of figures included in this application document

Figure reference	Document title	Sheet	Document number	Revision
7-1A	Phase 1 Habitats	1 of 5	GCCM5J10-ATK-EBD-ZZ-GS-GI-000002	0
7-1A	Phase 1 Habitats	2 of 5	GCCM5J10-ATK-EBD-ZZ-GS-GI-000002	0
7-1A	Phase 1 Habitats	3 of 5	GCCM5J10-ATK-EBD-ZZ-GS-GI-000002	0
7-1A	Phase 1 Habitats	4 of 5	GCCM5J10-ATK-EBD-ZZ-GS-GI-000002	0
7-1A	Phase 1 Habitats	5 of 5	GCCM5J10-ATK-EBD-ZZ-GS-GI-000002	0
7-1B	Designated Sites	1 of 1	GCCM5J10-ATK-EBD-ZZ-GS-GI-000003	0
7-1C	Priority Habitats	1 of 1	GCCM5J10-ATK-EBD-ZZ-GS-GI-000004	0
7-1D	Invasive Non-Native Plant Species	1 of 1	GCCM5J10-ATK-EBD-ZZ-GS-GI-000005	0



LEGEND (CONT...)

- ORDER LIMITS
- INTACT HEDGE - NATIVE SPECIES-RICH
- INTACT HEDGE - SPECIES-POOR
- DEFUNCT HEDGE - NATIVE SPECIES-RICH
- DEFUNCT HEDGE - SPECIES-POOR
- HEDGE WITH TREES - NATIVE SPECIES-RICH
- HEDGE WITH TREES - SPECIES-POOR
- DRY DITCH
- EARTH BANK
- HEDGE - NO ACCESS
- RUNNING WATER
- FENCE
- VETERAN TREE

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Maintenance / Cleaning	None
Use	None
Decommission / Demolition	None

LEGEND		
 ORDER LIMITS	 SEMI-NATURAL MIXED WOODLAND	 SEMI-IMPROVED NEUTRAL GRASSLAND
 SCHEME	 PLANTATION MIXED WOODLAND	 IMPROVED GRASSLAND
 200M STUDY	 DENSE SCRUB	 POOR SEMI-IMPROVED GRASSLAND
PHASE 1 HABITATS	 SCATTERED SCRUB	 TALL RUDERAL
 SEMI-NATURAL BROAD-LEAVED WOODLAND	 SCATTERED TREES	 STANDING WATER
 PLANTATION BROAD-LEAVED WOODLAND	 UNIMPROVED NEUTRAL GRASSLAND	 RUNNING WATER
 PLANTATION CONIFEROUS WOODLAND		 ARABLE
		 AMENITY GRASSLAND
		 EPHEMERAL/SHORT PERENNIAL
		 INTRODUCED SHRUB
		 CARAVAN SITE
		 BUILDINGS
		 BARE GROUND
		 HARDSTANDING
		 TRADITIONAL ORCHARD
		 HABITAT COMPLEXES
		 AERIAL PHOTOGRAPH INTERPRETATION
		 GRASSLAND/ AGRICULTURAL
		 RESIDENTIAL GARDEN
		 ROADSIDE/VERGE
		 WOODLAND
		 WATER

Description	Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
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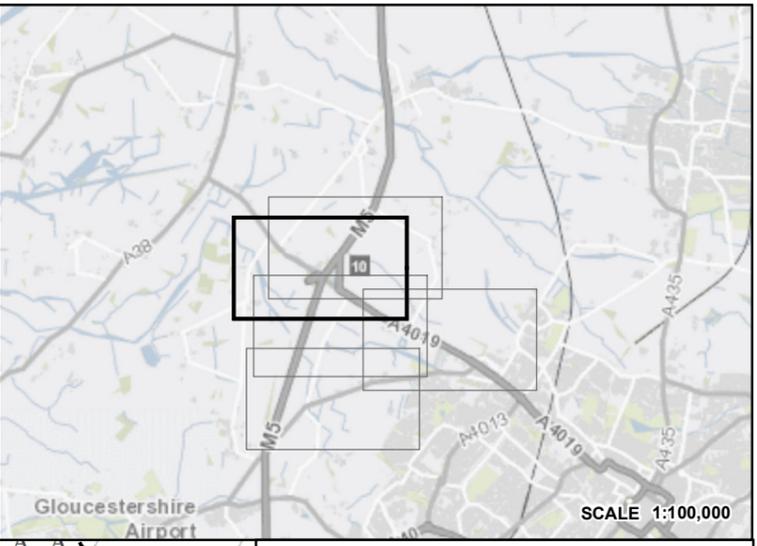
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Project Title	M5 Junction 10 Improvements Scheme
Drawing Title	FIGURE 7-1A PHASE 1 HABITATS
Drawing Number	Project: GCCM5J10 - ATK - EBD Originator: ZZ - GS - GI - 000002 Volume: 1 of 5
Original Size: A3	Scale: 1:6,000 Project Ref: 5214106 Sheet: 1 of 5 Rev: P02



LEGEND (CONT...)

- ORDER LIMITS
- INTACT HEDGE - NATIVE SPECIES-RICH
- INTACT HEDGE - SPECIES-POOR
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- DEFUNCT HEDGE - SPECIES-POOR
- HEDGE WITH TREES - NATIVE SPECIES-RICH
- HEDGE WITH TREES - SPECIES-POOR
- DRY DITCH
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LEGEND

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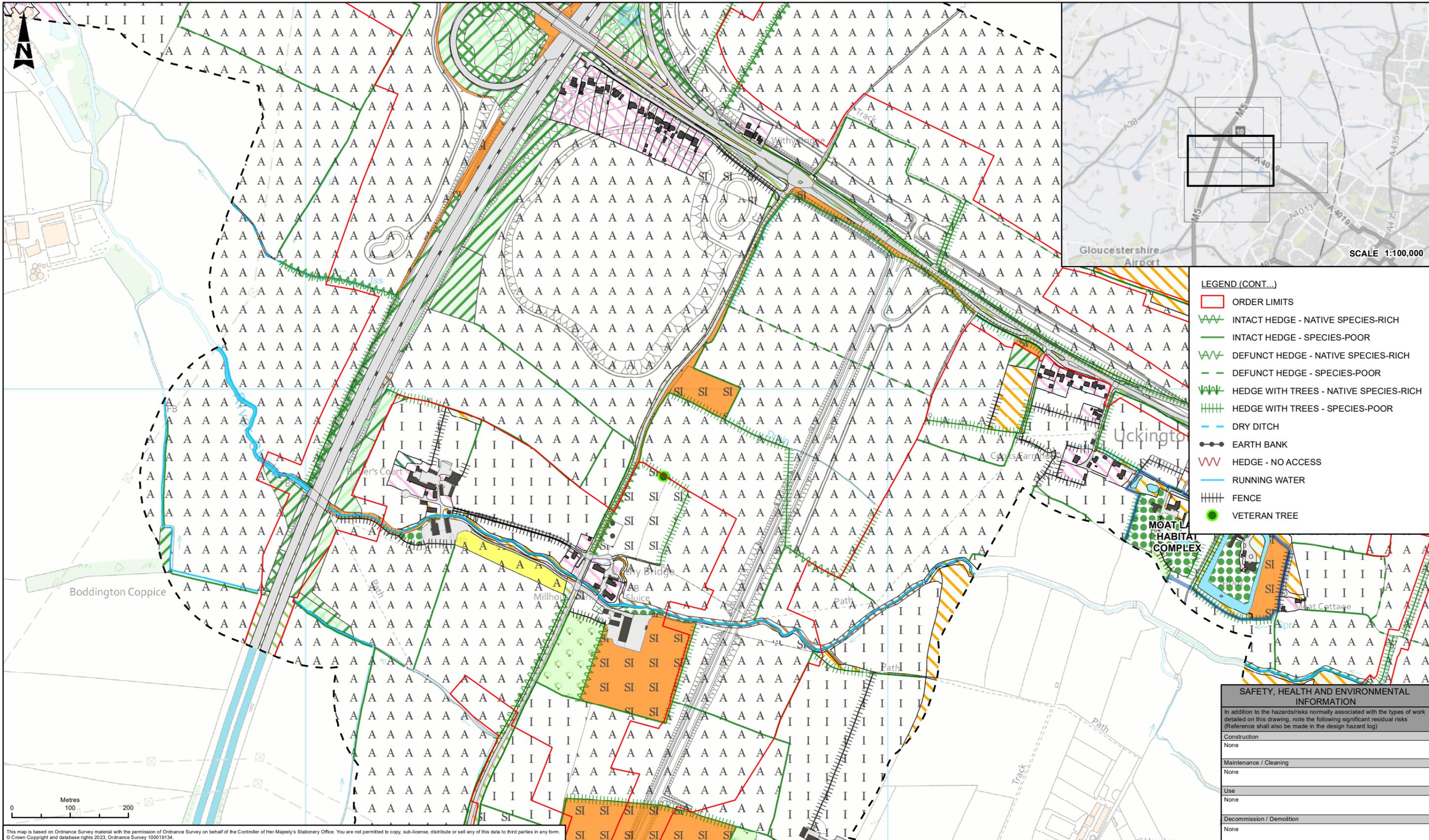
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Drawing Title	FIGURE 7-1A PHASE 1 HABITATS
Drawing Number	A1
Project	GCCM5J10 - ATK - EBD
Originator	ZZ - GS - GI - 000002
Volume	2 of 5
Location	
Scale	1:6,000
Project Ref.	5214106
Sheet	2 of 5
Rev.	P02



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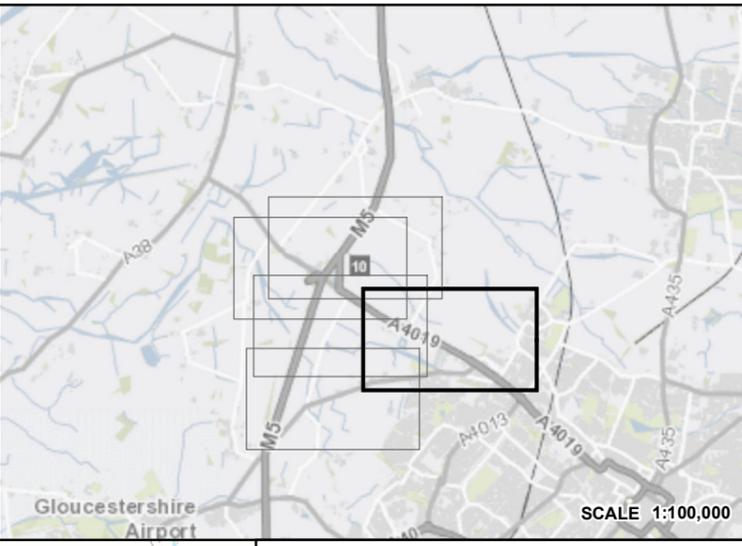
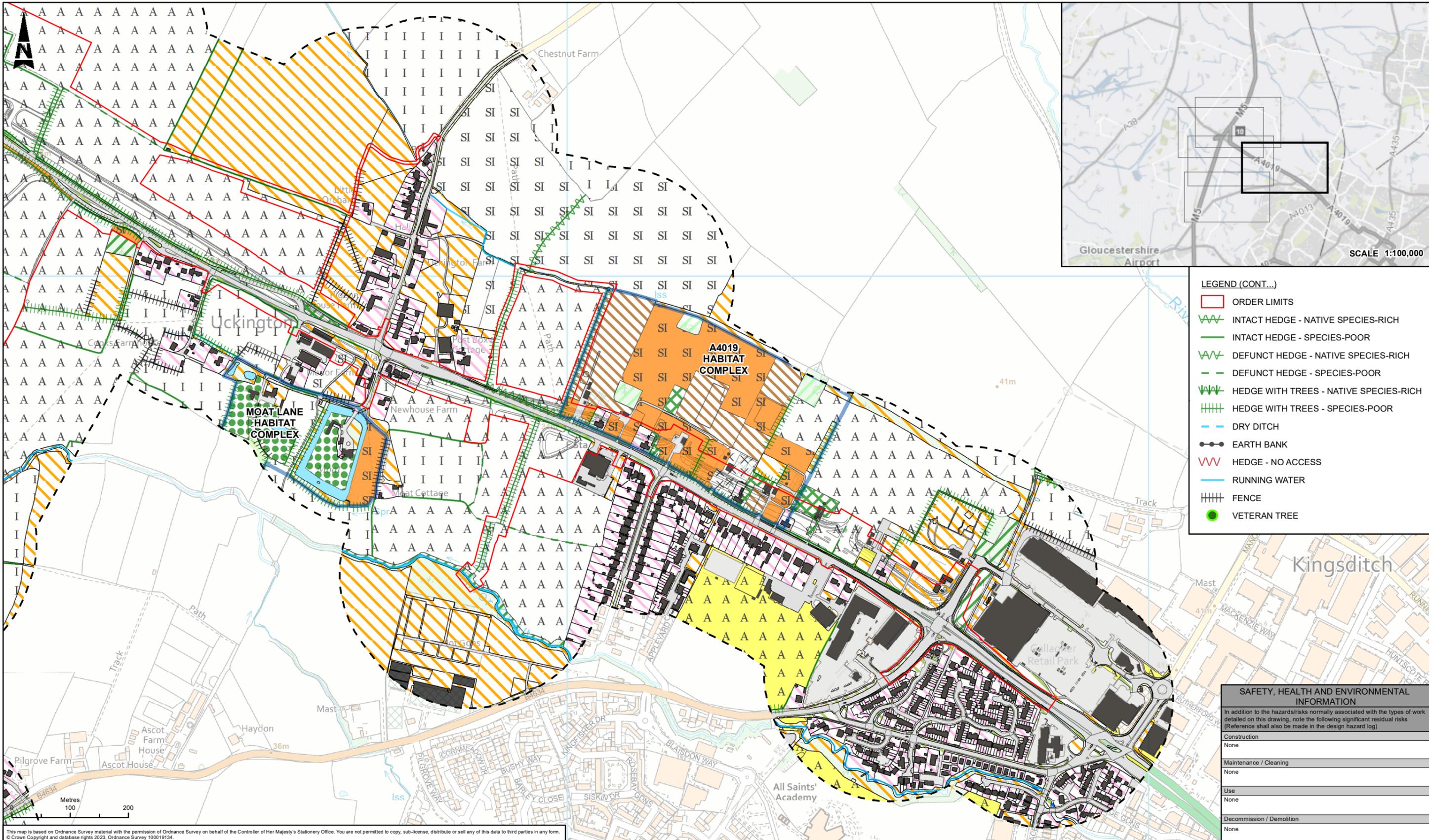
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Decommission / Demolition	None

LEGEND

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LEGEND		
 ORDER LIMITS	 SEMI-NATURAL MIXED WOODLAND	 AMENITY GRASSLAND
 SCHEME	 PLANTATION MIXED WOODLAND	 EPHEMERAL/SHORT PERENNIAL
 200M STUDY	 DENSE SCRUB	 INTRODUCED SHRUB
PHASE 1 HABITATS	 SCATTERED SCRUB	 CARAVAN SITE
 SEMI-NATURAL BROAD-LEAVED WOODLAND	 SCATTERED TREES	 BUILDINGS
 PLANTATION BROAD-LEAVED WOODLAND	 UNIMPROVED NEUTRAL GRASSLAND	 BARE GROUND
 PLANTATION CONIFEROUS WOODLAND	 SEMI-IMPROVED NEUTRAL GRASSLAND	 HARDSTANDING
	 IMPROVED GRASSLAND	 TRADITIONAL ORCHARD
	 POOR SEMI-IMPROVED GRASSLAND	 HABITAT COMPLEXES
	 TALL RUDERAL	 AERIAL PHOTOGRAPH INTERPRETATION
	 STANDING WATER	 GRASSLAND/ AGRICULTURAL
	 RUNNING WATER	 RESIDENTIAL GARDEN
	 ARABLE	 ROADSIDE/VERGE
		 WOODLAND
		 WATER

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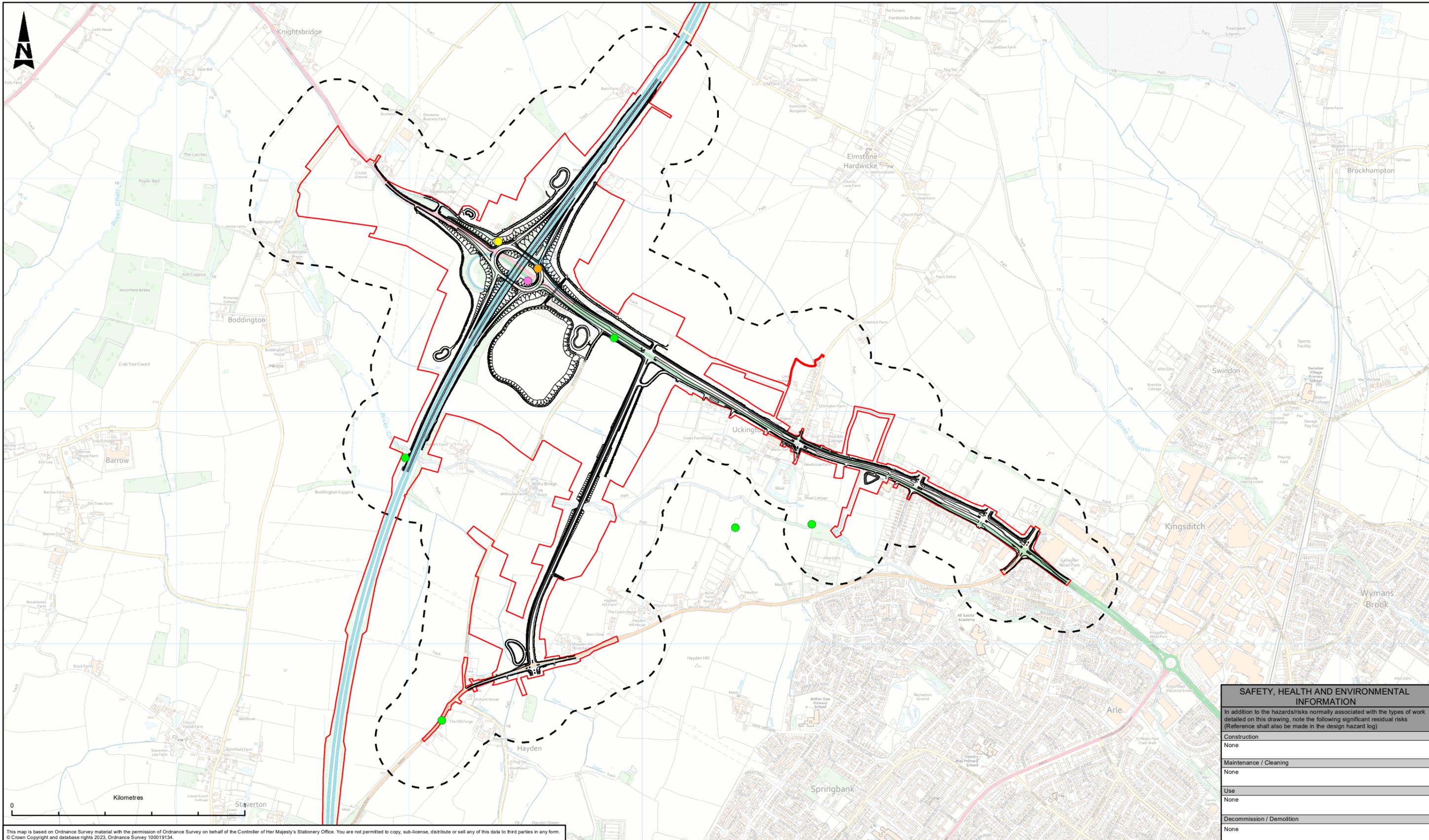
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Original Size: A3	Scale: 1:6,000	Project Ref: 5214106	Sheet: 5 of 5 Rev: P02



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Decommission / Demolition	None

LEGEND	
	ORDER LIMITS
	SCHEME ALIGNMENT
	200M STUDY
INVASIVE NON-NATIVE SPECIES	
	COTONEASTER
	HIMALAYAN BALSAM
	RHODODENDRON
	VARIEGATED YELLOW ARCHANGEL

Description						
Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
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Drawing Suitability: **PUBLISHED**

Status: **A1**

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Drawing Number		Project: GCCM5J10 - ATK - EBD Originator: ZZ - GS - GI - 000005 Volume: 1 of 1	
Original Size: A3	Scale: 1:15,000	Project Ref: 5214106	Sheet: 1 of 1
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