M42 Junction 6 Improvement
Scheme Number TR010027
Volume 6
6.3 Environmental Statement
Appendix 9.2 Phase 1 & Phase 2 Habitat Survey Report

Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

January 2019

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M42 Junction 6 Improvement

Development Consent Order 202[-]

6.3 Environmental Statement
Appendix 9.2 Phase 1 & Phase 2 Habitat Survey Report

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Appendix 9.2 Phase 1 & Phase 2 Habitat Survey Report

1 Introduction

1.1 Purpose of this document

1.1.1 Previous Phase 1 and Phase 2 surveys of the Order Limits and surrounding area were completed in 2017 [REF 2, REF 3, REF 4] (Annex E). The purpose of this appendix is to provide further detail to that contained in Chapter 9 Biodiversity of the Environmental Statement [**TR010027/APP/6.1**] on the findings of the repeat survey and evaluation of the habitats in order to:

a. reaffirm the habitats previously mapped, identify any changes on site since 2017 requiring further ecological survey and assessment and take account of any adjustment to the Order Limits;

b. map and target note the location of the identified ecological features, including any habitats associated with existing nature conservation designations and any other notable habitat and floral species present, particularly Habitats and Species of Principal Importance listed under Section 41 of the Natural Environment & Rural Communities (NERC) Act 2006 [REF 5];

c. update information regarding invasive plant species, particularly those listed under Schedule 9 of the Wildlife & Countryside Act 1981 (as amended) [REF 6]; and

d. discuss potential ecological constraints.

1.1.2 Further details of mitigation are detailed within Chapter 9 of the Environmental Statement [**TR010027/APP/6.1**] where applicable.

1.2 Structure of this document

1.2.1 This document comprises the following sections:

a. methodology - this section outlines those methods employed during desk study and field study stages of the assessment and also lists limitations to survey scope;

b. results – this section contains the results of both the desk study and field surveys; and

c. summary – this section outlines the findings of the study.

1.2.2 The results of hedgerow surveys are presented in Appendix 9.3 [**TR010027/APP/6.3**].

1.3 Designated sites

1.3.1 A number of areas within and/or immediately adjacent to the Order Limits have been designated as statutory or non-statutory sites of nature conservation interest. For the purpose of this appendix the following sites are of note:

a. Bickenhill Meadows Site of Special Scientific Interest (SSSI) – The SSSI is designated for its grassland communities; being one of the richest grassland flora in the county;

b. The River Blythe SSSI – The river is designated for the high diversity of substrate types and diverse plant communities whilst also supporting diverse invertebrate communities;

c. Coleshill & Bannerly Pools SSSI – A notable area of valley mire;

d. Greens Ward Piece Local Wildlife Site (LWS) – an area of unimproved grassland that forms Shadow Brook Nature Reserve together with one unit of the Bickenhill Meadows SSSI;

e. Castle Hill Farm Meadows LWS – An extensive area of grassland supporting a notable flora;

f. Aspbury's Copse potential LWS (pLWS) - A notable area of ancient woodland;

g. Hollywell Brook pLWS – A watercourse with notable riparian vegetation; and

h. Kingshurt Brook/Low Brook pLWS – A notable watercourse

1.3.2 A full description of these designations is provided in Appendix 9.1 [**TR010027/APP/6.3**].

2 Methodology

2.1 Phase 1 habitat survey

2.1.1 As a minimum the habitat survey area covered all accessible locations that were located within 50m of the Order Limits as shown in **Figure 9.2A**. The full extent of survey area exceeded this in some locations, which reflected either changes to the emerging scheme design (i.e. those areas that have been excluded from the final Scheme Order Limits) or areas that were included because of the need to consider the potential for indirect impacts from the Scheme. For completeness all of the areas of survey covered by Phase 1 surveys completed in 2018 have been included within this appendix.

2.1.2 The habitats present were mapped in accordance with the published Phase 1 methodology [REF 7]. A note was made of the dominant vegetation present within land parcels making up the survey area where access permission had been granted in advance of survey, or where visible from other accessible land parcels or from public rights of way, or other publicly accessible areas. Plant species recorded were named in accordance with Stace 2010 [REF 8].

2.1.3 The survey was undertaken during suitable weather conditions in March, May and June 2018, which is within the optimal period for undertaking this type of survey. Distributing survey visits throughout the optimal period allows for a greater range of floral species to be recorded. Results were compared to the existing baseline information from the 2017 Phase 1 habitat survey to determine any significant difference or changes.

2.1.4 Throughout the surveys consideration was given to the potential suitability of the habitats present to support protected and notable species of plant.

2.1.5 The presence was noted of any invasive, non-native plant species that were visible at the time of survey. This included recording the location and extent of any plants that are listed under Schedule 9 of the WCA 1981 (as amended) [REF 6], including Japanese knotweed (Fallopia japonica) (where applicable).

2.2 Phase 2 habitat survey

2.2.1 A Phase 2 National Vegetation Classification (NVC) survey was undertaken of the identified homogenous stands of grassland vegetation within the boundary of selected grasslands, including Bickenhill Meadows Site of Special Scientific Interest (SSSI). The surveys were completed on the 27 June and the 7 August 2018. The surveys followed the standard published methodology [REF 9] and comprised recording a minimum of five quadrats in each identified grassland type and at least one in each parcel/field of each grassland type. Following this, the data sets identified were matched to the published grassland community types using the keys provided in Rodwell (1992) [REF 10] and using the software TABLEFIT [REF 11].

2.3 Limitations

2.3.1 This appendix details the flora noted during the field surveys. It should not be viewed as a complete list of species that may frequent or exist on site at other times of the year. Every effort has been made to predict the occurrence of species in suitable habitats and absence in unsuitable habitats, based on current scientific literature. However, it should be noted that wildlife does not necessarily conform to standard behaviour and as such predictions cannot be validated with absolute certainty without unequivocal evidence.

2.3.2 Access was not permitted into some areas of privately owned land within the Order Limits due to landowner refusing permission or not being contactable. Where possible these areas were observed from adjacent accessible land parcels, public rights of way and the potential for any ecological constraints have been assessed accordingly.

2.3.3 Overall the majority of the Scheme was accessible across the survey occasions and, as such, access issues are not considered a significant limitation to achieving the objectives of the survey.

3 Results

3.1 Site description

3.1.1 The Scheme is predominantly located in the south-western quadrant of Junction 6, formed by the intersection of the M42 and the A45, to the east of Birmingham. The National Exhibition Centre (NEC), Birmingham International Railway Station and Birmingham Airport are also located to the north.

3.1.2 A variety of semi-natural and man-made habitats can be found within and surrounding the Order Limits. These habitats are dominated by arable and pasture farmland with the villages of Bickenhill and Hampton in Arden on either side of the M42.

3.1.3 Broadly the habitats within the Order Limits comprise the M42 and A45 carriageways, associated road verges, blocks of both mature broadleaved and mixed woodland, some of which are ancient, hedgerows, watercourses (brooks and wet ditches), waterbodies (ponds), areas of neutral grassland ranging from unimproved to improved, a mixture of arable and grazing pasture, areas of amenity grassland, urban areas and roads.

3.2 Phase 1 habitat survey

3.2.1 The habitats recorded and their approximate extent and distribution are shown in **Figure 9.2B**. Associated Target Notes (TN) record key habitat features, or other features of ecological interest are provided as appropriate in Annex A of this report, and illustrative photos are provided in Annex B. Plant species recorded at the time of survey are provided in Annex C.

3.2.2 A summary of the habitats present within the survey area as mapped in 2018, are presented in **Table 1**.

Table 1: Habitat descriptions

Habitat types recorded	Description
Broadleaved woodland – semi-natural woodland (including ancient woodland)	Within the Order Limits, there is one area of ancient replanted woodland; Aspbury's Copse with other stands being smaller and of more recent origin. Aspbury's Copse is bisected by the M42 and under the direct footprint of the Scheme; the areas to the west (TN38) are dominated by pedunculate oak (*Quercus robur*) and silver birch (*Betula pendula*) dominant with occasional hybrid black poplar (*Populus* X *canadensis*) and Scot's pine (*Pinus sylvestris*). Ground flora includes many species characteristic of ancient broad-leaved woodland including dog's mercury (*Mercurialis perennis*), moschatel (*Adoxa moschatellina*) and wood anemone (*Anemone nemorosa*) (Photograph 12). The area to the east (TN39) is more mixed in composition with Scot's pine, pedunculate oak and hybrid black poplar the dominant species. Ground flora in this area includes dog's mercury, bluebells (*Hyacinthoides non-scripta*) and cleavers (*Galium aparine*) (Photograph 13).

Habitat types recorded	Description
	There is a separate area of semi-natural woodland east of the Scheme and adjacent to Catherine-de-Barnes Lane (Photograph 11). Predominantly pedunculate oak and ash (*Fraxinus excelsior*) dominant around the drier margins, with an area of wet woodland in the centre where alder (*Alnus glutinosa*) is dominant. Ground flora in this woodland consists of red campion (*Silene dioica*), English and Spanish bluebell (*Hyacinthoides hispanica*), nettle (*Urtica dioica*) and bramble (*Rubus fruticosus* agg.) with rushes (*Juncus* spp.) and sedges (*Carex* spp.) more dominant within the wet areas (TN40). Barber's Coppice is outside but immediately south and west of the Scheme but connected to the Scheme by hedgerows. Dominant species in the canopy of Barber's Coppice included Scot's pine and European larch (*Larix decidua*).
Plantation woodland (Broadleaved and mixed)	Most of the plantation woodland within the survey area is composed of broad-leaved trees. Species composition includes sycamore (*Acer pseudoplatanus*), willow species (*Salix* sp.), Japanese cherry, silver birch (*Betula pendula*), field maple (*Acer campestre*), elder (*Sambucus nigra*), hazel (*Corylus avellana*) and ash. Small areas of mixed plantation woodland are located around the NEC and M42 Junction 6 itself (Photograph 6) where dominant species include Scot's pine, pedunculate oak, field maple and silver birch. There is also a band of mixed plantation woodland along the eastern embankment of the M42 where Norway spruce (*Picea abies*) is dominant (TN28). Ground flora consists of Yorkshire fog (*Holcus lanatus*), cleavers, hedge mustard (*Sisymbrium officinale)*, bramble, common hogweed (*Heracleum sphondylium*), tufted vetch (*Viccia cracca*), and fat hen (*Chenopodium album*).
Scrub – scattered and dense / continuous	Scrub occurs frequently throughout the survey area and is dominated by locally native shrubs that are usually less than 5m high. The majority of the habitat comprises bramble or stands of mature common hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*) or grey willow (*Salix cinerea subsp. oleifolia*). This habitat is frequent around the M42, NEC particularly on the road embankments and other associated features (e.g. roundabouts). There is also a large area of scrub at TN50 where common hawthorn, blackthorn and immature sycamore are dominant (Photograph 16).
Unimproved neutral grassland	Unimproved grassland is found at TN12 and forms part of Bickenhill Meadows SSSI (recognised as Shadow Brook Lane Meadow) (Photograph 5). Dominant species within this area include common bent (*Agrostis capillaris*), meadow foxtail (*Alopecurus pratensis*), Yorkshire fog, common knapweed (*Centaurea nigra*), common bird's-foot-trefoil (*Lotus corniculatus*), meadow vetchling (*Lathyrus pratensis*) and yellow rattle (*Rhinanthus minor*).

Habitat types recorded	Description
	The third field in the south east part of the SSSI and the two fields in the north west represent examples of a flood plain grassland type typified by a dominance of bulky perennials such as meadow sweet (*Filipendula ulmaria*) and greater burnet (*Sanguisorba officinalis*) and meadow foxtail. There is also a range of other forbs and here at the SSSI this includes tormentil (*Potentilla erecta*), saw wort (*Serratula tinctoria*) and betony (*Betonica officinalis*).
Semi-improved neutral grassland	Areas of semi-improved grassland are found throughout the survey area, including some areas of Castle Hills Meadow LWS. The dominant species within these areas include common bent, cock's-foot (*Dactylis glomerata*) and Yorkshire fog, red fescue (*Festuca rubra*), cat's-ear (*Hypochaeris radicata*) and common sorrel (*Rumex acetosa*) (Photograph 3 &10). Another area of semi-improved grassland (TN8) is associated with Bracey's nursery running east to west and immediately north of the Warwickshire Gaelic Athletic Association sports ground. Dominant species within this area include common bent, cock's-foot, Yorkshire fog and meadow buttercup (*Ranunculus acris*). This extends into the next field to the north, which is large and used to be used for horse grazing but becoming dominated in places by a few coarse grass species such as false-oat grass (*Arrhenatherum elatius*) and cock's-foot but there are still patches of finer grasses with a few common forbs such as ribwort plantain (*Plantago lanceolata*) and bird's foot trefoil. Removal of grazing is also allowing scrub to invade and start to develop large stands.
Marshy grassland	There is a small area of marshy grassland within the Warwickshire Wildlife Trust Nature Reserve of Shadow Brook Lane Meadow (part of Bickenhill Meadows SSSI). This area is dominated by rushes, sedges and tall herbs such as meadowsweet and great burnet. A separate, small area of marshy grassland was found to the east of M42 at TN55. Although dry at the time of survey the dominant presence of rushes and sedges suggest this area becomes wetter at certain times of the year (Photograph 7).
Improved grassland	This habitat is found throughout the survey area. The majority of these areas were previously mapped as arable but the current survey has reclassified as improved grassland. Dominant species within these habitats included perennial rye grass (*Lolium perenne*), dandelion (*Taraxacum officinale agg.*), white clover (*Trifolium repens*), creeping buttercup (Ranunculus repens), Yorkshire fog, broad-leaved dock (*Rumex obtusifolius*) and spear thistle (*Cirsium vulgare*). (Photographs 2 and 9).

Habitat types recorded	Description
Open Water	A total of 16 ponds were identified within the Phase 1 survey area and thus within 50m of the Order Limits including 8, 9, 17, 19, 20, 21, 34, 35, 36, 39, 40, 41, 42, 43, 44 and 45 (e.g. Photographs 8 and 21). Pond 10 was no longer present. Ponds 8, 39, 42 and 45 were either completely dry or dried out over the course of 2018 (i.e. were ephemeral ponds). These, ponds were largely over-shaded and either completely lacked or had a very limited diversity of aquatic and marginal plants. Pond 39 is located within an area of wet woodland and may be indirectly affected by the Scheme. Ponds 9, 20, 21, 34, 35, 36, 41, 42 (merged with pond 35) and 44 were wet at the time of survey. Pond 9 (Photograph 8) & 41 supported stands of marginal vegetation dominated by reed mace (*Typha latifolia*). Pond 41 was located within Greens Ward Piece LWS.
Running water	Including Kinghurst Brook potential Local Wildlife Site (pLWS), Holywell Brook (north of the Scheme) pLWS, tributaries of Shadow Brook (central to and south of the Scheme) & River Blythe SSSI. Hollywell brook was the largest of the watercourses scoped for aquatic surveys. A greater variety of habitats and substrates was present here including a ponded section. Kinghurst/low brook pLWS, Shadow Brook and the tributary of Shadow Brook were of all similar habitat quality. These small stream/ditches were narrow, shallow and for the most part heavily shaded.
Wet ditch	There are several wet ditches around the arable field margins to the east of the Scheme and also one south of the junction between the A45 and Catherine de Barnes Lane (running east to west) (TN54).
Hedgerow	Hedgerows are found across the survey area. These range in structure from intact to defunct and also in terms of species diversity. The dominant species in the majority of hedgerows were hawthorn and blackthorn, with standard trees and scrub along some sections.
Cultivated/ disturbed –Arable	This is the dominant habitat to the west of the Scheme. In general the land has been intensively managed with narrow field margins consisting of improved or semi-improved grassland (Photograph 1).
Cultivated/ disturbed – Amenity grassland	The habitat has a characteristic short sward due to regular mowing. The largest single area of amenity grassland comprises playing fields at the Gaelic Athletic Association sports ground to the east of Catherine de Barnes Lane (Photograph 4). Amenity grassland is also frequently found along roadside verges around the NEC and associated infrastructure and also found within private gardens.

Habitat types recorded	Description
	In all areas the vast majority of the sward was species-poor, with dominant species present included perennial rye grass, common daisy (*Bellis perennis*), dandelion and white clover.
Cultivated/ disturbed – ephemeral/short perennial	This habitat is found within several areas of derelict waste ground within the road networks associated with the NEC, the A46 and Junction 6 itself. These areas are characteristic brownfield sites where disturbed ground has become vegetated over by short patchy plant associations and shrubs, surrounded by denser areas of bramble scrub. Dominant species include annual meadow-grass (*Poa annua*), rosebay willowherb (*Chamerion angustifolium*), common bird's-foot-trefoil, creeping cinquefoil (*Potentilla reptans*) and common teasel (*Dipsacus fullonum*) (TN47) (Photographs 14 and 15).
Buildings and hardstanding	This habitat is found frequently throughout the survey area particularly within tarmac car parks and road network associated with the NEC, M42 and A45. Full descriptions of existing buildings and structures within the Scheme are provided in Appendix 9.5 Bat Report **[TR010027/APP/6.3]**. The highest density of buildings is outside the boundary of the survey area and located around the airport, NEC, village of Bickenhill and dwellings along Catherine-de-Barnes Lane.
Other habitat – Private gardens	This habitat is around the residential properties within the village of Bickenhill and is characterised by ornamental herbaceous plantings, trees and shrubs.

3.3 Invasive species

3.3.1 Several stands of Japanese knotweed were found during the 2018 Phase 1 Habitat survey at TN41 (Photograph 20), TN43 (Photograph 17), TN44 (Photograph 18), TN45 (Photograph 19) and TN51 (Photograph 16).

3.3.2 The Schedule 9 species water fern (Azolla filiculoides) was found to be covering the entire surface of Pond 36 (TN52; Photograph 21).

3.4 Phase 2 habitat survey

3.4.1 The location of field compartments subject to Phase 2 surveys is illustrated in **Figure 9.2C.** The field results from Phase 2 surveys are provided in Annex D.

3.4.2 Bickenhill Meadows SSSI comprises two separate units; one to the north-west (NW) and one to the south-east (SE). The results of survey in each unit of the SSSI and the boundary of Greens Ward Piece LWS are reported in **Table 2**. Within the SSSI the vegetation in all the fields on the days of the survey was tall and coarse and because of this appeared uniform with the subtle changes in ground level apparent earlier in the year masked by the dense growth.

Table 2: Description of quadrat data from Bickenhill Meadows SSSI

Location	Description & NVC Results
SE Unit (east)	The two fields on the eastern side slope down to the watercourse and the vegetation on the day of the survey was grass dominated (tall and lodging in places) and dry. Yorkshire fog (*Holcus lanatus*) was abundant with other grasses such as cock's-foot (*Dactylis glomerata*), common bent (*Agrostis capillaris*), red fescue (*Festuca rubra*), crested dog's tail (*Cynosurus cristatus*) and meadow fescue (*Schedonorus pratensis*). A range of generally common forbs were recorded and included ribwort plantain (*Plantago lanceolata*), common knapweed (*Centaurea nigra*), bird's foot trefoil (*Lotus corniculatus*) and red clover (*Trifolium pratense*). Less common species included yellow rattle (*Rhinanthus minor*) and tormentil (*Potentilla erecta*). Seven quadrats were recorded in the two fields, as they were uniform in appearance and structure. The data obtained was run through TABLEFIT and the goodness of fit to the NVC community type MG5; *Cynosurus cristatus - Centaurea nigra* was at around 83% and classed as very good fit. The second best fit was to the MG5a *Lathyrus pratensis* sub-community type.
SE Unit (west)	The field within the SE SSSI unit on the west side of the watercourse was generally flat but with an apparent rise towards the northern boundary; the grasses did not dominate to the degree they did in the dry fields and there were patches of meadowsweet (*Filipendula ulmaria*) and great burnet (*Sanguisorba officinalis*). Meadowsweet and other wetland species such as wild angelica (*Angelica sylvestris*) seemed to be more frequent towards the watercourse where the vegetation was taller and coarser. Interesting species recorded here were betony (*Betonica officinalis*) and tormentil (*Potentilla erecta*). It has been reported that meadow thistle (*Cirsium dissectum*) is also present but this was not found during the current survey. The rare plant register for Warwickshire (REF 12) notes this species having been recorded here but not found in 2013. Five quadrats were recorded in this western field and along with the data collected from similar vegetation recorded in the NW section of the SSSI (described below) were run through TABLEFIT. The goodness-of-fit to the NVC community type MG4; *Alopecurus pratensis – Sanguisorba officinalis* was around 63% and classed as a fair fit. Any variation in the vegetation from topographical variation was masked by the tall growth and a better understanding of this would be obtained once the field has been cut.
NW Unit (east)	The eastern field of the NW SSSI unit was only visited in August and had much coarser vegetation and the dominant grass across larger areas was tufted hair grass (*Deschampsia cespitosa*) but with meadowsweet and great burnet also frequent throughout the field. Sedges appeared to be more common in this field and included hairy sedge (*Carex hirta*), false fox sedge (*Carex otrubae*), common sedge (*Carex nigra*) and tufted sedge (*Carex acuta*). Otherwise it was very similar to the western field. Part way along the western boundary of the field, there was a distinctive change in vegetation and whilst this will have to be shown by survey, it appeared to be delineated by a low spot, possibly linked to the ditch and was demarked by young alders (*Alnus glutinosa*). The vegetation here was dominated by tall rushes including soft rush (*Juncus effusus*), hard rush

Location	Description & NVC Results
	(*Juncus inflexus*) and sharp flowered rush (*Juncus acutiflorus*), along with sedges with abundant great hairy willowherb (*Epilobium hirsutum*) and in the wettest areas patches of fool's watercress (*Apium nodiflorum*). Five quadrats were recorded in this area and the data was run through TABLEFIT. The goodness-of-fit to the NVC community type OV26; *Epilobium hirsutum* community was around 58% and classed as a fair fit. A similar fit was obtained from the MG9 community; *Holcus lanatus-Deschampsia cespitosa* grassland. This community is found in area where the ground is seasonally waterlogged and can be found in association with MG4 grassland, but is not usually as species diverse and is tolerant of less free draining soils.
NW Unit (west)	The western field appeared to be uniform in structure and was generally a mix of patches of larger forbs such as great burnet (*Sanguisorba officinalis*) and meadowsweet (*Filipendula ulmaria*), and grasses with a range of smaller forbs including several legumes scrambling through the vegetation. This field appeared to be more diverse than the corresponding field in the SE SSSI units and here saw-wort (*Serratula tinctoria*), quaking grass (*Briza media*) and devil's bit scabious (*Succisa pratensis*) were recorded in addition to the more typical and commoner forb species. When visited in August 2018, tufted hair grass (*Deschampsia cespitosa*) was the dominant species in this field. Five quadrats were recorded in the field and along with the data collected from similar vegetation recorded in the SE SSSI unit were run through TABLEFIT. The goodness-of-fit to the NVC community type MG4; *Alopecurus pratensis – Sanguisorba officinalis* was around 63% and classed as a fair fit.

3.5 Changes in habitat since 2017

3.5.1 The changes in habitat type or extent recorded in the survey area in 2018, in comparison to the 2017 survey are described in **Table 3**.

Table 3: Changes in habitat since 2017

Previous habitat(s)	Description of habitat changes
Scrub	Areas around the NEC carparks previously mapped as dense/continuous scrub have been reclassified as mixed woodland plantation.
Improved Grassland	An area of improved grassland to the west of Catherine-de-Barnes Lane and due west of Bickenhill has been reclassified semi-improved neutral grassland surrounded by both scattered and in parts dense/continuous scrub.
Amenity Grassland	Several of the road verges along Catherine-de-Barnes Lane have been reclassified from amenity grassland to semi-improved neutral grassland to account for the greater floral diversity and value.
	Areas of previously mapped amenity grassland including the road verges around Junction 6 and the NEC have been reclassified as semi-improved neutral grassland.

Previous habitat(s)	Description of habitat changes
	An area of waste ground immediate north east of Junction 6 previously mapped as amenity grassland surrounded by dense/continuous scrub has been remapped to include an area of broadleaved woodland plantation surrounded by a mixture of disturbed land – ephemeral/short perennial and dense/continuous scrub.
Amenity Grassland & Scrub	The roundabout of Junction 6 itself originally mapped as amenity and scattered scrub has been reclassified to include an area of mixed broadleaved woodland plantation and dense/continuous scrub.
	The A45 roundabout due south of the NEC which was originally mapped as amenity and scattered scrub has been reclassified to include an area of mixed broadleaved woodland plantation and dense/continuous scrub surrounded by semi-improved neutral grassland.
Arable land	An area of arable land to the west of the Motorcycle Museum has been reclassified to include an area of disturbed land – ephemeral/short perennial and a species-poor hedge with trees.
	Several arable fields to the West of the Scheme have been reclassified as improved grassland to account for the habitat type present at the time of survey.
Field Boundaries	Several hedgerows along Catherine-de-Barnes Lane and within land to the west have been reclassified from intact hedge species-poor to hedge with trees - species-poor.
	Field boundaries previously marked as scattered scrub or left blank have been reclassified as hedge with trees - species-poor.
No previous classification	A previously omitted wet ditch due south of the A45/NEC roundabout has been included.

4 Summary

4.1.1 The following section provides an outline evaluation of the habitats recorded during survey. Further detail of the impact assessment and proposals for mitigation are presented in the accompanying Chapter 9 Biodiversity **[TR010027/APP/6.1].**

4.2 Habitats

4.2.1 Following on from habitat surveys completed in 2017 [REF 2, REF 3, REF 4] (Annex F), the updated surveys presented in this has appendix have re-affirmed the nature and extent of habitats within the Order Limits and adjacent to it (i.e. within 50m). Although some minor variations have been observed it is considered that the nature and extent of the majority of habitats has not altered significantly.

4.2.2 There are ten notable habitats present on or within 50m of the Order Limits: broadleaved semi-natural woodland, plantation woodland (broadleaved and mixed), wet woodland, unimproved and semi-improved neutral grassland, marshy grassland, scrub, hedgerow, private gardens, ponds and running water. **Table 4** provides a summary of the notable habitats present.

Table 4: Notable habitat

Habitat	NERC Act[1]	LBAP[2]	LWS[3]	Supporting comments
Broadleaved woodland – semi-natural woodland (including ancient woodland)	✓	✓	✓	Aspbury's Coppice pLWS (ancient woodland).
Wet woodland	✓	✓	x	Alder-dominated woodland that is characteristically species-poor.
Plantation woodland (Broadleaved and mixed)	x	✓	x	Semi-mature stands of recent origin.
Unimproved Neutral Grassland (including associated Marshy Grassland)	✓	✓	✓	Bickenhill Meadows SSSI & Greens Ward Piece LWS.
Marshy grassland	x	x	x	Area outside boundary of existing designated sites is species-poor and limited in extent.
Hedgerow	✓	✓	x	Numerous hedgerows within the Scheme boundary. Refer to Appendix 9.3 [**TR010027/APP/6.3**].
Buildings and hard-standing; and Private gardens	x	?	x	Although not designated, the Built Environment LBAP exists to highlight enhancement opportunities for this habitat type.
Pond	✓	✓	?	Including pond 41 within Shadow Brook Lane Meadow (part of Bickenhill Meadows SSSI).
Running water	✓	✓	✓	Including Kinghurst Brook potential Local Wildlife Site (pLWS), Holywell Brook (north of the Scheme), tributaries of Shadow Brook (central to and south of the Scheme) & River Blythe SSSI.

[1] Habitat of Principal Importance under Section 41of the NERC Act 2006

[2] Priority Habitat of the Warwickshire, Coventry & Solihull Biodiversity Action Plan (BAP) [REF 13]

[3] Area already designated as a non-statutory LWS or pLWS according to the published criteria [REF 14]

4.3 Bickenhill Meadows SSSI

4.3.1 The Bickenhill Meadows SSSI is a statutory site of national importance. The SSSI is located in two units that are designated for their species-rich grassland and includes areas of wet meadows and wet alder woodland. Small streams run through each SSSI unit, and are tributaries of Shadow Brook (east) and Low Brook (west). Wet conditions need to be maintained in the SSSIs to ensure the preservation of the rare grassland habitats that are housed within.

4.3.2 The surveys have demonstrated that the two dry grassland fields in the SE SSSI unit fit closely to the MG5 community type and that, for the most part, the wetter field in the SE unit and the two fields in the NW unit fit to the MG4 community type. Within the wetter fields, there is localised variation which was re-affirmed by the Phase 1 habitat surveys.

4.3.3 The results of the survey are considered to be consistent with the known interest features of Bickenhill Meadows SSSI.

4.4 Ancient woodland

4.4.1 Aspbury's Copse pLWS covers an area of 2.62ha and is recognised as a plantation ancient woodland site (PAWS) by Natural England. Ancient woodland, whether identified as ancient semi-natural or ancient replanted, is recognised under national and local planning policy as being an irreplaceable habitat. Phase 2 survey completed in 2017 detailed the extent of habitats within the woodland [REF 4] (Annex F). The habitat types present were re-affirmed by survey completed in 2018.

4.5 Invasive species

4.5.1 At the time of writing, stands of Japanese knotweed were present within the Order Limits and without eradication would be disturbed during the construction phase of the Scheme.

4.5.2 The main methods of eradication as outlined in 'The Knotweed Code of Practice' [REF 15] are removal of stems and rhizome contaminated soil to registered landfill or specially constructed on-site burial cells, or chemical treatment, which can take up to three years to be completely effective. Leaving the stands in situ may increase the risk that the species would spread further such that it becomes a constraint to the operation of the Scheme in the future.

4.5.3 Pond 36 would not directly be impacted by the Scheme, however, as water fern is present in the vicinity of the Scheme precautionary measures will be put in place to control this invasive plant should its presence subsequently be confirmed.

5 References

Reference Number	Source
REF 1	REFERENCE NOT USED
REF 2	Mouchel (2017) *M42 J6 Improvements Extended phase 1 habitat survey report*.
REF 3	WSP (2017f) *M42 J6 Improvement grassland national vegetation classification survey report*
REF 4	WSP (2017g) M42 J6 Improvement woodland national vegetation classification
REF 5	The Natural Environment & Rural Communities Act 2006 https://www.legislation.gov.uk/ukpga/2006/16/contents
REF 6	The Wildlife & Countryside Act 1981 (as amended). HMSO https://www.legislation.gov.uk/ukpga/1981/69
REF 7	Joint Nature Conservation Committee (2010). *Handbook for Phase 1 habitat survey A technique for environmental audit* http://jncc.defra.gov.uk/page-2468
REF 8	Stace, C. (2010). *The New Flora of the British Isles (3rd Edition)*. Cambridge University Press, Cambridge
REF 9	Rodwell, J. S. (2006) National Vegetation Classification; Users' Handbook. Joint Nature Conservation Committee, Peterborough
REF 10	Rodwell, J. S. (ed.) 1992. British Plant Communities. ES Volume 3. Grassland and montane communities. Cambridge University Press.
REF 11	Hill, M (2015) TABLEFIT Version 2; A program to identify types of vegetation by measuring goodness-of-fit to association tables. Centre of Ecology and Hydrology, Wallingford
REF 12	Walton, J. & Walton, M. (March 2018) Rare Plant Register for Warwickshire (Vice County 38). Warwickshire Biological Records Centre https://bsbi.org/rare-plant-registers
REF 13	Warwickshire Wildlife Trust (2017) Warwickshire, Coventry & Solihull Biodiversity Action Plan http://www.warwickshirewildlifetrust.org.uk/LBAP (accessed 28.09.18)
REF 14	Warwickshire Wildlife Trust *Guidance Note on Application of Site Selection Criteria: 'The Green Book' – Guidance on the Selection of Local Wildlife Sites in Warwickshire, Coventry and Solihull (ver 12/13).* Local Wildlife Sites Project. https://apps.warwickshire.gov.uk/api/documents/WCCC-863-559
REF 15	Environment Agency (2006) Managing Japanese Knotweed on development sites – the knotweed code of practice. Environment Agency, Bristol https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/536762/LIT_2695.pdf

Annex A: Target Notes

Reference to legend on figure	Description
TN1	Arable land with margins containing Yorkshire fog (d), cleavers (a), common nettle (a), bramble and cow parsley, lords and ladies found in hedge area
TN2	Bramble dominated scrub.
TN3	Young broadleaved plantation woodland/overgrown hedge on verge of M42, sycamore (d), willow species (o) and silver birch (o), understory elder (a), ash (o), bramble (a), hazel (o) & dog rose (o).
TN4	Grassland containing white clover (d), annual meadow grass (d) and spear thistle (o), new hedge borders grassland, mosaic with bramble scrub. Nearby defunct hedge containing hawthorn (d) with understory of lords and ladies (a) and common nettle (a).
TN5	Area of improved grassland next to arable land, red clover (d), perennial rye grass (d), Yorkshire fog (a), common nettle and cleavers dominant in the margins.
TN6	Area of improved grassland very similar to target note 5
TN7	Mosaic of dense scrub containing dogwood (d), tall ruderal containing common nettle (d) and grassland dominated by Yorkshire fog. Near the slip road is a band of mixed plantation woodland containing willows (d), silver birch (o) and scots pine (a).
TN8	Strip of semi-improved grassland meadow associated with Bracey's nursery with an area of bramble scrub (composting from the nursery) at the western end of the field. Dominant species include Yorkshire fog (d), ribwort plantain, cock's-foot (a), red fescue and dandelion. Owners confirmed that management is limited to an annual hay cutting.
TN9	Adjoining field to TN8. Very similar makeup, scattered young blackthorn coming up through field, cock's-foot becoming more dominant.
TN10	Very heavily grazed horse pasture with scattered young blackthorn saplings.
TN11	Heavily grazed/managed grassland, perennial rye grass (d). Only viewed from SW corner of Shadow Brook Lane/Catherine-de-Barnes Lane junction.
TN12	Area of unimproved grassland at Shadow Brook Lane Meadow. Dominant species included soft rush (a), marsh thistle (a), common bent, meadow foxtail, Yorkshire fog, common knapweed, common bird's-foot-trefoil, meadow vetchling and yellow rattle. North western edge band of dense bramble scrub. Pond in field reedmace dominated.
TN13	Broadleaved semi natural woodland, alder (d), silver birch (o), hazel (o), understory-elder (o), ground flora- wood avens (a), common nettle (a), red dead nettle (o), cleavers (a), bluebells (a) (not in flower), male fern (o) and cowslip (a).
TN14	Dry grassland, Yorkshire fog (d), ribwort plantain (a), creeping buttercup (a), soft rush (a) and cowslip (a).
TN15	Oak (d), ash (a), understory – holly (a), hazel (a), ground flora – bluebell (a) in fringes and bramble (a).
TN16	Line of trees alder dominant.
TN17	Hedge with trees, other self-set trees visible beyond hedge line.
TN18	Species poor hedge
TN19	Not a hedge just a strip of dense bramble adjacent to fence.
TN20	Mosaic of dense bramble scrub and heavily grazed (by rabbits). Likely semi-improved Yorkshire fog (d), annual meadow grass (a).
TN21	Mixed woodland plantation on M42 junction 6 roundabout, viewed from distance, visible species included silver birch (a), ash (o), oak (o) with a mosaic of bramble and gorse scrub understorey.
TN22	Cock's-foot (d), teasel (a), lady's bedstraw (o), ribwort plantain (a), spear thistle (a). In the wetter area hard rush becomes dominant, cock's-foot still abundant.
TN23	Mature pedunculate oak, 0.2m DBH. OS grid reference: SP1912182649.

Reference to legend on figure	Description
TN24	Ivy covered mature ash, 0.2m DBH. OS grid reference: SP1913382646.
TN25	Veteran pedunculate oak, 0.5m DBH, surveyed from distance so closer inspection required to confirm suitable bat roost features. OS grid reference: SP1866781517.
TN26	Standing dead wood, 0.2m DBH. OS grid reference: SP1879381617.
TN27	Sandy mound covered in perennial rye grass, cock's-foot , Yorkshire fog, bramble, bindweed, teasel, common nettle and ash saplings
TN28	Coniferous woodland plantation along M42, Norway spruce dominant with occasional oak and silver birch. Ground flora consists of Yorkshire fog, cleavers, hedge mustard, brambles, common hogweed, tufted vetch, fat hen.
TN29	Line of oak trees that becomes small area of woodland, oak dominant.
TN30	Arable (wheat) field with grass dominated margins. Species recorded include soft brome, hedge mustard, oil seed rape, rough meadow grass, cleavers, cow parsley, meadow foxtail and rosebay willow-herb.
TN31	Area of semi-improved grassland dominated by Yorkshire fog, crested dog's-tail, annual meadow grass, perennial rye grass, creeping buttercup, meadow foxtail, spear thistle and ribwort plantain.
TN32	Defunct hedge turning into a fence line individual species include pedunculate oak, wild service tree, Scot's pine.
TN33	Line of trees along pond including standing deadwood.
TN34	Broadleaved woodland plantation along road verge. Dominant species include field maple, crack willow, ash also common hawthorn. Ground flora includes annual meadow grass, common hogweed, cow parsley, cock's-foot, fat hen and dove's-foot crane's-bill.
TN35	Mature pedunculate oak, 0.3m DBH. OS grid reference: SP1892180683.
TN36	Improved pasture – heavily grazed at the time of survey. Dominant species included perennial rye grass, dandelion, white clover, creeping buttercup, Yorkshire fog broad leaved dock and spear thistle. Meadow foxtail and soft brome more abundant on rougher field margins. Signs of ridge and furrow.
TN37	Pond in arable field surrounded by dense hawthorn, elder, dog rose, crab apple scrub with a single pedunculate oak tree.
TN38	Aspbury's Copse bisected by the M42 and under the direct footprint of the Scheme, the areas to the West is dominated by pedunculate oak and silver birch dominant with occasional hybrid black poplar and Scot's pine. Ground flora includes many species characteristic of ancient broad-leaved woodland including dog's mercury, moschatel and wood anemone.
TN39	Eastern area of Aspbury's Copse is more mixed in composition than the western area (TN38) with Scot's pine, pedunculate oak and hybrid black poplar the dominant species. Ground flora in this area includes of dog's mercury, bluebells and cleavers.
TN40	Semi-natural broadleaved woodland east of Catherine-de-Barnes Lane. Predominantly semi-mature pedunculate oak and ash dominant around the drier margins with an area of wet woodland in the centre where alder is dominant. Ground flora in this woodland consist red campion, English and Spanish bluebell, nettle and bramble with rushes and sedges more dominant within the wet areas.
TN41	Area of Japanese knotweed on the southern edge of the unnamed woodland east of Catherine-de-Barnes Lane (TN40). OS grid reference: SP1850581208
TN42	Kinghurst Brook pLWS containing aquatic species such as buttercup, yellow iris and reed sweet grass. Brook is surrounded by planted broadleaved trees and grassland.
TN43	Area of Japanese knotweed along hedgerow to the east of Catherine-de-Barnes Lane. OS grid reference: SP1815681716
TN44	Area of Japanese knotweed along hedgerow to the east of Catherine-de-Barnes Lane. OS grid reference: SP1815981778

Reference to legend on figure	Description
TN45	Area of Japanese knotweed along hedgerow to the west of the Gaelic Athletic Association sports ground, east of Catherine de Barnes Lane. OS grid reference: SP1824281805
TN46	Area of amenity grassland comprises playing fields at the Gaelic Athletic Association sports ground to the east of Catherine de Barnes Lane. Dominant species visible from a distance included perennial rye grass, common daisy, dandelion and white clover.
TN47	Area of disturbed ground (characteristic of brownfield sites) that have become vegetated over by short patchy plant associations and shrubs, surrounded by denser areas of bramble scrub. Dominant species include annual meadow-grass, rosebay willowherb, common bird's-foot-trefoil, creeping cinquefoil and common teasel.
TN48	Area of improved grassland (classified as arable during previous surveys) dominant species within this area include common bent, cock's-foot and Yorkshire fog, red fescue, cat's-ear and common sorrel. Overgrown bramble-hawthorn hedgerows and area scrub-fringed woodland to the west.
TN49	Shallow wet ditch with meadowsweet and yellow iris lining the channel. Common bent, cock's-foot and Yorkshire fog, red fescue, cat's-ear and common sorrel dominant species along margins and within surrounding grassland.
TN50	Large area of blackthorn, willow scrub east of Catherine-de-Barnes Lane dominant species include perennial rye grass, cock's-foot and Yorkshire fog, teasel, bramble, common sorrel and cow parsley.
TN51	Area of Japanese knotweed within an area of dense scrub east of Catherine-de-Barnes Lane (TN50). OS grid reference: SP1829082430.
TN52	Water fern (*Azolla filiculoides*) covering the entire surface of Pond 36. OS grid reference: SP1899982527.
TN53	An area of varied topography and vegetation structure dominated by bramble scrub and plant species characteristic of disturbed ground (annual meadow grass, bramble, teasel, yellow loosestrife, common ragwort and mugwort). There are also refuge opportunities provided by from log piles and brash piles and other fly-tipped material.
TN54	Dry ditch surrounded by dense scrub (silver birch dominant) running east to west and south of the junction between the A45 and Catherine-de-Barnes Lane.
TN55	Area of marshy grassland to the east of M42. Although dry at the time of survey the dominant presence of rushes and sedges suggest this area becomes wetter than the surrounding habitat at certain times of the year.

Annex B: Photographs

Table B-5-1 – Photographs

Photograph	Notes
	Photograph 1 - Arable fields east of Catherine-de-Barnes lane as found throughout the Scheme boundary (TN1)
	Photograph 2 - Improved grass land South of the A45 (TN5)
	Photograph 3 - Area of semi-improved grassland associated with Bracey's nursey (TN8)

	Photograph 4 - Area of amenity grassland comprises playing fields at the Gaelic Athletic Association sports ground (TN46)
	Photograph 5 - Shadow Brook Lane Meadow (part of Bickenhill Meadows SSSI) (TN12)
	Photograph 6 - Area of mixed woodland plantation within the M42 Junction 6 roundabout (TN21)

	Photograph 7 - Area of marshy grassland to the east of M42 (TN55)
	Photograph 8 - Reedmace dominated pond 9 within arable field (TN12)
	Photograph 9 - Area of improved (heavily grazed) pasture. Ridge and furrow visible in the distance (TN36)

	Photograph 10 - Semi-improved grassland west of Catherine de Barnes Lane
	Photograph 11 - Semi-mature broadleaved woodland east of Catherine-de-Barnes Lane (TN40)
	Photograph 12 - Western area of Aspbury's Copse (TN38)

	Photograph 13 - Eastern area of Aspbury's Copse (TN38)
	Photograph 14 - Area varied topography, vegetation structure and natural refugia (TN53)
	Photograph 15 - Area of derelict waste ground (TN47)

	Photograph 16 - Area of Japanese knotweed at OS grid reference: SP1829082430 (TN51) within an area of dense scrub east of Catherine-de-Barnes Lane (TN50)
	Photograph 17 - Area of Japanese knotweed along hedgerow to the east of Catherine de Barnes Lane. OS grid reference: SP1815681716 (TN43)
	Photograph 18 - Area of Japanese knotweed along hedgerow to the east of Catherine de Barnes Lane. OS grid reference: SP1815981778 (TN44)

	Photograph 19 - Area of Japanese knotweed along hedgerow to the west of the Warwickshire Gaelic Athletic Association sports ground, east of Catherine-de-Barnes Lane. OS grid reference: SP1824281805 (TN45)
	Photograph 20 - Area of Japanese knotweed on the southern edge of the unnamed woodland east of Catherine-de - Barnes Lane (TN40). OS grid reference: SP1850581208 (TN41)
	Photograph 21 - Water fern (*Azolla filiculoides*) covering the entire surface of pond 36. OS grid reference: SP1899982527 (TN52)

Annex C: Floral Species List 2018

Table C-5-2 – Floral Species List

Latin name	Common Name
Acer campestre	Field Maple
Acer pseudoplatanus	Sycamore
Achillea millefolium	Yarrow
Adoxa moschatellina	Moschatel
Aegopodium podagraria	Ground-Elder
Agrimonia eupatoria	Agrimony
Agrostis capillaris	Common Bent
Agrostis stolonifera	Creeping Bent
Ajuga reptans	Bugle
Alchemilla mollis	Lady's Mantle
Alliaria petiolata	Garlic Mustard
Allium ursinum	Ramsons
Alnus glutinosa	Alder
Alopecurus pratensis	Meadow Foxtail
Anagallis arvensis	Scarlet Pimpernel
Anemone nemorosa	Wood Anemone
Anthoxanthum odoratum	Sweet Vernal-Grass
Anthriscus sylvestris	Cow Parsley
Arctium lappa	Greater Burdock
Arrhenatherum elatius	False Oat-Grass
Artemisia vulgaris	Mugwort
Arum maculatum	Lords And Ladies
Azolla filiculoides	Water Fern
Bellis perennis	Daisy
Betonica officinalis	Betony
Betula pendula	Silver Birch
Brachypodium sylvaticum	Wood False Brome
Bromus hordeaceus	Common Soft Brome
Bromus racemosus	Smooth Brome
Calystegia sepium	Hedge Bindweed
Cardamine pratensis	Cuckooflower
Carex nigra	Common Sedge
Carex pendula	Pendulous Sedge
Carex spp.	Sedges
Castanea sativa	Sweet Chestnut
Centaurea nigra	Common Knapweed
Centaurium erythraea	Common Centaury
Cerastium fontanum	Common Mouse-Ear

Latin name	Common Name
Chamerion angustifolium	Rosebay Willowherb
Chenopodium album	Fat-Hen
Circaea x intermedia	Hybrid Enchanter's-Nightshade
Cirsium arvense	Creeping Thistle
Cirsium palustre	Marsh Thistle
Cirsium vulgare	Spear Thistle
Cochlearia danica	Danish Scurvygrass
Conopodium majus	Pignut
Convolvulus arvensis	Field Bindweed
Cornus sanguinea	Dogwood
Corylus avellana	Hazel
Crataegus monogyna	Hawthorn
Cupressus × Xanthocyparis	Leyland Cypress
Cynosurus cristatus	Crested Dog's-Tail
Dactylis glomerata	Cock's-Foot
Digitalis purpurea	Foxglove
Dipsacus fullonum	Common Teasel
Dipsacus fullonum sens.lat.	Wild Teasel
Dryopteris filix-mas	Male-Fern
Equisetum arvense	Field Horsetail
Euphorbia peplus	Petty Spurge
Fagus sylvatica	Beech
Fallopia japonica	Japanese Knotweed
Festuca rubra	Red Fescue
Ficaria verna subsp. fertilis	Lesser Celandine
Filipendula ulmaria	Meadowsweet
Frangula alnus	Alder Buckthorn
Fraxinus excelsior	Ash
Galium aparine	Cleavers
Galium verum	Lady's Bedstraw
Geranium dissectum	Cut-Leaved Crane's-Bill
Geranium molle	Dove's-Foot Crane's-Bill
Geranium robertianum	Herb-Robert
Geum urbanum	Wood Avens
Glechoma hederacea	Ground-Ivy
Glyceria maxima	Reed Sweet Grass
Hedera helix	Common Ivy
Heracleum sphondylium	Hogweed
Hieracium agg.	Hawkweeds

Latin name	Common Name
Holcus lanatus	Yorkshire-Fog
Hyacinthoides non-scripta	Bluebell
Hyacinthoides x massartiana	Bluebell (Hybrid)
Hypericum calycinum	Rose-Of-Sharon
Hypericum maculatum	Imperforate St. John's-Wort
Hypochaeris radicata	Cat's-Ear
Ilex aquifolium	Holly
Iris pseudacorus	Yellow Iris
Juncus effusus	Soft Rush
Juncus spp.	Rushes
Lamium purpureum	Red Dead-Nettle
Larix decidua	European Larch
Lathyrus pratensis	Meadow Vetchling
Lemna minor	Common Duckweed
Leontodon saxatilis	Lesser Hawkbit
Lepidium latifolium	Dittander
Leucanthemum vulgare	Oxeye Daisy
Ligustrum vulgare	Wild Privet
Linaria purpurea	Purple Toadflax
Lolium perenne	Perennial Rye Grass
Lonicera periclymenum	Honeysuckle
Lotus corniculatus	Common Bird's-Foot-Trefoil
Lychnis coronaria	Rose Campion
Lysimachia nummularia	Creeping Jenny
Lysimachia vulgaris	Yellow Loosestrife
Medicago lupulina	Black Medick
Mercurialis perennis	Dog's Mercury
Milium effusum	Wood Millet
Myosotis arvensis	Field Forget-Me-Not
Myosotis secunda	Creeping Forget-Me-Not
Narcissus pseudonarcissus subsp. pseudonarcissus	Daffodil
Papaver rhoeas	Common Poppy
Phleum pratense	Timothy
Picea abies	Norway Spruce
Pilosella aurantiaca	Fox-And-Cubs
Pinus sylvestris	Scot's Pine
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain

Latin name	Common Name
Poa annua	Annual Meadow-Grass
Poa pratensis sens.lat.	Smooth Meadow-Grass
Poa trivialis	Rough Meadow-Grass
Populus X Canadensis	Hybrid Black Poplar
Potentilla anserina	Silverweed
Potentilla reptans	Creeping Cinquefoil
Poterium sanguisorba subsp. sanguisorba	Salad Burnet
Primula veris	Cowslip
Primula vulgaris	Primrose
Prunella vulgaris	Selfheal
Prunus avium	Wild Cherry
Prunus serrulata	Japanese cherry
Prunus spinosa	Blackthorn
Pteridium aquilinum	Bracken
Pulmonaria officinalis	Common Lungwort
Quercus petraea	Sessile Oak
Quercus robur	Pedunculate Oak
Ranunculus acris	Meadow Buttercup
Ranunculus auricomus	Goldilocks Buttercup
Ranunculus repens	Creeping Buttercup
Reseda luteola	Weld
Rhinanthus minor	Yellow Rattle
Rosa canina sens.str.	Dog-Rose
Rubus fruticosus	Bramble
Rumex acetosa	Common Sorrel
Rumex obtusifolius	Broad-Leaved Dock
Salix caprea	Goat Willow
Salix cinerea subsp. oleifolia	Grey Willow
Salix fragilis	Crack-Willow
Sambucus nigra	Elder
Sanguisorba officinalis	Great Burnet
Scrophularia nodosa	Common Figwort
Senecio jacobaea	Common Ragwort
Silene dioica	Red Campion
Silene flos-cuculi	Ragged-Robin
Sisymbrium officinale	Hedge Mustard
Solanum dulcamara	Bittersweet
Sonchus arvensis	Perennial Sow-Thistle
Sonchus asper	Prickly Sowthistle

Latin name	Common Name
Sonchus oleraceus	Smooth Sowthistle
Sorbus aucuparia	Rowan
Sorbus intermedia	Swedish Whitebeam
Sorbus torminalis	Wild Service Tree
Spiraea salicifolia	Bridewort
Stachys sylvatica	Hedge Woundwort
Stellaria graminea	Lesser Stitchwort
Stellaria holostea	Greater Stitchwort
Stellaria media	Common Chickweed
Succisa pratensis	Devil's-Bit Scabious
Symphytum × uplandicum	Russian Comfrey
Taraxacum officinale agg.	Dandelion
Tilia x europaea	Common Lime
Tragopogon pratensis	Goat's-Beard
Trifolium dubium	Lesser Trefoil
Trifolium pratense	Red Clover
Trifolium repens	White Clover
Tripleurospermum inodorum	Scentless Mayweed
Tussilago farfara	Colt's-Foot
Typha latifolia	Bulrush
Ulex europaeus	Gorse
Urtica dioica	Common Nettle
Verbascum thapsus	Great Mullein
Veronica chamaedrys	Germander Speedwell
Veronica spicata	Spiked Speedwell
Vicia sativa	Common Vetch
Viola riviniana	Common Dog-Violet

Annex D: Phase 2 Survey Results

Table D-5-3 – Total Quadrat Survey Results

	SSSI South East												SSSI North West									
	F1 dry					F2 dry		F3					West field					East field; wetter area				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Holcus lanatus	7	5	6	7	7			7	8	5	7	7	6		5	5	7			4		
Lotus corniculatus	7	5	6	8	6	6	6	4	6	6	6	6	4			4						
Dactylis glomerata	4		4	3	5	7	8	7	6	6	6	5			4	4						
Festuca rubra	8	7		7	6	6	6		5		5	5	7	5	5		5					
Plantago lanceolata	5		6	6	5	5	6	6	6	7	7	5								4		
Agrostis capillaris	7	7	4	5	6	6	7				5		4			5						
Deschampsia cespitosa		4			6								5	7	4		4	4	5		5	6
Lathyrus pratensis		6			5			5	4	5	4					4	4	5	5			
Sanguisorba officinalis								5	6	5	5	5	6	4	7	5		5				
Anthoxanthum odoratum	4	5	6	6	5	6	5									5						
Centaurea nigra	4		5	3		5	6							5		4				4		
Stellaria graminea	4	4	4			4	4			4		5			3							
Filipendula ulmaria								8		6	6						5	6	6	6		
Ranunculus repens													5	4			7		6	5	5	5
Agrostis stolonifera									5	4								4		6	6	5
Alopecurus pratensis								5	5				4	5	4		4					
Juncus acutiflorus				4		4		5				4		4						6		
Rumex acetosa	4				3			4		4	4					4						
Arrhenatherum elatius			5				5		5	5						5						
Cynosurus cristatus	6	5	4			4	4															
Epilobium hirsutum																		4	5	5	6	4
Festuca pratensis										5			5		4	4	5					
Juncus effusus				4														6		7	7	6
Lotus uliginosus																		4	5	5		4
Potentilla reptans					4	3		4										6				
Stachys officinalis									4	4	4	5										
Vicia cracca													5				4	5	5			
Cerastium fontanum				3									4							4		
Poa trivialis													4	4	4							
Potentilla erecta										4	5	6										
Trifolium pratense				4			6			5												
Carex hirta															3	4						
Carex otrubae																			5	5		
Cirsium palustre																4			4			
Equisetum arvense				2							4											
Phleum pratense		4											3									
Rumex crispus																			4	4		

	SSSI South East												SSSI North West									
	F1 dry					F2 dry		F3					West field					East field; wetter area				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Angelica sylvestris																				4		
Carex ovalis																			5			
Carex nigra																		7				
Conopodium majus									4													
Heracleum sphondylium							4															
Juncus inflexus																						7
Luzula campestris						3																
Silene flos cuculi																			5			
Primula veris										4												
Ranunculus acris						3																
Rhinanthus minor			3																			
Symphytum officinalis																				5		
Taraxacum officinale agg.				4																		
Trisetum flavescens										3												
Vicia hirta													4									

Table C-2 – Constancy Table for SSSI South East Unit (Fields F1 & F2)

	SSSI South East							
	F1 dry					F2 dry		
	1	2	3	4	5	6	7	Constancy
Lotus corniculatus	7	5	6	8	6	6	6	V
Agrostis capillaris	7	7	4	5	6	6	7	V
Anthoxanthum odoratum	4	5	6	6	5	6	5	V
Dactylis glomerata	4		4	3	5	7	8	V
Festuca rubra	8	7		7	6	6	6	V
Plantago lanceolata	5		6	6	5	5	6	V
Holcus lanatus	7	5	6	7	7			IV
Centaurea nigra	4		5	3		5	6	IV
Stellaria graminea	4	4	4			4	4	IV
Cynosurus cristatus	6	5	4			4	4	IV
Deschampsia cespitosa		4			6			II
Lathyrus pratensis		6			5			II
Juncus acutiflorus				4		4		II
Rumex acetosa	4				3			II
Arrhenatherum elatius			5				5	II

	SSSI South East							
	F1 dry					F2 dry		
	1	2	3	4	5	6	7	Constancy
Potentilla reptans					4	3		II
Trifolium pratense				4			6	II
Juncus effusus				4				I
Cerastium fontanum				3				I
Equisetum arvense				2				I
Phleum pratense		4						I
Heracleum sphondylium							4	I
Luzula campestris						3		I
Ranunculus acris						3		I
Rhinanthus minor			3					I
Taraxacum officinale agg.				4				I
Total species	**11**	**10**	**11**	**14**	**11**	**13**	**12**	

Table C-3 – Constancy Table for SSSI South East Unit (Field F3) and North West Unit, West Field

	SSSI S east					SSSI N west					
	F3					West field					
	8	9	10	11	12	13	14	15	16	17	Constancy
Holcus lanatus	7	8	5	7	7	6		5	5	7	V
Sanguisorba officinalis	5	6	5	5	5	6	4	7	5		V
Lotus corniculatus	4	6	6	6	6	4			4		IV
Dactylis glomerata	7	6	6	6	5			4	4		IV
Festuca rubra		5		5	5	7	5	5		5	IV
Lathyrus pratensis	5	4	5	4					4	4	III
Alopecurus pratensis	5	5				4	5	4		4	III
Plantago lanceolata	6	6	7	7	5						III
Festuca pratensis			5			5		4	4	5	III
Deschampsia cespitosa						5	7	4		4	II
Filipendula ulmaria	8		6	6						5	II
Rumex acetosa	4		4	4					4		II
Stachys officinalis		4	4	4	5						II
Agrostis capillaris				5		4			5		II
Stellaria graminea			4		5			3			II
Ranunculus repens						5	4			7	II
Juncus acutiflorus	5				4		4				II

	SSSI S east					SSSI N west					
	F3					West field					
	8	9	10	11	12	13	14	15	16	17	Constancy
Arrhenatherum elatius		5	5						5		II
Poa trivialis						4	4	4			II
Potentilla erecta			4	5	6						II
Centaurea nigra							5		4		I
Agrostis stolonifera		5	4								I
Vicia cracca						5				4	I
Carex hirta								3	4		I
Anthoxanthum odoratum									5		I
Potentilla reptans	4										I
Cerastium fontanum						4					I
Trifolium pratense			5								I
Cirsium palustre									4		I
Equisetum arvense				4							I
Phleum pratense						3					I
Conopodium majus		4									I
Primula veris			4								I
Trisetum flavescens			3								I
Vicia hirta						4					I
Total species	**11**	**12**	**17**	**13**	**10**	**14**	**8**	**10**	**13**	**9**	

Table C-4 – Constancy Table for SSSI South East Unit, East Field

	East field; wetter area					
	18	19	20	21	22	Constancy
Epilobium hirsutum	4	5	5	6	4	V
Deschampsia cespitosa	4	5		5	6	IV
Ranunculus repens		6	5	5	5	IV
Agrostis stolonifera	4		6	6	5	IV
Juncus effusus	6		7	7	6	IV
Lotus uliginosus	4	5	5		4	IV
Filipendula ulmaria	6	6	6			III
Lathyrus pratensis	5	5				II
Vicia cracca	5	5				II
Carex otrubae		5	5			II
Rumex crispus		4	4			II

	East field; wetter area					
	18	**19**	**20**	**21**	**22**	**Constancy**
Holcus lanatus			4			I
Plantago lanceolata			4			I
Sanguisorba officinalis	5					I
Centaurea nigra			4			I
Juncus acutiflorus			6			I
Potentilla reptans	6					I
Cerastium fontanum			4			I
Cirsium palustre		4				I
Angelica sylvestris			4			I
Carex ovalis		5				I
Carex nigra	7					I
Juncus inflexus					7	I
Silene flos cuculi		5				I
Symphytum officinalis			5			I
Total species	**11**	**12**	**15**	**5**	**7**	

Annex E: Previous 2017 Survey Reports

(Phase 1 Habitat Report, Woodland NVC Report, Grassland NVC Report)

M42 Junction 6 Improvements

Extended Phase 1 Habitat Survey Report

16 March 2017

Produced for
Highways England

Prepared by

Three White Rose Office Park
Millshaw Park Lane
Leeds
LS11 0DL

T 07810 287857
E paul.hanson@mouchel.com

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Contents

1 Introduction

1.1 Background

Mouchel was commissioned by Highways England to undertake an Extended Phase 1 Habitat survey for the proposed improvement works at Junction 6 of the M42 to the east of Birmingham, West Midlands. The M42 is a fundamental part of the Strategic Road Network (SRN) and forms the southern and eastern arms of the Birmingham Box area, which encompasses various smart motorway schemes.

There are currently three options for the improvement works: Option 1 (Option 2R West), Option 2 (Option 2R East) and Option 3 (Option 2P). The Phase 1 Habitat survey area, shown in Appendix 1: Figure 1 covers land which may be affected by all of the three route options

1.2 Site location

The proposed options are predominantly located to the south west of Junction 6, although all route options also include improvements to the junction itself.

To the east of Birmingham, the land is predominantly used for agriculture and pasture grazing, with the residential villages of Bickenhill and Hampton in Arden within the survey area on either side of the M42. The scheme is close to the National Exhibition Centre (NEC), Birmingham International Railway Station, and Birmingham Airport as well as proposed developments including High Speed 2 (HS2) route and terminal, a Motorway Service Area (MSA) and UK Central development.

1.3 Study rationale and objectives

The aim of the study was to appraise the ecological value of the survey area. To achieve this, the following objectives were set:

- Consult records covering locations of statutory and non-statutory protected sites, habitats and species that are ecologically important within the survey area;
- Map the habitats within the scheme and adjacent to it;
- Identify habitats that are ecologically important and/ or have legal protection;
- Assess the potential of each habitat to support and, where possible, also undertake preliminary field surveys for ecologically important and/ or legally protected species;
- Identify ecological risks and appropriate actions to be taken to ensure compliance with wildlife legislation and conservation policy; and
- Identify invasive species present in the area of the works and provide recommendations as to how to best manage any such relevant issues.

2 Methods

2.1 Desk study

Online sources were consulted to establish the location of statutory and non-statutory designated sites within the survey area. This was achieved using the online, open source database MAGIC (www.magic.defra.gov.uk). This resource was also used to investigate whether any European Protected Species (EPS) licences have been issued within the past 10 years within the survey area.

Warwickshire Biological Records Centre and ENVIS Species Records (records kept by Highways England) were consulted for biological records within the survey area, from within the past 10 years[1]. Records of statutory protected sites, non-statutory protected sites, priority habitats/species, and other animals and plants of note were requested.

2.2 Site visit

2.2.1 Extended Phase 1 Habitat Survey

An extended Phase 1 Habitat survey was undertaken from 14th to 16th February 2017. Habitats were identified using the standard Phase 1 Habitat survey methodology[2]. In addition to mapping habitat types and dominant flora, the ability of habitats to support legally protected, valuable or controlled species, including Priority Species and invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) was assessed. Incidental field signs or sightings of such species were recorded during the site visit.

2.2.2 Habitat Suitability Index (HSI) Assessment

A review of OS mapping undertaken prior to the site visit which identified 41 ponds within 500m of the three route options. During the site visit, a Habitat Suitability Index (HSI)[3] assessment was undertaken. The HSI is a numerical score between 0 and 1 (0 indicating unsuitable habitat, 1 representing optimal habitat) which is derived from ten suitability indices, all of which are factors thought to affect the likelihood of a pond supporting breeding great crested newts. The HSI score provides an indicator of the suitability of a water body to support great crested newts and ranges from poor (an HSI score of less than 0.5) to excellent (an HSI score of greater than 0.8).

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[1] Older records have been ignored as they will not accurately reflect current ecological conditions.

[2] JNCC. 2007. *Handbook for Phase 1 Habitat Survey - a Technique for Environmental Audit*. England Field Unit, Joint Nature Conservancy Council, Peterborough.

[3] Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. 2000. *Evaluating the suitability of habitat for the great crested newt* (*Triturus cristatus*). Herpetological Journal 10:143-155.

2.3 Limitations

Access was not permitted into large areas of privately owned land, with some landowners refusing permission or not being contactable. Where possible these areas were observed from adjacent accessible or public access land. Where this was not possible, habitats were mapped using aerial imagery.

The majority of land beneath the footprint of the four route options is contained within the south-western quadrant formed by the intersection of the M42 and the A45. This area was predominantly fully accessible at the time of the survey and, as such, access limitations are not a significant limitation to achieving the objects of the survey.

3 Results

3.1 Desk Study

3.1.1 Statutory sites

Information obtained from MAGIC confirmed that there are two statutory designated sites within the survey area. The River Blythe Site of Special Scientific Interest (SSSI) and Bickenhill Meadows SSSI.

The River Blythe SSSI is an excellent example of a lowland river on clay substrate. The structure of the river is very variable and is important due to the rarity of such examples in lowland Britain. Botanically, the River Blythe is one of the richest rivers in lowland England with the most species-rich sections containing as many species as the very richest chalk streams. The habitats along the river are also important for invertebrate communities.

Bickenhill Meadows SSSI consists of two groups of fields comprising species-rich grassland situated to the south and west of the village of Bickenhill on predominantly neutral soils. The unit to the west of Catherine de Barnes Lane is 2.53ha whilst the unit to the east of Catherine de Barnes Lane is 3.15ha. The unit to the east of Catherine de Barnes Lane also forms part of the Shadowbrook Meadows Warwickshire Wildlife Trust Nature Reserve which covers an area of 4.40ha.

The meadows as a whole comprise one of the richest grassland floras in the county with good examples of both meadow foxtail *Alopecurus pratensis* – great burnet *Sanguisorba officinalis* floodmeadow and common knapweed *Centaurea nigra* – crested dog's-tail *Cynosurus cristatus* meadow and pasture. Both grassland types have declined very severely nationally in the 20th century due to agricultural improvement. The West Midlands Region contains a major part of the national resource of the common knapweed – crested dog's-tail grassland type which is typically associated with level topography, loam or clay soils, moderately free drainage and the retention of traditional farming methods with small fields.

There is a complex pattern of vegetation resulting from local variations in topography and drainage, such as the ridge and furrow pattern, evident in some of the fields. This has led to the development of mosaics where the main vegetation types intermingle, as well as to areas where each type can be recognised. Characteristic species include common bent *Agrostis capillaris*, meadow foxtail, Yorkshire-fog *Holcus lanatus*, sweet vernal-grass *Anthoxanthum odoratum*, common sorrel *Rumex acetosa*, cat's-ear *Hypochoeris radicata*, ribwort plantain *Plantago lanceolata* and yellow rattle *Rhinanthus minor*. The sward is enriched by the presence of cowslip *Primula veris*, quaking-grass *Briza media*, lady's bedstraw *Galium verum*, devil's-bit scabious *Succisa pratensis*, heath-grass *Danthonia decumbens* and common spotted-orchid *Dactylorhiza fuchsii*. The fields also contain a number of uncommon species such as betony *Stachys officinalis*, pepper-saxifrage *Silaum silaus*, saw-wort *Serratula tinctoria*, as well as meadow thistle *Cirsium dissectum*, a county rarity.

Further interest is provided by wetter areas characterised by rushes *Juncus* spp., sedges *Carex* spp. and tall herbs such as meadowsweet *Filipendula ulmaria* and great burnet. Both groups of meadows have streams and there is a good range of tree and shrub species in the hedgerows around the fields.

The scheme is within the Impact Risk Zone (IRZ) for both these SSSIs. This means that for planning applications for any road proposals, the LPA should consult Natural England regarding any likely risks from the proposed scheme.

3.1.2 Non-statutory sites

These include Local Wildlife Sites (LWS), Ecosites, Nature Conservation Sites (NCS), Local Geological Sites (LGS) and ancient woodland within the survey area:

- Castle Hill Farm Meadows LWS;
- Marsh adjacent to River Blythe Ecosite;
- Barbers Coppice Ecosite;
- The Jungle LWS;
- Main Birmingham to London Railway Line Ecosite;
- Pendigo Lake and The Rough Ecosite/ancient woodland;
- Catherine De Barnes Ecosite;
- Greens Ward Piece LWS;
- Bickenhill Churchyard Ecosite
- Aspbury's Coppice ancient woodland/Ecosite;
- Clock Lane Meadows;
- Wayside Cottages Meadow LWS;
- Low Brook and Kinghurt Brook Ecosite;
- Road Side Hedge Ecosite;
- Shadow Brook Ecosite;
- Holywell Brook Ecosite;
- Disused Railway Ecosite;
- Hampton Grasslands LWS;
- Hampton Manor Grounds and Churchyard Ecosite;
- Denbigh Spinney LWS;
- Arden Brickworks LGS; and
- Marshy Fields Ecosite.

3.1.3 EPS licences

There have been four EPS licences issued in the past 10 years within the survey area:

- At SP 184 828, near the junction of Catherine de Barnes Lane (B4438) and the A45. EPSM2012-4998 issued for bats (common pipistrelle) to allow destruction of a resting place. Start 26/10/12. End 31/08/15.

- At SP 187 821, in Bickenhill village. 2015-9758-EPS-MIT issued for bats (brown long-eared, common pipistrelle, soprano pipistrelle) to impact on a breeding site, allow destruction of a breeding site and allow destruction of a resting place. Start 05/05/15. End 01/05/25.

- At SP 198 824, between Old Station Road and the M42/train track, just south of Junction 6 of M42. EPSM2012-5010 issued for bats (brown long-eared) to allow destruction of a resting place. Start 17/10/12. End 30/10/13.

- At SP 198 826, between Old Station Road and the M42/train track, just south of Junction 6 of M42. EPSM2012-5244 issued for bats (brown long-eared, common pipistrelle) to impact on a breeding site, allow destruction of a breeding site and allow destruction of a resting place. Start 02/12/12. End 01/09/16.

3.1.4 Species

ENVIS data, and data received from Warwickshire County Council Records Centre indicated that there are records of the following species from within the survey area from the past 10 years:

- Otter *Lutra lutra* signs (spraint only) where Holly Brook crosses under the A456 Chester Road;
- Great crested newt records from two ponds south east of Junction 6 near Hampton in Arden;
- Three records of Leisler's bat *Nyctalus leisleri* in flight in Little Packington and three roost records at Grange Farm, Bickenhill of brown long-eared bat *Plecotus auritus*, common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *Pipistrellus pygmaeus*;
- Seven badger *Meles meles* setts within 1km of the M42 and six road casualties along Catherine de Barnes Lane; and
- Records of moth, butterfly and beetle species of principal importance.

3.2 Habitats

The survey area contained a mixture of common habitat types. Table 1 presents a summary description of each habitat type found, which should be read in conjunction with the Phase 1 Habitat Map (Appendix 1; Figure 1), the table of Target Notes (Appendix 2) and photographs in Appendix 3.

Table 1- Habitats identified within the survey area

Habitat	Description	Biodiversity Value
Broad-leaved semi-natural and mixed semi-natural woodland	This habitat comprises all stands which do not obviously originate from planting. Within the survey area there are two areas of ancient replanted woodland (TN19 and TN20) with other stands being of more recent origin. Two areas of woodland are mapped as mixed semi-natural woodland (TN20 and TN73) due to them having a high coniferous (Scots pine) component within the canopy. Despite the predominance of conifers the ground flora within woodland at TN20 still includes many species more characteristic of ancient broad-leaved woodland.	Broad-leaved semi-natural woodland can provide habitat for foraging and roosting bats if suitable holes/cracks or mature ivy is present on trees. Standing trees also provide habitat for breeding birds and cover for commuting and foraging mammals. These habitats usually are botanically rich and may include important or rare lichen and fungi species which are associated with mature trees.
Plantation woodland	Plantation woodland includes woodland of any age which is obviously planted. Most of the plantation woodland within the survey area is composed of broad-leaved trees but there is a single narrow belt of Norway spruce *Picea abies* along the eastern embankment of the M42, around TN9.	Plantation woodland can also provide suitable foraging and roosting habitat for bats although plantation woodland normally contains fewer bat roosting features than semi-natural woodland due to the generally smaller size of trees within plantations. Plantation woodland also provides breeding and foraging habitat for birds and mammals.
Scattered and dense /continuous scrub	Scrub occurs frequently throughout the survey area and is dominated by locally native shrubs usually less than 5m high and any stands of mature hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa* or grey willow *Salix cinerea*, even if over 5m high. The majority of woody vegetation along the embankments of the M42 is comprised of scrub.	Scrub provides valuable habitat for nesting birds, with many species such as hawthorn or blackthorn also providing a winter food-source for birds. Scrub is also a valuable habitat for sheltering reptiles where if forms an interface with more open grassland or tall herbaceous habitat, particularly on south-facing slopes. Patches of scrub also provide cover over mammal resting or breeding places including badger setts.

Habitat	Description	Biodiversity Value
Hedgerow	Hedgerows throughout the survey area are mapped as all being species-poor. This is due to the fact that the survey was undertaken in February, with most hedgerows being leafless. Identification of component species was further hindered due to the majority of hedgerows having been recently flailed, with the majority of the previous season's growth being removed. Previous walkover surveys of the area, however, describe hedgerows as mostly being overgrown and species-rich in places, particularly along Catherine de Barnes Lane.	Hedgerows (including those not classified as 'important' under the Hedgerow Regulations 1997) are typically significant corridors for wildlife, particularly in intensively farmed landscapes, and link habitats such as woods, ponds, grasslands and wetlands. They also provide nesting and foraging areas for birds.
Bare ground	Bare ground mapped within the survey area consists mostly of tarmac car parks, located around the airport and hotels and conference/arena buildings.	This habitat has very little biodiversity value, except possibly for foraging or breeding birds within ornamental shrub planting immediately adjacent to the car parks.
Arable /improved grassland	This is the dominant habitat in the landscape, both to the east and west of the M42. Interspersed are wooded areas, ponds, scrub and unimproved and semi-improved grasslands and species-rich hedgerows in places.	Common farmland birds such as skylark *Alauda arvensis* may use fields such as these to nest during the breeding season (March to July). Badgers and other mammals such as hedgehog also use these areas to forage.
Amenity grassland	This habitat is present along parts of the roadside verge within the survey area and is intensively managed with a short sward due to regular mowing. Species present include perennial rye grass *Lolium perenne*, daisy *Bellis perennis,* dandelion *Taraxacum officinale* agg. and white clover *Trifolium repens.* Large areas of amenity grassland also occur within private gardens and surrounding conference centres and hotels. The largest single area of amenity grassland comprises playing fields at the Gaelic Athletic Association sports grounds to the east of Catherine de Barnes Lane.	This habitat is generally of low value as a result of its management regime. Where this habitat is adjacent to scrub, however, it may be valuable for basking reptiles and foraging mammals.

Habitat	Description	Biodiversity Value
Unimproved and semi-improved neutral grassland	Unimproved and semi-improved neutral grasslands have either not been modified by the addition of fertilisers/herbicides, intensive grazing and drainage or have only been treated with low levels of farmyard manure. Unimproved grassland at TNs 42 and 50 constitutes the Bickenhill Meadows SSSI. There are also numerous LWS and ecosites within the survey area designated for the diverse range of plant species associated with species-rich grasslands. Other smaller areas are undesignated.	Grasslands such as these are important for the invertebrate assemblages they support as well as for their intrinsic value. This habitat also provides rich foraging habitat for mammals, birds, reptiles and amphibians.
Marshy grassland	Marshy grassland covers certain grasslands with a high proportion of rushes, sedges and herbaceous species such as meadowsweet *Filipendula ulmaria*, marsh-marigold *Caltha palustris* or valerian *Valeriana* species. It differs from swamp habitat in that the latter has a water table distinctly above the substratum for much of the year and is dominated by reed grasses or large sedges. There is a large area of marshy grassland towards the south of the survey area, just north of the sewage works, to the east of the M42. There are also smaller patches of marshy grassland which are too small to map, including within the eastern unit of the Bickenhill Meadows SSSI/ Shadowbrook Meadows Warwickshire Wildlife Trust Nature Reserve.	Marshy grassland is intrinsically important as it includes many scarce National Vegetation Classification (NVC) communities, with associated rare and scarce invertebrate species. Marsh grassland also provides valuable feeding habitat for bird species, particularly waterfowl and waders, with several species also nesting within marshy grassland habitat.
Open water	There are numerous ponds within 500m of the Options footprint.	These have value to waterfowl and farmland birds as well as amphibians such as great crested newt. The results of the great crested newt HSI assessments are covered separately within the great crested newt HSI survey report. Bats may also use these open water bodies for feeding and foraging.
Running water	There are several streams/wet ditches within the survey area including those at TNs 14, 41 and 52.	These watercourses may have value to riparian mammal and amphibian species and can act as corridors for dispersal for these animals.

3.3 Species

3.3.1 Birds

The hedgerows, woodland, scrub and arable fields adjacent to and within the survey area provide suitable nesting habitat for birds between March and July, and provide foraging habitat for the resident local garden and farmland bird communities throughout the year.

3.3.2 Bats

There is suitable foraging and roosting habitat for bats within the survey area. Mature trees and built structures with potential roost features were identified during the Phase 1 Habitat survey. See locations listed in the table of Target Notes (Appendix 2) for further details. Hedgerows and vegetated embankments adjacent to the M42 may also be used by commuting and foraging bats.

3.3.3 Badger

The woodland, scrub, grasslands and arable fields within the survey area and the surrounding landscape are suitable habitat for this species. Badger signs were found at the following locations during the Phase 1 Habitat survey:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

[redacted]

[redacted]

Sett at TN62		
Hole	**OS Grid Ref**	**Description**
1	[redacted]	Badger shaped, loose spoil, some debris in entrance but obviously in use.
2	[redacted]	Wide badger-shaped entrance which is clear of debris and in active use.
3	[redacted]	Clear entrance, old bedding present.
4	[redacted]	Very wide tunnel with fresh digging.
5	NA	Recent digging but entrance blocked by brick. Not in use.
6	[redacted]	In use.

[redacted]

Sett at TN72		
Hole	**OS Grid Ref**	**Description**
1&2	[redacted]	One hole blocked with leaves and barbed wire in entrance (Photograph 2), one in use (Photograph 3).
3	[redacted]	Clear hole beneath tree roots (Photograph 4) with badger footprint nearby (Photograph 5).
4	[redacted]	Some debris in entrance (Photograph 6).
5&6	[redacted]	Some debris in entrance (Photographs 7&8).
7&8	[redacted]	Both holes clear with recent spoil in entrance (Photographs 9&10).

3.3.4 Reptiles

The habitat within the survey area is suitable to support reptiles. Arable fields, grasslands, woodland and scrub provide sites that can be used for basking, foraging or shelter for these animals. An example of suitable habitat can be found along the south-facing road embankment at TN45 (Photograph 11). The presence of reptiles within the survey area, however, was not confirmed by any desk-study records.

3.3.5 Great crested newt

Ponds suitable for breeding amphibians and habitats such as hedgerow, dense scrub, woodland and grassland, which are suitable for foraging and sheltering amphibians, are present within the survey area.

41 waterbodies were identified from OS mapping within 500m of the route options and an additional 5 waterbodies were recorded during the Phase 1 habitat survey. HSI surveys were undertaken to assess the suitability of these waterbodies to support breeding newts. The full results of the HSI surveys are provided in Appendix 2.

3.3.6 Water vole

Arable ditches and streams throughout the survey area can provide suitable habitat for water voles, although the watercourses observed during the survey were mostly heavily shaded (Photograph 12), with water that appeared contaminated. No evidence of water vole was found during the site visit, however their presence cannot be ruled out without further, more detailed investigation.

3.3.7 Dormouse

Suitable habitat for this species exists throughout the survey area with patches of woodland, linked by an extensive network of hedgerows. The presence of dormouse within the survey area, however, was not confirmed by any desk-study records.

3.3.8 Otter

Rivers and their component watercourses can provide habitat for otters, which typically have large home ranges. No evidence of otters was found during the Phase 1 Habitat survey, however, it is likely that these animals use the River Blythe, which is located just outside the survey area, to the east of the A452.

3.3.9 White-clawed crayfish

Suitable habitat for this species was identified during the Phase 1 Habitat survey, with some stony sections within the watercourse at TN52. The presence of white-clawed crayfish within the survey area, however, was not confirmed by any desk-study records.

3.3.10 Invertebrates

Data collected from the desk study and the field survey indicate that parts of the survey area, in particular land west of the M42 where unimproved grassland, woodland and marshy grasslands occur, are likely to support locally important invertebrate assemblages.

3.3.11 Hedgehogs

Habitat suitable for use by foraging hedgehogs, such as scrub, grasslands and woodland is present within the survey area. However, the habitat on the highways verges and embankments is of poorer quality and close to traffic and therefore less likely to be used by this species.

3.3.12 Schedule 9 plant species

Several stands of Japanese knotweed *Fallopia japonica* were found during the Phase 1 Habitat survey at TNs 51 (Photograph 13), 54 (Photograph 14), 55 (Photograph 15) and 63. The Schedule 9 species water fern *Azolla filiculoides* was found to be covering the entire surface of Pond 36 (Photograph 16).

4 Legislative and policy context

4.1 Summary of relevant legislation and policy

This section summarises the legislation and policy which is relevant, in ecological terms, to this assessment; i.e., legislation relevant to species present or likely to be present within the survey area, and has guided the scope of work undertaken in order to identify likely ecological constraints.

4.2 Conservation of Habitats and Species Regulations 2010

All bat species in England and Wales are fully protected through inclusion within Schedule II of the Conservation of Habitats and Species Regulations 2010. Under this legislation they are given the status of a European protected species (EPS). This legislation makes it an offence to deliberately capture, kill, injure or disturb bat species. For the purposes of this legislation disturbance has been defined as that likely:

- Impair their ability to:

  (i) Survive, breed or reproduce, or to rear or nurture their young; or

  (ii) Hibernate or migrate.

- Affect significantly the local distribution or abundance of that species to which they belong.

It is also an offence to damage or destroy a breeding site or resting place of these species. It may be possible to apply for a licence from Natural England to allow activities that would otherwise be an offence under these Regulations.

All bats are also partially protected in England and Wales through their inclusion in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Under this legislation, it is an offence to intentionally or recklessly disturb a bat whilst it is using a place of rest or shelter and/ or from being obstructed from entering such a place. This applies to individuals but is subject to a number of defences, including if the disturbance was the '*incidental result of a lawful operation that could not reasonably have been avoided*'. No licences are available for the purposes of development for offences under the Wildlife and Countryside Act 1981 (as amended).

4.3 Wildlife and Countryside Act 1981 (as amended)

This is the main piece of legislation which protects animals, plants, and in some cases their habitats, in England. Through its inclusion under Schedule 5 of The Act water voles, their breeding sites and resting places are protected by law. Under Part 1 of The Act, all wild birds receive protection from being intentionally killed, injured or taken damage. It is also an offence to destroy a wild bird nest (whilst being built or in use) or its eggs. Species listed on Schedule 1 of The Act (such as barn owl *Tyto alba*) receive further protection which makes it an offence to intentionally or

recklessly disturb these species while building a nest, or in, on or near a nest containing eggs or young; or to disturb dependent young of such a bird.

Under Section 14 of the Wildlife and Countryside Act 1981 (as amended) it is an offence to release (or in the case of plants, cause to grow) any species of animal or plant listed on Schedule 9 of the Act.

Priority Species (such as the European hedgehog *Erinacus europaeus* and the common toad *Bufo bufo*) are those that are identified as being the most threatened and requiring conservation action under the UK Biodiversity Action Plan (now superseded by the UK Post-2010 Biodiversity Framework). Whilst inclusion on this list does not confer any direct protection upon the species concerned, government agencies and local authorities are legally obliged to have regard to those features of principal conservation importance and in exercising its functions. Conservation of Priority Species is considered a material consideration for national and local planning policy (including the granting of planning permission) after the introduction of the Countryside and Rights of Way (CROW) Act 2000 and Natural Environment and Rural Communities (NERC) Act 2006 (both as amended). Government agencies and local authorities are also obliged under Section 74 (3) of the CROW Act 2000 to undertake steps to further the conservation interest of such species, and under Section 41 of the NERC Act, 2006, to restore or enhance a population or habitat of such species.

5 Recommendations

5.1 Habitats

There are two statutory designated sites, twenty two non-statutory designated sites and two ancient woodlands within the survey area. All three route options may result in both direct and indirect adverse impacts on these sites. Narrow strips of ancient woodland (TNs 19 & 20) located directly adjacent to the M42 would be also be lost to Options 1 and 2.

It is recommended that, once route selection has been made and land-take requirements confirmed, a more detailed habitat assessment is undertaken in order to assess likely impacts. This may include detailed NVC surveys which should be undertaken during the appropriate season. It is recommended that Options which results in the direct loss of designated sites and ancient woodland be avoided. Options which impact these sites may also incur major impacts on the timescale and cost of the project.

As the survey area lies within several SSSI IRZs, further consultation with Natural England is recommended.

5.2 Birds

Vegetation throughout the survey area provides nesting and foraging habitat for garden and farmland birds. If trees, woodland, hedgerows or other woody vegetation are to be removed, there is risk of negative effects on breeding birds and/ or their young and nests. Work should be planned to control this risk, and removal of vegetation that is likely to support breeding birds should be undertaken outside the breeding season (March to July).

If clearance during the breeding season is unavoidable then vegetation should be checked for the nests by an experienced ecologist prior to removal. If active nests are present, then work around the nest should cease until the young have fledged.

5.3 Bats

Mature trees and buildings beneath one or more of the route options within the survey area, have features suitable to support roosting bats. Further assessment of trees and buildings should be undertaken to determine bat roost suitability.

All bat species receive statutory protection covering both killing or injuring individual bats, and disturbance which may impair their ability to survive, breed, hibernate or rear young. The scheme could impact bats by effects on roosting sites, disruption of commuting routes, changing or removing foraging areas and commuting lines, artificial lighting and vibration and noise associated with construction and road infrastructure.

A bat roost suitability assessment can be undertaken during any month of the year. If given access, an internal and external inspection (including an endoscope survey of

accessible crevices) for features suitable to support roosting bats, should be undertaken in conjunction with the bat roost suitability assessment. Depending on the outcome of the survey, structures and trees may require emergence/ re-entry surveys to inform more accurately the presence, species, number of bats present and type of roost. This level of survey should be undertaken during May-September when bats are active.

Linear features, such as hedgerows and watercourses, and areas of grassland and woodland may provide suitable habitat for foraging and commuting bats. It is recommended that an assessment of the likely value of these habitats for bats is undertaken. Further surveys, including walked-transects and the deployment of static bat detectors may be required and these surveys should be undertaken between March and October.

5.4 Badger

[redacted] If this option is adopted, works within the vicinity of the sett will have to be undertaken under Natural England licensing and appropriate mitigation provided.

5.5 Reptiles

Suitable habitat for reptiles occurs at locations throughout the survey area. It is recommended that presence / absence surveys are undertaken within suitable areas of habitat which are currently beneath the footprint of any of the route options, such as the south-facing road embankment at TN45. Surveys would require the placement and regular checking of artificial refugia within suitable areas of habitat and should be undertaken between March to October.

5.6 Great crested newt

Both aquatic and terrestrial habitats suitable for great crested newts are present within the survey area. It is recommended that further survey work, comprising presence/absence surveys, is undertaken to determine if this species is present. Surveys should be undertaken between mid-March and mid-June, with at least half of the surveys taking place between mid-April and mid-May. Should great crested newts be found during these surveys, an additional two surveys may be required to allow an assessment of the population size.

5.7 Water voles

Habitat suitable for water voles is present within the survey area. It is recommended that a water vole survey is undertaken on all watercourse sections within the survey area, which are beneath any of the route options, to determine the presence or absence of this species. The survey should be undertaken during the water vole active period, April to September.

5.8 Dormouse

The presence of dormouse within the survey area is uncertain. It is recommended that consultation with local mammal groups is undertaken to gain a greater insight into the current distribution of this species within the region. This information will enable a decision to be made as to whether to undertake presence / absence surveys within the survey area. Should these surveys be required, these should be undertaken between April and November.

5.9 Otter

Watercourses within the survey area are generally small streams or field drains, with the most suitable otter habitat (the River Blythe) being located just outside the survey area to the east of the A452. Otter field signs can be searched for at the same time as water vole surveys are undertaken on all watercourse sections within the survey area, which are beneath any of the route options.

5.10 White-clawed crayfish

The presence of white-clawed crayfish within the survey area is uncertain. Further assessments of habitat suitability should be undertaken on all watercourse sections within the survey area which are crossed by any of the route options. A habitat suitability assessment is not seasonally constrained, however should any additional surveys for white-clawed crayfish be required, these should be undertaken during June to September.

5.11 Invertebrates

It is recommended that further habitat suitability assessment is undertaken within areas of unimproved grassland, woodland and marshy grassland to determine whether this habitat is suitable to support important invertebrate assemblages.

5.12 Hedgehogs

If scrub, woodland and hedgerow habitat is to be removed, this should be first checked by a suitably qualified ecologist for resting animals, which can then be moved to a suitable location outside the works area.

If a substantial area of semi-improved grassland or scrub is to be lost due to the scheme, it is recommended this is either reinstated or compensated for with like-for-like habitat in order to further the conservation interest of this species as a Local Species of Principle Importance.

5.13 Schedule 9 plant species

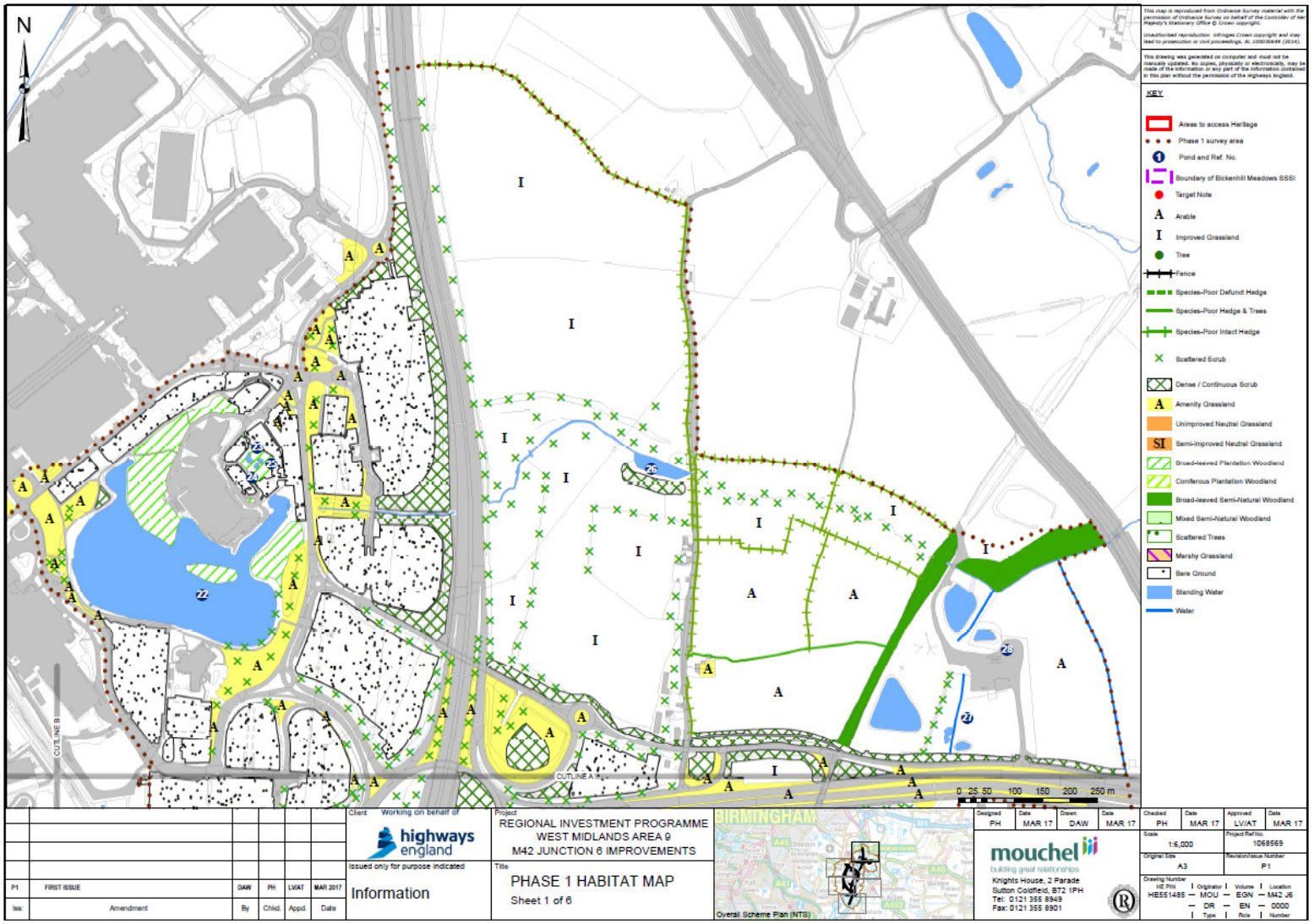
Japanese knotweed at TNs 51, 54, 55 and 63 is currently beneath the footprint of Option 1. If this route option is chosen, the stands of knotweed will have to be chemically treated and removed by a licenced contractor, prior to any digging or vegetation removal to avoid committing an offence under the Wildlife & Countryside Act 1981 (as amended), by potentially spreading this species to the wider environment.

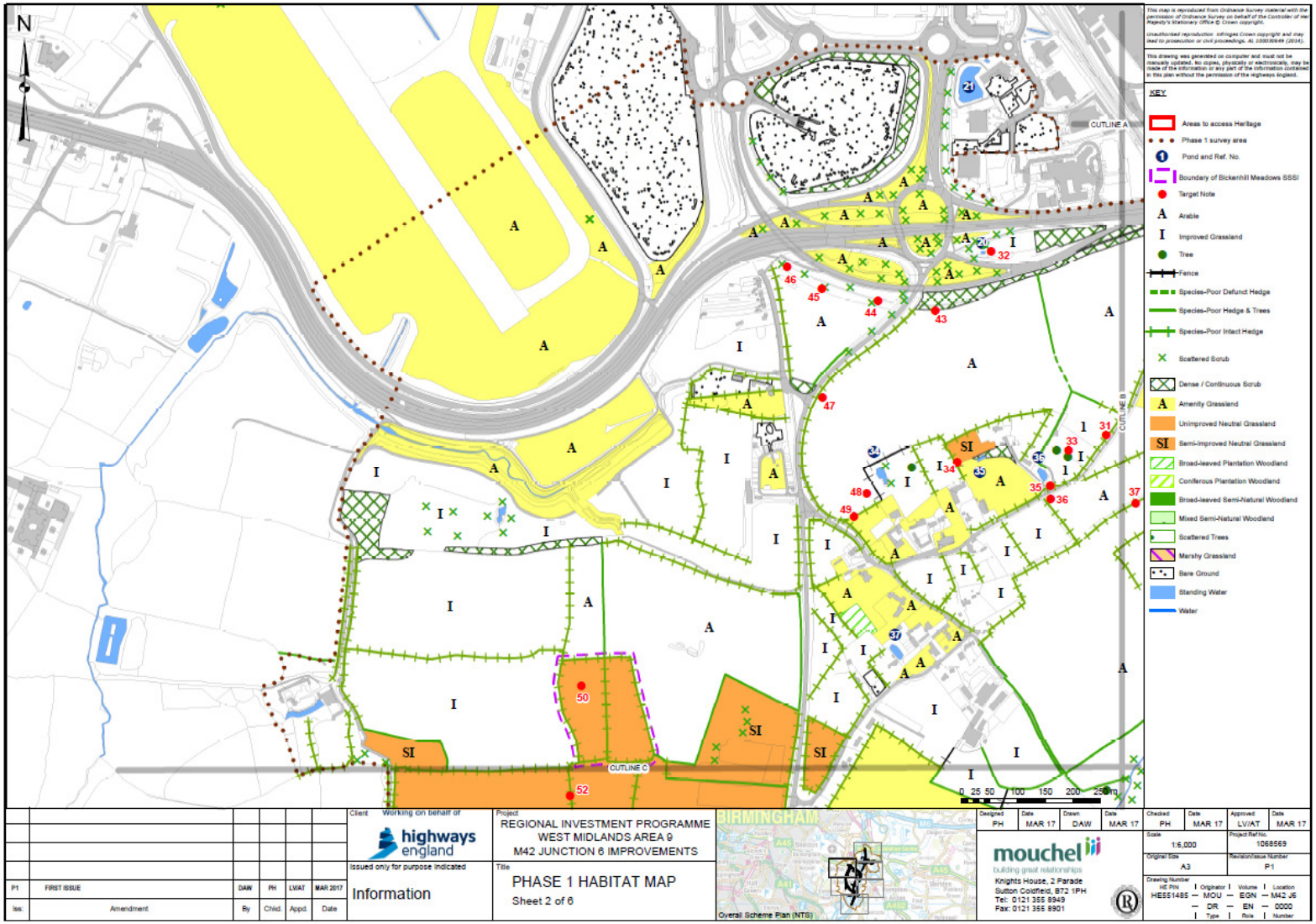
Pond 36 which contains water fern is not beneath the footprint of any of the route options. If the pond is to be bottle trapped as part of great crested newt surveys, however, care will need to be taken to avoid spreading this species to any other survey ponds. This could most easily be achieved by using a single set of bottle traps and canes solely on this pond to avoid carrying fragments of the plant which may get trapped within the traps or on canes.

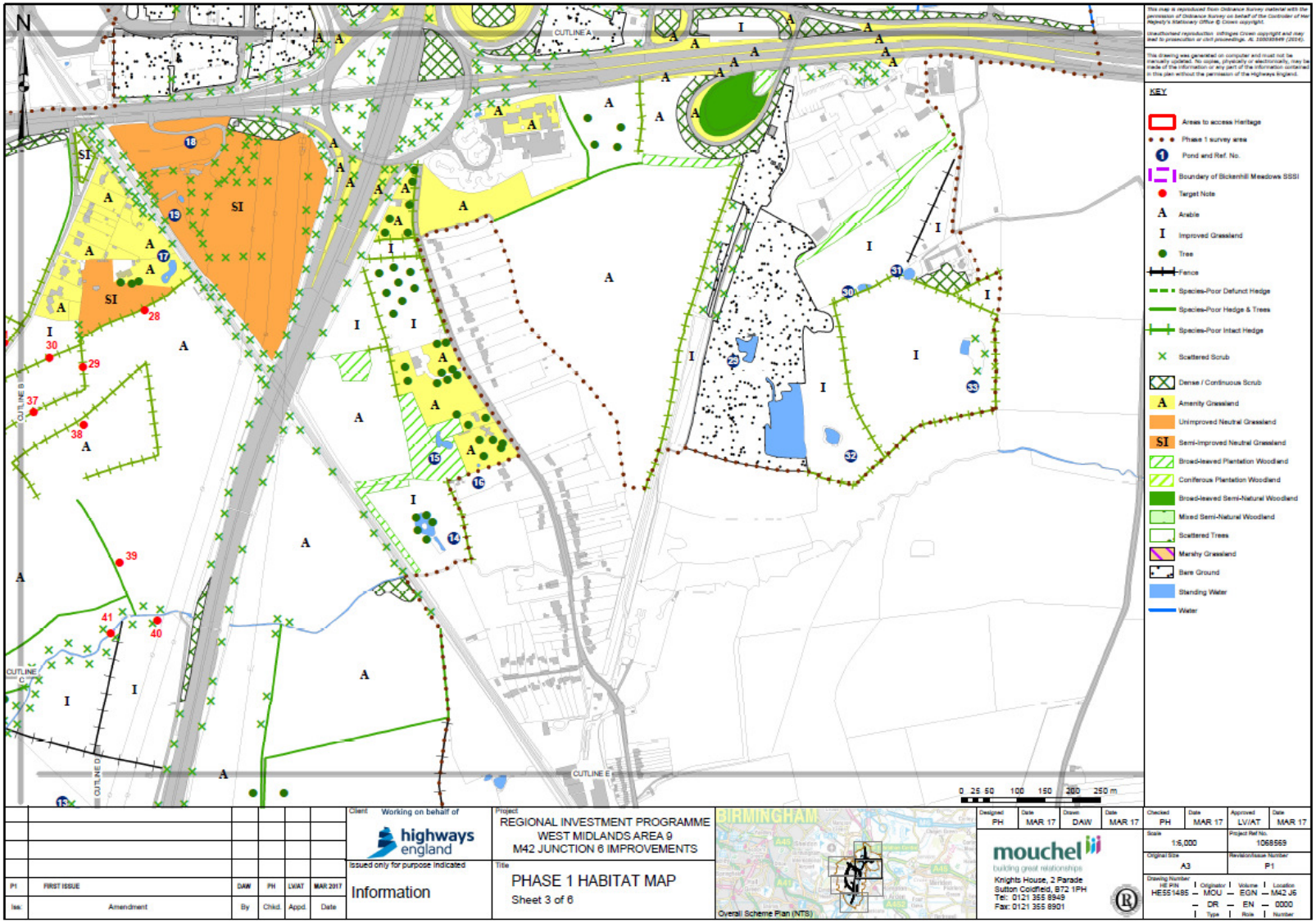
5.14 Survey programme

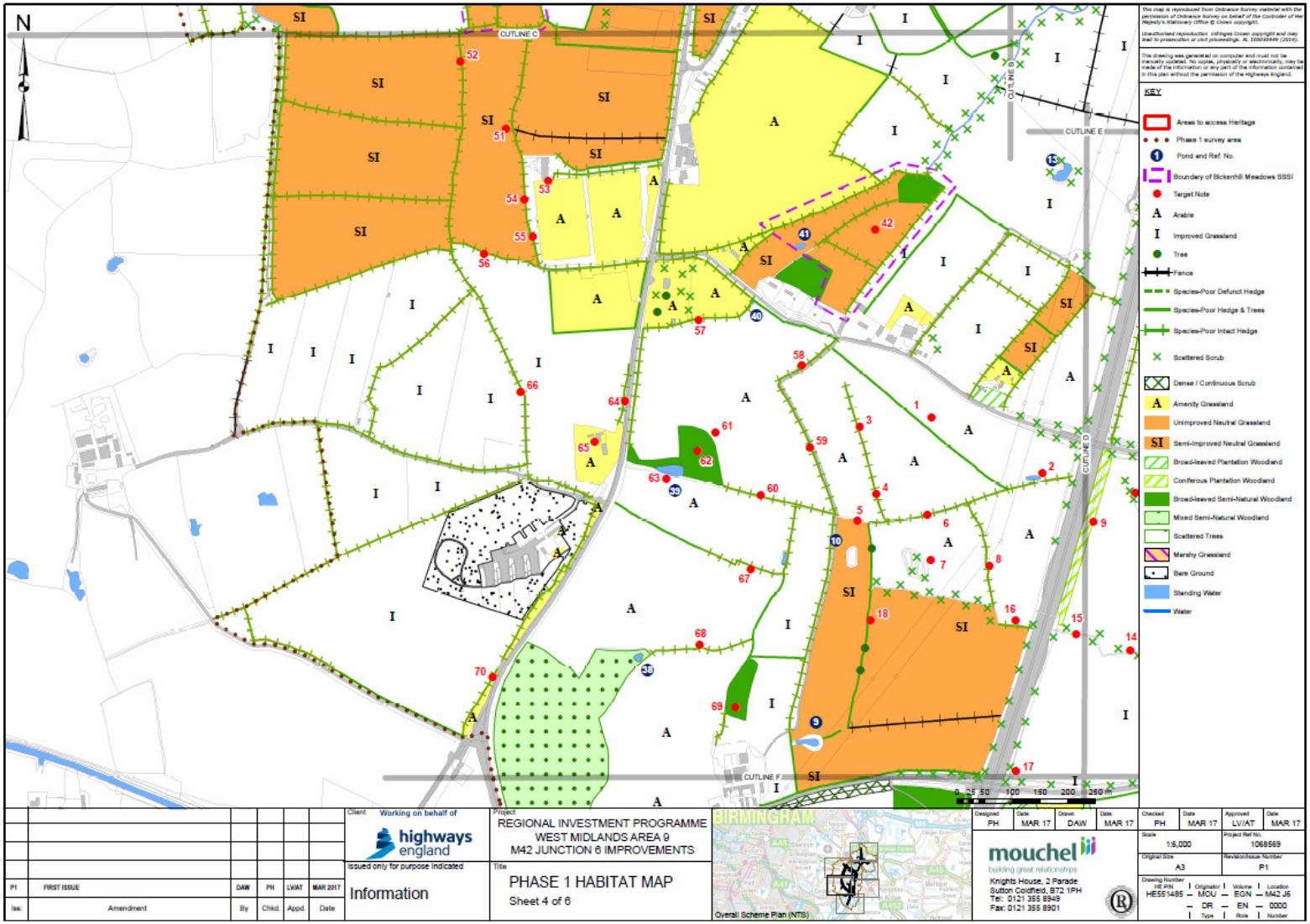
An indicative survey programme is provided in Appendix 6 outlining mobilisation periods and when surveys need to be undertaken for different species.

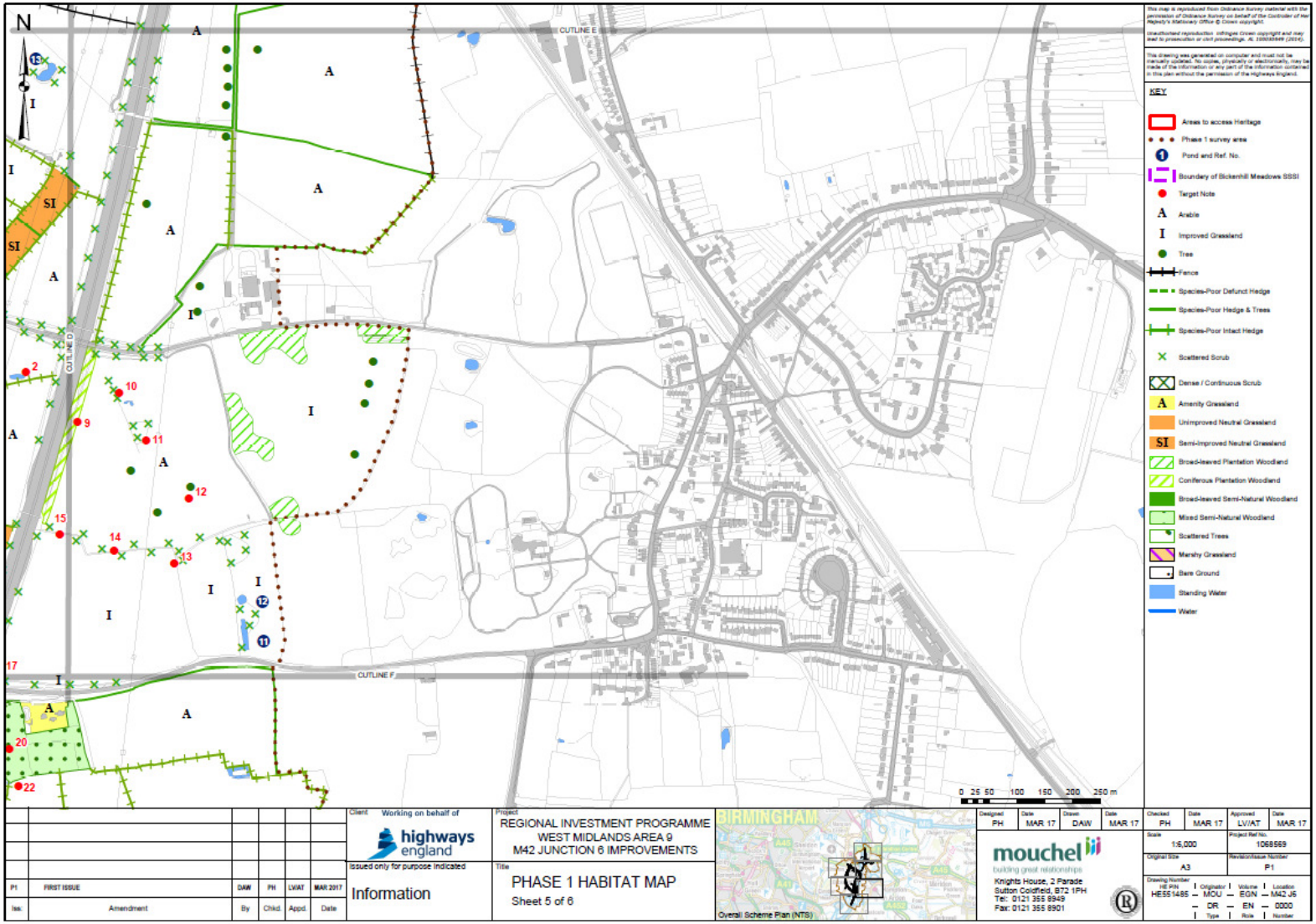
Appendix 1: Phase 1 habitat survey map

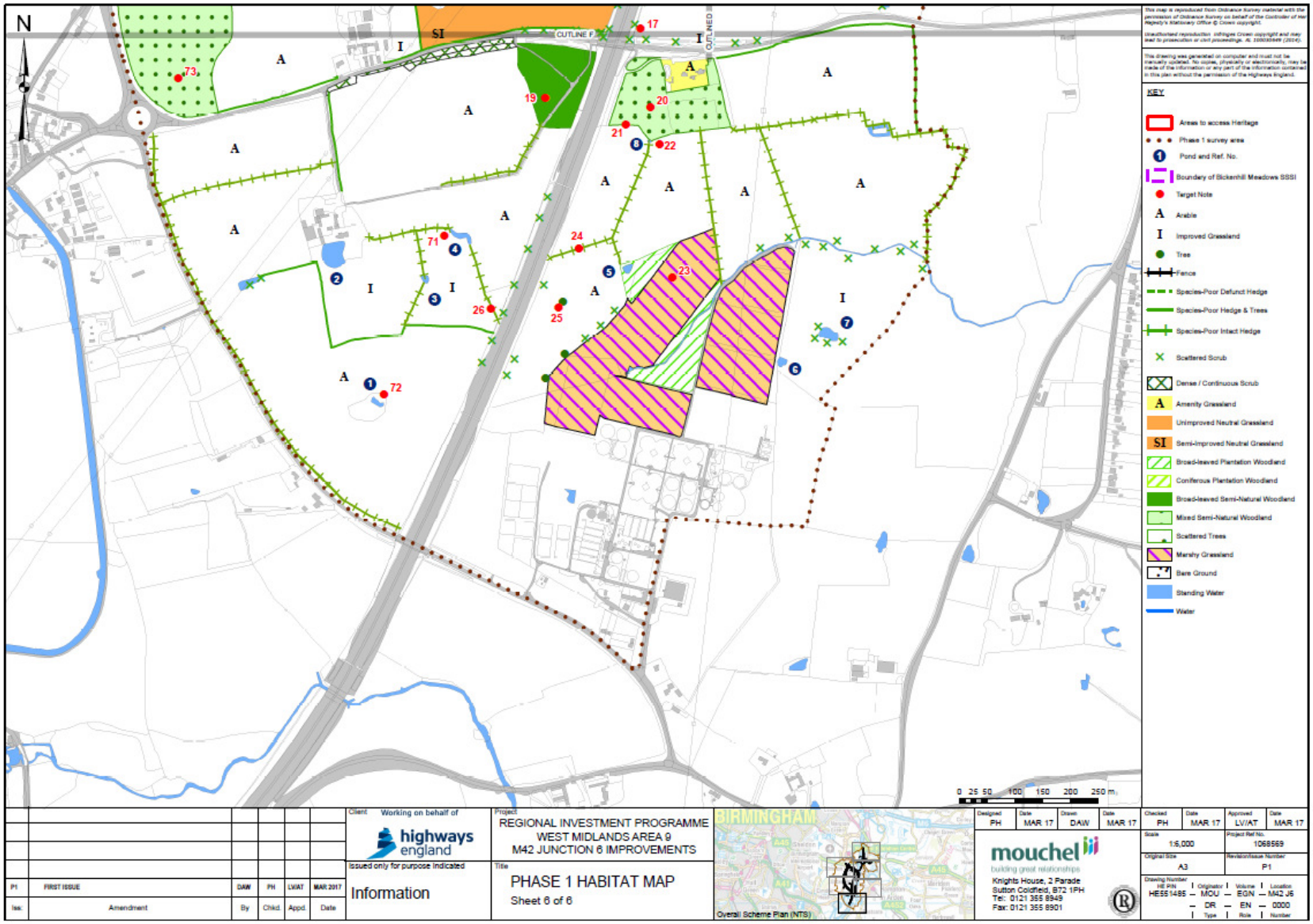












Appendix 2: Phase 1 target notes table

TN	Description
1	Location of new pond, discovered during survey (Pond C).
2	Line of trees with bat roost potential.
3	Tree with bat roost potential.
4	Tree with bat roost potential.
5	Tree with bat roost potential.
6	Line of trees with bat roost potential.
7	Group of trees with bat roost potential.
8	Line of trees with bat roost potential.
9	Single tree with bat roost potential within a belt of conifers (predominantly Norway spruce *Picea abies*) along eastern embankment of M42.
10	Line of trees with bat roost potential.
11	Group of trees with bat roost potential.
12	Tree with bat roost potential.
13	Tree with bat roost potential.
14	Watercourse heavily shaded by bramble *Rubus fruticosus* agg. for full length. Silty substrate with discoloured water (grey).
15	Tree with bat roost potential.
16	Line of trees with bat roost potential.
17	Tree with bat roost potential.
18	Line of trees with bat roost potential.
19	[redacted] Woodland is ancient replanted woodland with canopy of pedunculate oak *Quercus robur*, ash *Fraxinus excelsior* and poplar *Populus* sp. Currently not much understorey-heavily shaded but including holly *Ilex aquifolium*, elder *Sambucus nigra*, hazel *Corylus avellana* and honeysuckle *Lonicera periclymenum*. Ground layer includes common dog-violet *Viola riviniana*, wood avens *Geum urbanum*, pendulous sedge *Carex pendula* and lesser celandine *Ficaria verna*.
20	Ancient replanted woodland with canopy of predominantly Scots pine *Pinus sylvestris* with deciduous species including pedunculate oak, ash and poplar. Understorey including holly, elder, hazel, ivy *Hedera helix*, bramble, hawthorn *Crataegus monogyna* and honeysuckle. Ground layer includes broad buckler-fern *Dryopteris dilatata*, common nettle *Urtica dioica*, lesser celandine, herb-robert *Geranium robertianum*, male fern *Dryopteris filix-mas*, garlic mustard *Alliaria petiolata*, cow parsley *Anthriscus sylvestris*, greater stitchwort *Stellaria holostea*, pendulous sedge, bluebell *Hyacinthoides non-scripta*, wood avens, cleavers *Galium aparine* and dog's-mercury *Mercurialis perennis*.
21	Mammal pathways leading into woodland.
22	Pond 8 indicated on map is not present. Just a patch of wet grassland.
23	Fox holes dug within depression in ground within marshy grassland and tall herbaceous vegetation.
24	Line of trees with bat roost potential.
25	Tree with bat roost potential.
26	Group of trees with bat roost potential.
27	Mammal push-through beneath fencing at bottom of motorway embankment.
28	Line of trees with bat roost potential.
29	Line of four trees with bat roost potential.
30	Line of trees with bat roost potential.
31	Line of trees with bat roost potential.
32	Frequent rabbit holes around Pond 20.
33	Two mature trees with bat roost potential. Multiple features including dead wood and holes. Category 1 bat potential.
34	Location of new pond, discovered during survey (Pond A).
35	Oak tree with Category 2 bat potential. Some dead wood present.
36	Oak tree with Category 1 bat potential. Large rot hole on branch on north side and

	smaller knot hole.
37	Line of seven mature trees and one dead tree with bat roost potential.
38	Multiple trees with bat roost potential along tree and hedge lines in middle of arable field.
39	Clear badger footprint found in mud in arable field.
40	Tree with bat roost potential.
41	Watercourse. Moderate flow, silted, shallow with some deeper sections. Heavily shaded but with some great willowherb *Epilobium hisutum* growing in channel. Banks muddy and lacking vegetation coverage.
42	Part of Bickenhill Meadows SSSI. Bickenhill Meadows consists of two separate groups of fields comprising species-rich grassland situated to the south and west of the village of Bickenhill on predominantly neutral soils. Other group of fields comprising the SSSI is at TN50. This unit of the SSSI is also designated as Shadowbrook Meadows Warwickshire Wildlife Trust Nature Reserve.
43	Location of dry ditch running along bottom of road embankment. Although the ditch was dry at the time of the survey it did contain frequent bulrush *Typha latifolia*. There was also a mammal push-through beneath fencing at bottom of embankment at this point.
44	Mammal push-through beneath fencing at bottom of embankment.
45	Road embankment covered in frequent scrub and tall herbaceous vegetation.
46	Location of new pond, discovered during survey (Pond B).
47	Fox observed at this point during survey.
48	Signs of badger foraging.
49	Frequent rabbit digging.
50	Part of Bickenhill Meadows SSSI. Other group of fields comprising the SSSI is at TN42.
51	Large stand of Japanese knotweed *Fallopia japonica* at OS grid reference SP 18242 81809. The dead stems appear to have been recently cut down (Photograph 13).
52	Watercourse running along field boundary, not marked on map. Approximately 2m wide with sediment and stone/gravel substrate. Water appeared discoloured (grey).
53	Clubhouse building at Gaelic Athletic Association sports grounds with bat roost potential.
54	Japanese knotweed stand at SP 18254 81725 (Photograph 14).
55	Japanese knotweed stand at SP 18258 81692 (Photograph 15).
56	Multiple trees with bat roost potential along tree and hedge line running east to Catherine de Barnes Lane.
57	Line of trees with bat roost potential.
58	Line of three trees with bat roost potential.
59	Line of trees with bat roost potential.
60	Line of trees with bat roost potential.
61	[redacted]
62	Woodland with mature predominantly deciduous trees including pedunculate oak and ash with some Scots pine. Multiple trees with bat roost potential. Understorey includes bramble, holly, honeysuckle and wild privet *Ligustrum vulgare.* Signs of rabbit digging and mammal foraging. [redacted]
63	Large (10m x 5m) stand of Japanese knotweed at edge of woodland / arable field.
64	Trees with bat roost potential along boundary.
65	Several buildings beneath road footprint. Main house with bat roost potential and possibly bat roost potential in smaller structures.
66	Line of three trees with bat roost potential.
67	Old disused holes along tree / hedge line. One is badger shaped but very small. Possibly old and partially filled-in. Another hole appears to be used by rabbits. Several trees with bat roost potential along this tree / hedge line. Location of new pond, just to south-east of TN67, discovered during survey (Pond D).
68	Line of trees with bat roost potential.

69	Group of mature trees, all with bat roost potential.
70	Line of trees with bat roost potential.
71	Evidence of mammal digging near Pond 4. Badger hair found but all holes appeared too small for badger occupation.
72	[redacted]
73	Large woodland (Barber's Coppice) dominated by Scots pine with pedunculate oak around the edges. Holly, bramble and honeysuckle amongst understorey.

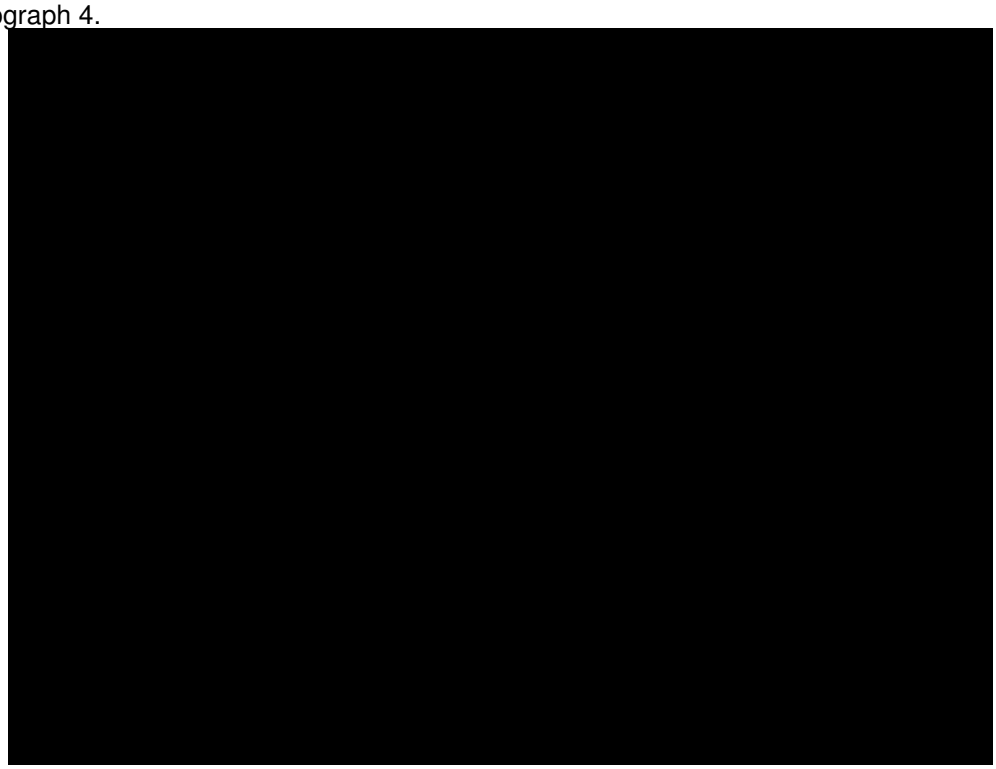
Appendix 3: Site photographs

Photograph 1.

Photograph 2.

Photograph 3.

Photograph 4.



Photograph 5.

[redacted]

Photograph 6.

[redacted]

[redacted]

Photograph 7.

Photograph 8.

Photograph 9.

Photograph 10.

Photograph 11.

Suitable reptile habitat along south-facing road embankment at TN45

Photograph 12.

Heavily shaded watercourse at TN41

Photograph 13.

Japanese knotweed at TN51

Photograph 14.

Japanese knotweed at TN54

Photograph 15.

Japanese knotweed at TN55

Photograph 16.

Water fern completely covering surface of Pond 36

Appendix 5: HSI Survey Results

Pond Number	Date of Survey Visit	SI1 Geographic Location	SI2 Pond Area	SI3 Pond Drying	SI4 Water Quality	SI5 Shade	SI6 Fowl	SI7 Fish	SI8 Ponds	SI9 Terrestrial Habitat	SI10 Macrophytes	Sum	HSI Score	HSI Category
1	16/02/2017	1	0.2	0.1	0.33	0.6	1	1	0.83	1	0.3	0.00	0.50	Below Average
2	15/02/2017	1	0.88	1	0.67	1	0.67	0.67	0.88	1	0.3	0.07	0.77	Good
3	15/02/2017	1	0.3	0.1	0.64	0.2	1	1	0.88	1	1	0.00	0.57	Below Average
4	15/02/2017	1	0.3	0.1	0.67	0.2	1	1	0.92	0.67	0.3	0.00	0.49	Poor
5	16/02/2017	1	0.2	0.5	0.67	0.4	1	1	1	1	0.3	0.01	0.62	Average
6	16/02/2017	1	0.3	0.5	0.67	0.2	1	1	1	0.67	0.3	0.00	0.58	Below Average
7	16/02/2017	1	1	1	1	0.8	1	1	1	0.67	0.35	0.19	0.85	Excellent
8	16/02/2017	No pond present												
9	15/02/2017	1	0.8	1	0.67	0.8	0.67	0.67	0.95	0.67	0.5	0.06	0.76	Good
10	15/02/2017	No pond present												
11	16/02/2017	1	0.9	0.5	0.67	1	1	1	1	0.67	0.8	0.16	0.83	Excellent
12	16/02/2017	1	0.1	0.5	0.67	1	1	1	1	0.67	0.4	0.01	0.62	Average
13	No Access													
14	No Access													
15	No Access													
16	No Access													
17	14/02/2017	1	0.9	1	0.67	1	1	0.67	0.83	1	0.35	0.12	0.81	Excellent
18	No Access													
19	No Access													
20	14/02/2017	1	0.05	0.1	0.67	0.7	1	1	0.83	0.67	0.4	0.00	0.47	Poor
21	14/02/2017	1	0.8	0.9	0.67	1	0.67	0.67	0.92	0.67	0.35	0.05	0.74	Good
22	14/02/2017	1	0.8	0.9	0.67	0.9	0.67	0.67	0.38	0.67	0.3	0.01	0.66	Average
23	14/02/2017	Pond Dry												
24	14/02/2017	Pond Dry												

25	14/02/2017	Pond Dry												
26	No Access													
27	No Access													
28	No Access													
29	No Access													
30	No Access													
31	No Access													
32	No Access													
33	No Access													
34	14/02/2017	1	0.6	1	0.67	1	1	1	1	0.67	0.4	0.11	0.80	Excellent
35	14/02/2017	1	0.05	0.1	0.67	0.4	1	1	1	1	0.3	0.00	0.46	Poor
36	14/02/2017	1	0.4	1	0.67	1	1	0.67	1	1	0.8	0.14	0.82	Excellent
37	16/02/2017	Not accessible at time of survey												
38	15/02/2017	Pond Dry												
39	15/02/2017	Pond Dry												
40	14/02/2017	1	0.05	0.1	0.67	0.2	1	1	0.95	1	0.3	0.00	0.42	Poor
41	14/02/2017	1	0.3	0.5	1	1	1	1	0.95	1	1	0.14	0.82	Excellent
A	14/02/2017	1	0.05	0.1	0.67	0.2	1	1	1	1	0.5	0.00	0.45	Poor
B	14/02/2017	1	0.05	0.5	0.01	0.2	1	1	0.98	0.67	0.35	0.00	0.32	Poor
C	15/02/2017	1	0.4	0.5	0.67	0.2	1	1	0.92	1	0.35	0.01	0.62	Average
D	15/02/2017	1	0.05	0.1	0.67	0.2	1	1	1	1	0.3	0.00	0.43	Poor
E	16/02/2017	1	0.05	0.1	0.33	1	1	1	1	0.01	0.3	0.00	0.29	Poor

Appendix 6: Indicative Survey Programme

M42 Junction 6 Indicative Survey Programme

Ecology Surveys

Survey Type	Survey Window	Proposed Survey Dates	Mobilisation Time	Additional surveys
Grassland NVC	June - August	20.07.17	1 week	
Woodland NVC	March - April	06.04.17	1 week	
Bats - Roost Assessment	No seasonal constraint	10.04.17 - 13.04.17	1 week	Following the roost assessment surveys, there may be the requirement to undertake further survey work to establish if bats are present. These would be subject to seasonal constraints and additional fees.
Reptiles	March - October	Set up - 15-16.05.16	1 week	
		1. 26.05.17		
		2. 05.06.17		
		3. 12.06.17		
		4. 23.06.17		
		5. 26.06.17		
		6. 05.07.17		
		7. 21.07.17		
Great crested newt	4 surveys to be undertaken between mid-March to mid-June. At least 2 two surveys to be undertaken between mid-Apil and mid-May. If great crested newts found during these surveys, an additional 2 surveys should be undertaken, with at least 3 of the 6 surveys being undertaken between mid-April and mid-May (these surveys have been included within the costings and based on the assumptions that	1. 03.04.17 - 07.04.17	2 weeks	
		2. 10.04.17 - 13.04.17		
		3. 02.05.17 - 05.05.17		
		4. 15.05.17 - 19.05.17		
		5. 30.05.17 - 02.06.17		
		6. 05.06.17 - 09.06.17		
Water vole	Mid-April - late-September	02.05.17	1 week	
White-clawed crayfish - Scoping	No seasonal constraint	02.05.17	1 week	Following the habitat assessment surveys there may be the requirement to underake further survey work to esatblish if white-clawed crayfish are present. These would be subject to seasonal contraints and additional fees.
Dormice	Surveys to be undertaken between April and November	Set-up - 03.04.17 - 07.04.17	2 weeks	
		1. 17-19.05.17		
		2. 19-20.06.17		
		3. 26-27.07.17		
		4. 17-18.08.17		
		5. 18-19.09.17		

Annex F: Ancient Woodland Technical Note

M42 Junction 6: Technical Note for Translocation of Ancient Woodland

Prepared by:	Paul Benyon	03/09/18
Checked by:	Marcus Wainwright-Hicks	11/09/18
Approved by:	Paul Benyon	11/09/18
Verified by:	Graeme Cowling	14/09/18

1. Introduction

Aspbury's Copse is awoodland totalling 2.62 hectares (ha) and is recognised as a plantation ancient woodland site (PAWS) by Natural England. The woodland is located approximately 2 km east of Solihull in the West Midlands and is divided () into two separate parcels due to the construction of the M42 motorway in the 1960's. Aspbury's Copse is also listed as a potential Local Wildlife Site (pLWS). At the time of writing it is understood that the designated ancient woodland boundary of Asbury's Copse is under review. As such this technical note uses the currently available Natural England datasets (accessed July 2018) through Natural England's online mapping tool MAGIC.

A Development Consent Order (DCO) is being sought by Highways England for a scheme to improve Junction 6 of the M42 motorway. The scheme involves construction of a new carriageway to the west of Bickenhill village and a new Junction 5a to the immediate north of Solihull Road B4102 in addition to improvements to the existing M42 and the Junction 6 and Clock Interchange.

The proposed Junction 5a would require the inclusion of south facing, on-slip and off-slips from the M42 mainline. These slip roads are likely to impact upon Aspbury's Copse which would result in loss of approximately 875m^2 of the eastern parcel and 4,730m^2 to the western parcel (see Figure 1).

Ancient woodland, whether identified as ancient semi-natural or ancient replanted, is recognised under national and local planning policy as being an irreplaceable habitat. However, where a development demonstrates that there is no alternative to loss of the woodland and the benefits of the development outweigh retention of the woodland, appropriate compensation has to be provided with the understanding that the woodland is irreplaceable. Compensation can include stripping and re-laying of the woodland soils followed by tree planting and tree planting to join up fragmented woodland parcels and to increase the size of remaining woodland. Where PAWS are present, an appropriate management plan can also be included as part of the package of measures.

2. Woodland Surveys

A Phase 2 survey was undertaken of the woodland in May 2017[1], whereby the ancient woodland was defined as two 'areas' for the purpose of the survey.

Area 1 (located to the west of the M42) - Approximately 1.50 ha of re-planted woodland with a field layer that included bluebell, dog's mercury, lesser celandine, wood anemone, enchanter's nightshade, wood melick and Lords and Ladies; all typical woodland ground flora species with several also being indicators of ancient woodland. The NVC survey indicates that the woodland has affinities with W8: ash - field maple - dog's mercury or W10; oak - bracken - bramble. In both cases the best fit was to the wood anemone sub community type

Area 2 (located to the east of the M42) - Approximately 1.12 ha of re-planted woodland with a field layer that included bluebell, lesser celandine, dog's mercury, Lords and Ladies, male fern and wood sorrel; again typical woodland ground flora species with several also being indicators of ancient woodland. As with Area 1, the woodland in Area 2 had affinities with W8 and W10.

The Phase 2 survey employed the National Vegetation Classification (NVC) methodology; whereby homogenous areas of vegetation are identified and mapped and then sampled using appropriately sized quadrats for the vegetation type being surveyed. All species within each quadrat are recorded and assigned a 'by-eye' percentage cover. The data from replicate quadrats is then analysed and using tables of published NVC types matched to the most appropriate.

[1] Completed by WSP Group, who were the incumbent consultancy for the M42 Junction Improvement Scheme at that time.

For woodland surveys, different levels within woodlands are recorded with different sized quadrats; thus the canopy is recorded using 50m x 50m quadrat; 10m x 10m for tall woodland field layers and 4m x 4m for lower woodland field layers. Details of the surveys and analysis undertaken in Aspbury's Copse can be found in WSP 2017[2] (Appendix 2).

The two areas were surveyed using the NVC methodology; the field maple stands were single species plantation and the road verges are obviously not ancient woodland having been created when the M42 was built.

The results from the survey found that the woodland to the west (Area 1) of the M42 supported three distinct stands;

- An area of mature replanted woodland west of the motorway (Area 1), comprising mature/ semi-mature pedunculate oak with localised area dominated by hybrid black poplar;
- Plantation woodland dominated by field maple; and
- The verge of the M42 supporting scrub with hawthorn, elder, semi-mature oaks trees and bramble and a rage of grasses and herbs.

The woodland to the east (Area 2) of the M42 had again three distinct stands:

- An area of pedunculate oak/ Scot's pine / hybrid black poplar (Area 2);
- A stand of field maple plantation; and
- The M42 verge.

Wardell Armstrong (2015) surveyed Aspbury's Copse to support a separate planning application (PL/2015/51409/PPOL)[3] for a motorway service station and road junction between Junctions 5 & 6.

In addition to the species recorded in the quadrats in 2017, a walkover of the woodlands in 2015 recorded other ground flora species that have been identified as ancient woodland indicators. The species included west of the M42; moschatel, wood millet, remote sedge, wood speedwell, pendulous sedge, broad-leaved helleborine and yellow pimpernel. When the list is compared to those in the Warwickshire Local Wildlife Site designation criteria, only four are listed; moschatel, pendulous sedge, wood anemone and wood millet. Two woody species are also listed in the LWS criteria; hazel and crab apple.

A similar list was also recorded in the east and included in addition to the ones in the west; small-leaved lime, greater stitchwort wood sorrel and wych elm.

The nature and extent of these habitats have also been confirmed by AECOM in May 2018.

Lichen, Fungi & Invertebrates

In 2015 surveys were undertaken for specific features within Aspbury's Coppice; lichens, fungi and invertebrates. The surveys recorded several species of each group within the woodland that are notable:

- The woodland was considered to be County importance for terrestrial invertebrate assemblage and particularly the saproxylic fauna;
- Five notable lichens were recorded in the west area of woodland, and these were focused along the track that runs through the woodland and further to the west; and
- Several hot spots for fungi were identified; two in the north west of the western section; one in the eastern section adjacent to the M42 and two further areas on the eastern boundary of the eastern section.

3. Assessment

Currently it is anticipated that a total of 0.56 ha of Aspbury's Copse would be impacted upon by the Scheme, which is equivalent to 21.4% of the current coverage of ancient woodland habitat. It is proposed that the potential impact upon the ancient woodland will be mitigated through the use of a translocation strategy in addition to compensation planting for soils to be translocated to.

Although the likely areas impacted upon fall within the designated boundary of the ancient woodland, botanical surveys have demonstrated that the affected habitats are largely dominated by a poor ground flora and canopy, with the majority of ancient woodland ground-flora located outside the affected area and further into each of the parcels of ancient woodland. In addition, the fungi and lichen surveys highlighted that hotspots relating to these species were outside these areas. AECOM are proposing to undertake fungi and

[2] WSP (2017) M42 Junction 6 Improvement: Woodland National Vegetation Classification Survey. Unpublished report by WSP Leeds for Highways England

[3] https://publicaccess.solihull.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=NQRLYUOEHYP00

lichen surveys in 2018 to re-validate the surveys undertaken in 2015 by Wardell Armstrong. Both of which are considered reflective of the soil quality and broader ancient woodland indicators.

Given the limited extent of habitat affected (noting the poor ground flora it supports), with the implementation of a translocation strategy, it is considered unlikely that the unavoidable losses would undermine the conservation status of the ancient woodland. Therefore, despite the uncertainty associated with the translocation of ancient woodland habitats, it is considered that at most the habitat loss would result in no more than a long-term adverse impact of Local significance upon Asbury's Copse pLWS.

4. Translocation Methodology

Where the decision is taken that it is feasible/ practical to translocate the soils from the areas to be lost, the following methodology should be followed. This is based on published best practice (Anderson 2003[4]) and case studies from other translocation strategies.

The following information is required to inform the soil translocation:

- A clear and detailed understanding of the site characteristics (physical and chemical characteristics), of the donor and receptor areas to ensure comparability;
- the inclusion of coppice stools, veteran trees and standing and fallen dead wood suitable for transfer in the transfer process to encourage lichen and fungi habitat;
- Presence and abundance of species of woodland plant with bulbs and rhizomes to inform soil depths to be moved;
- Restrictions to undertaking the works; and
- Presence of protected species and associated constraints.

All soil-handling operations shall be carried out in accordance with best practice guidelines (DEFRA 2000).[5] Prior to all woodland soil handling operations, a soil scientist should ensure the soils are in an appropriate condition to be handled without risk of damage. The following details the measures to be undertaken during translocation, which will be refined based upon the results on the soil survey.

General Measures

These general measures shall apply during all soil stripping operations:

- Translocation should be undertaken in late autumn/ early winter, avoiding frost/ snow and heavy rain;
- Low ground pressure vehicles should be used for these works;
- Haul and access routes must not run on topsoil, but may run on exposed subsoil; and
- Any vegetation clearance and removal should account for any other legal restrictions e.g. nesting birds and other protected species.

Receptor site Preparation

The below assumes that only topsoil would be required for translocated. Where donor and receptor are close, as is the case here, the soils are likely to be similar but not necessarily and there may have to be a contingency to also move sub-soils. Also, the areas to be moved however are small and there may not be much scope for moving other than the topsoil.

- The topsoil shall be stripped and removed (to the depth defined by soil surveys), using a non-toothed bucket.
- Sequential stripping is to be undertaken as material from the donor site becomes available, to limit the extent of bare ground present at any time and no more than can be translocated and laid in the day should be stripped;
- Prior to spreading the translocated soils, the subsoil is to be loosened using a toothed bucket
- Topographical and micro-topographical features at the donor site (including the slopes, depressions and raised areas (if considered necessary)), should be recreated if possible in the exposed subsoil surface prior to placement of translocated soils;

[4] Anderson, P (2003) *CIRCA C600: Habitat Translocation – a best practice guide* CIRCA

[5] Defra's CCoP. The MAFF Good Practice Guide, 2000

http://webarchive.nationalarchives.gov.uk/20090317221756/http://www.defra.gov.uk/farm/environment/land-use/soilguid/index.htm

Donor site Preparation

- Vegetation clearance should be undertaken within one month prior to soil translocation;
- Areas where the woodland soils are not suitable for translocation shall be identified and clearly demarcated;
- Prior to vegetation clearance, any coppice stools, saplings and dead wood should be identified and clearly marked; and
- Mature trees can be used to provide standing dead wood by removing all branches and “planting” the main trunk at the receptor site to a depth so that the tree is stable once installed.

Translocation of Soils

The following procedures will be implemented (where applicable) in the translocation process:

- Topsoil (to a depth defined through soil surveys but can be between 100mm and 300mm) at the donor site to be stripped using a non-toothed excavator bucket to avoid mixing of topsoil and subsoil. The soil survey undertaken previously will inform whether the topsoil is to be stripped as a single layer or as two layers.
- The width of each topsoil strip will be the working width of the excavator.
- The topsoil from the first strip should be placed to one side and then the next area stripped and taken directly to the receptor site. The contractors should restrict the storage of topsoil beyond the day of stripping, i.e. stripping, transport and restoration operations shall occur within one day.
- Where there is also a requirement for subsoil to the translocated, this shall be stripped and transported separately from the topsoil.
- Where coppice stools are to be translocated, they shall be lifted with as large a root ball as possible; using an appropriate bucket excavator or tree spade capable of a root ball up to three metres diameter. These should be lifted sequentially, moved to the receptor site and re-planted the same day. If this is not possible coppice stools can be stored during the dormant season for up to 3 days by placing in a trench and backfilled.
- The donor site topsoil is to be loose tipped onto the prepared receptor sub-soil surface and spread using a non-toothed bucket. The topsoil should spread to a depth as defined by the soil survey, with any additional depth included to allow for settlement of the soil. The soil is to be laid in strips as wide as the working width of the excavator.
- At the end of each day, the topsoil put to one side at the start of the day at the donor site, is the final material moved to the receptor site.
- Provided ground conditional allow, the re-laid soil should be rolled with a Cambridge (ribbed) roller.
- Tree planting should be undertaken in the next available planting season following translocation. Native trees shall be selected to match the existing composition of the canopy at Asbury’s Coppice.

APPENDIX 1 – FIGURE 1

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

HAZARDS DETERMINED TO BE SIGNIFICANT RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW. SIGNIFICANT RISKS ARE THOSE WHICH ARE NOT LIKELY TO BE OBVIOUS, ARE UNUSUAL, OR LIKELY TO BE DIFFICULT TO MANAGE.

CONSTRUCTION

FOR MAINTENANCE / OPERATION / DECOMMISSIONING AND DEMOLITION RISKS SEE PROJECT HEALTH AND SAFETY FILE.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

Legend

- Proposed Scheme
- Proposed Fence
- Aspbury's Copse Ancient Woodland
- Areas of Heavily Engineered and or very disturbed ground

Areas of Anticipated

- Anticipated Loss of Ancient Woodland (0.364ha)
- Anticipated Loss of Ancient Woodland in areas of Heavily Engineered and or very disturbed ground (0.214ha)

FIRST ISSUE	DM / CB	04/09/18	
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue

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Birmingham
B1 1RN

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Project Title

M42 JUNCTION 6 IMPROVEMENT WORKS

Drawing Title

ANTICIPATED LOSS OF ANCIENT WOODLAND

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Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire S41 7SL
Tel(01246) 209221
Fax(01246) 209229
www.aecom.com

AECOM

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Midpoint, Alencon Link, Basingstoke, Hampshire RG21 7PP

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APPENDIX 2 – REPORT

Woodland NVC survey

HIGHWAYS ENGLAND

M42 JUNCTION 6 IMPROVEMENT

WOODLAND NATIONAL VEGETATION CLASSIFICATION SURVEY

MAY 19, 2017

CONFIDENTIAL

wsp

M42 JUNCTION 6 IMPROVEMENT

WOODLAND NATIONAL VEGETATION CLASSIFICATION SURVEY REPORT

FINAL
CONFIDENTIAL

PROJECT NO.: 62241010
DATE: MAY 2017

WSP
THREE WHITE ROSE OFFICE PARK
MILLSHAW PARK LANE
LEEDS
LS11 0DL

PHONE: +44 (0)113 305 6623
WSP.COM

QUALITY MANAGEMENT

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SIGNATURES

PREPARED BY

David Kirby MCIEEM CEnv
Principal Ecologist

REVIEWED BY

Lucy Elliott, BSc (Hons) MSc MCIEEM
Senior Ecologist

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1 INTRODUCTION

1.1 BACKGROUND

WSP (formerly Mouchel) was commissioned by Highways England to undertake a National Vegetation Classification (NVC) survey at Aspbury's Coppice. This area of ancient woodland, also designated as an Ecosite, is likely to be directly affected by Options 1 and 2 of the proposed M42 Junction 6 Improvement Scheme. Further botanical survey was therefore recommended to characterise the ecological baseline and to determine the likely effects of the scheme on the woodland.

This report presents the results of the NVC survey at Aspbury's Coppice undertaken in May 2017.

1.2 SCHEME LOCATION

At the time of writing, three possible route options (Options 1, 2 and 3) are being considered. All three options are predominantly located to the south-west of Junction 6 close to the village of Bickenhill, although all route options also include improvements to the junction itself. The land within the proposed scheme is predominantly used for agriculture and pasture grazing, although the scheme is also close to the National Exhibition Centre (NEC), Birmingham International Railway Station and Birmingham Airport as well as proposed developments including High Speed 2 (HS2) route and terminal, a Motorway Service Area (MSA) and UK Central development.

1.3 STUDY AREA

Aspbury's Coppice is located south of Junction 6 of the M42, where the B4102 crosses the motorway (centred at Ordnance Survey (OS) Grid Reference SP190805). The site is bisected by the M42 which runs through its centre, and is surrounded arable farmland to the east, south, and west. It is bordered by the B4102 to the north (see Figure 1 in Appendix 1).

1.4 STUDY AIMS AND OBJECTIVES

The aim of the study was to assess the quality of Aspbury's Coppice with respect to its ancient woodland designation. To achieve this, the following objectives were set:

- Undertake an NVC survey to classify and map habitats within the site in accordance with the standard NVC method; and,
- To record the presence of ancient woodland indicator species where present within the site.

2 METHODOLOGY

2.1 OVERVIEW

The field survey was undertaken on the 4th May 2017 by two Mouchel surveyors.

The methodology employed for the NVC surveys followed the methods outlined in British Plant Communities (Rodwell et al. 1991a, 1991b, 1992, 1995 & 2000). The extent of areas of homogeneous vegetation was mapped and sample quadrats (relevés) were located within these areas to record the abundance and frequency of vascular plants within each compartment. The field data was then analysed and each compartment was assigned, where possible, to a particular plant community. The extent of these community types is represented within mapping of the survey area in Annex 1; Figure 1. Additional information in the form of Target Notes (TN) is provided in Annex 2 and photographs of the site are presented in Annex 3.

2.2 SAMPLING COMPARTMENTS

Prior to undertaking vegetation sampling, boundaries of all homogeneous plant communities were mapped, as accurately as possible, on large-scale field maps. An attempt was made to determine the most typical habitats for sampling.

For each homogenous stand identified, samples were taken using appropriate quadrat size (see 2.3 below). Within each stand selected for analysis an appropriate number of quadrats were positioned in areas supporting representative vegetation. This inevitably involved some surveyor bias, but avoided problems of the arrangement of random samples and incorporating obvious vegetation boundaries or unrepresentative floristic features.

2.3 QUADRAT SIZE

Throughout the NVC surveys, the size of the sampling quadrats reflected the scale of the vegetation being sampled. Thus the following quadrat dimensions were employed:

- 4 m x 4 m for taller or more open herb communities, and low woodland field layers;
- 10 m x 10 m for species-poor or very tall herbaceous vegetation or tall woodland field layers/low understorey and dense scrub;
- 50 m x 50 m for sparse scrub, woodland canopy and tall understorey.

Mosaics were treated as a single vegetation type where they were repeatedly encountered in the same form or where it is was impossible to sample their elements separately due to their small scale.

2.3.1 MEASURING SPECIES ABUNDANCE

Within each quadrat, a quantitative measure of the relative abundance of every vascular plant, bryophyte and lichen species was undertaken using the ten point Domin scale. Cover was assessed by eye as a vertical projection on to the ground of all live, above-ground parts of the plants within the quadrat. The Domin scale categories are presented below:

- Cover of 91-100% is recorded as Domin 10
- Cover of 76-90% is recorded as Domin 9

- Cover of 51-75% is recorded as Domin 8
- Cover of 34-50% is recorded as Domin 7
- Cover of 26-33% is recorded as Domin 6
- Cover of 11-25% is recorded as Domin 5
- Cover of 4-10% is recorded as Domin 4
- Cover of <4% with many individuals is recorded as Domin 3
- Cover of <4% with several individuals is recorded as Domin 2
- Cover of <4% with few individuals is recorded as Domin 1

2.4 LIMITATIONS

There were no limitations to the survey due to land access, allowing an appraisal of all the accessible habitat features present within the survey area.

The survey was undertaken at an appropriate time of year for identifying woodland ground-flora.

3 RESULTS AND DISCUSSION

3.1 OVERVIEW

Aspbury's Coppice ancient woodland can be split into two geographically distinct units: the area of woodland to the west of the M42 (Area 1) and the woodland to the east of the M42 (Area 2).

Area 1 supports three relatively distinct stands of vegetation:

1. An area of mature replanted woodland (TN1) which predominantly comprises semi-mature to mature pedunculate oak *Quercus robur* in the canopy, with localised areas dominated by hybrid black poplar *Populus X Canadensis* (TN2).
2. A stand of plantation woodland, dominated by field maple *Acer campestre* which is adjacent to the B4102 (TN3); and
3. The M42 verge habitats (TN4), which support scrub and grassland habitats comprising species such as hawthorn *Crataegus monogyna*, elder *Sambucus nigra*, bramble *Rubus fruticosus* agg., semi-mature pedunculate oak, and various grasses and herbs such as false oat grass *Arrhenatherum elatius*, cock's foot *Dactylis glomerata*, red campion *Silene dioica*, and curled leaf dock *Rumex crispus*.

Area 2 is similar in character to Area 1, although the composition of species in the canopy is more mixed in terms of the distribution of broad-leaved species, predominantly pedunculate oak and hybrid black poplar, and conifers, Scot's pine *Pinus sylvestris*. As with Area 1 above, three distinct vegetation stands were recorded:

1. The area of pedunculate oak/Scot's pine/hybrid black poplar woodland (TN5);
2. A stand of field maple dominated plantation woodland adjacent to the B4102 (TN6); and,
3. The M42 verge habitat (TN7).

The stands of mature woodland within Areas 1 and 2 (TNs 1 and 5) were subject to an NVC survey in line with the methods described in Section 2. The areas of field maple plantation woodland were not subject to NVC survey as these are planted, single species stands which do not equate to any of the NVC archetypes. The M42 verge habitats were also not subject to NVC survey as they are highly mosaic in nature and fall outside of the areas designated.

The results of the NVC survey within Areas 1 and 2 are presented below and on Figure 1 in Annex 1.

3.2 AREA 1 – WEST OF THE M42

Area 1 comprises approximately 1.4ha of replanted woodland dominated by pedunculate oak with localised areas dominated by hybrid black poplar. A single 50m x 50m quadrat of the canopy layer was recorded within the stand, given the size of the block. Within the understorey and field layers, five 4m x 4m quadrats were undertaken. Constants recorded within the understorey included hawthorn *Crataegus monogyna*, elder *Sambucus nigra*, with hazel *Corylus avellana* and honeysuckle *Lonicera periclymenum* occurring occasionally. Within the field layer, bluebell *Hyacinthoides non-scripta*, lesser celandine *Ficaria verna*, and wood anemone *Anemone nemorosa*, were recorded as constants, while lords and ladies *Arum maculatum*, and dog's mercury *Mercurialis perennis* occurred occasionally. Table 3.1 presents the quadrat data for Area 1.

Table 3.1 Quadrat data for Area 1.

COMMON NAME	LATIN NAME	1	2	3	4	5	FREQUENCY
Pedunculate oak	*Quercus robur*	10	10	10	10	10	V
Common hawthorn	*Crataegus monogyna*	6	6	4	6	5	V
Elder	*Sambucus nigra*	5	6	4	6	5	V
Bluebell	*Hyacinthoides non-scripta*	9	10	7	6	5	V
Lesser celandine	*Ficaria verna*	4	7	4		4	IV
Wood anemone	*Anemone nemorosa*		4	8	6	4	IV
Common nettle	*Urtica dioica*	1			1	2	III
Lords and ladies	*Arum maculatum*			1	5	2	III
Cleavers	*Galium aparine*	5			4		II
Honeysuckle	*Lonicera periclymenum*			1		1	II
Common hazel	*Corylus avellana*			1		5	II
Bramble	*Rubus fruticosus agg.*	4					I
Dog's mercury	*Mercurialis perennis*					9	I
Wood melick	*Melica uniflora*					1	I
Enchanter's-nightshade	*Circaea lutetiana*	1					I

The canopy layer is generally semi-mature to mature, and it is evident that the pedunculate oak have been planted relatively recently (the majority are approximately 25 – 50 years old). The ground flora within the stand is a good example of a well-developed broad-leaved woodland ground flora, with many ancient woodland indicator species present, including bluebell, lesser celandine, wood anemone, dog's mercury, and lords and ladies. Generally, the woodland nearest the M42 verge exhibits lower diversity and abundance of ancient woodland indicator species and a greater degree of scrub encroachment. However, these areas are still likely to contain a seed bank which supports species typical of ancient broad-leaved woodland.

In terms of NVC community, analysis of the quadrat data using MAVIS has returned the following top five fit for the woodland communities:

W8b – *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland - *Anemone nemorosa* sub-community - 44.4% fit;

W21 – *Crataegus monogyna – Hedera helix* scrub - 42.7% fit;

W21b - *Crataegus monogyna – Hedera helix* scrub - *Mercurialis perennis* sub-community - 42.3% fit;

W21a - *Crataegus monogyna – Hedera helix* scrub – *Hedera helix – Urtica dioica* sub-community - 40.6% fit; and,

W10b – *Quercus robur – Pteridium aquilinum – Rubus fruticosus* woodland – *Anemone nemorosa* sub-community - 40.15% fit.

The community does not exhibit features which accord with communities W21. Although there is a relative abundance of hawthorn with the quadrats, W21 is indicative of a scrub community, and the vegetation within the stand is a well-developed woodland.

The woodland within Area 1 therefore most closely conforms to communities W8 or W10 – oak or ash woods that are generally found in lowland Britain on calcareous (W8) to acidic soils (W10). Both W8 and W10 woodlands are relatively variable in the composition of the canopy, with the species composition within the field layer defining the two communities and their respective sub-communities. Where soils are intermediate between calcareous and acidic, the separation between W8 and W10 can be problematic.

In the case of Area 1, the dominance of pedunculate oak in the canopy is indicative of W10 as is the abundance of bluebell and wood anemone in the field layer. The relative scarcity of dog's mercury, an indicator of base-rich soils, is also more characteristic of the W10 woodland. However, other species that are generally constants in W10 woodland, including bramble, honeysuckle, and bracken, were absent or relatively scarce, although this may be due to the survey being undertaken relatively early in the flowering season for these species. In terms of W8 woodland, the W8b community can support abundant pedunculate oak and supports a ground flora with abundant wood anemone, bluebell, and lesser celandine.

Area 1 is exhibits features of characteristics of both W8 and W10 woodland; likely a result of soils which are intermediate in terms of acidity / alkalinity. However, given the abundance of oak in the canopy and bluebell and wood anemone in the field layer, and relative paucity of dog's mercury, it is likely that the woodland most closely conforms to W10b – *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland – *Anemone nemorosa* sub-community.

3.3 AREA 2 – EAST OF THE M42

Area 2 comprises approximately 1.1ha of replanted woodland, which supports predominantly pedunculate oak, Scots pine, and areas of hybrid black poplar. As with Area 1, a single 50m x 50m quadrat was recorded for the canopy layer, with five 4m x 4m quadrats recorded for the field layer. The understorey comprised hazel, hawthorn and elder as constants, with bluebell, dog's mercury, ivy, and cleavers *Galium aparine* frequent to abundant within the field layer.

Table 3.2 Quadrat data for Area 2.

COMMON NAME	LATIN NAME	1	2	3	4	5	FREQUENCY
Bluebell	*Hyacinthoides non-scripta*	4	9	7	9	9	V
Hazel	*Corylus avellana*	5	5	7	5	5	V
Pedunculate oak	*Quercus robur*		9	4	5	8	IV
Common hawthorn	*Crataegus monogyna*		5		5	5	III
Elder	*Sambucus nigra*	5		4		5	III
Cleavers	*Galium aparine*	5	7		3		III
Dog's mercury	*Mercurialis perennis*	9		8	5		III
Common ivy	*Hedera helix*	2		4	2		III
White poplar	*Populus alba*	10	5	7			III
Lesser celandine	*Ficaria verna*	4			7		II
Lords and ladies	*Arum maculatum*				3	3	II
Bramble	*Rubus fruticosus*		4			2	II
Common nettle	*Urtica dioica*	5					I
Red campion	*Silene dioica*	4					I
Common ash	*Fraxinus excelsior*				9		I

Scots pine	*Pinus sylvestris*					6	I
Male fern	*Dryopteris felix-mas*	1					I
Cow parsley	*Anthriscus sylvestris*				2		I
Wood sorrel	*Oxalis acetosella*				7		I

The canopy layer is of a similar age to Area 1, with the oak species approximately 50 years of age. There is a greater abundance of Scots pine and hybrid black poplar within this stand when compared to Area 1. The ground flora is generally well developed, with an abundance of species which are indicative of ancient broad-leaved woodland, including bluebell, dog's mercury, lesser celandine, lords and ladies, wood anemone, and wood avens *Geum urbanum*. Notably, wood avens was absent from within the quadrats within this stand.

Analysis of the quadrat data using MAVIS has returned the following top five fit for the woodland communities:

W8b - *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland - *Anemone nemorosa* sub-community - 46.4% fit

W8d - *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland *Hedera helix* sub-community - 41.9% fit

W8f - *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland - *Allium ursinum* sub-community - 41.2% fit;

W10c - *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland - *Hedera helix* sub-community - 41.2% fit; and,

W21b - *Crataegus monogyna – Hedera helix* scrub - *Mercurialis perennis* sub-community - 40.7% fit.

The woodland within Area 2 is generally of a similar character to Area 1, in that it supports similar species within the canopy, understorey, and field layers. Analysis with MAVIS has shown that Area 2 most closely fits with woodland community W8b *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland - *Anemone nemorosa* sub-community. A notable difference between Area 1 and 2, is the relative abundance of dog's mercury within Area 2, which is indicative of more basic soil conditions. This woodland community is, as with Area 1, an intermediary between W8 and W10 woodland, although it is likely to be a closer fit to W8b - *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland - *Anemone nemorosa* sub-community, given the abundance of dog's mercury.

4 CONCLUSIONS AND RECOMMENDATIONS

The woodland blocks within Area 1 and Area 2 are relatively good examples of lowland semi-natural broad-leaved woodland. Both stands support an abundance of ancient woodland indicator species, including bluebell, wood anemone, dog's mercury, wood sorrel, lords and ladies, and lesser celandine (amongst others). Despite being replanted, and supporting species which are uncharacteristic of this woodland type (hybrid black poplar and Scots pine), both woodland retain ancient woodland features, including a well-developed and diverse ground flora.

The impacts arising from the proposed scheme will be assessed in the forthcoming Environmental Appraisal Report, which will include a detailed mitigation strategy for ancient woodland. This should aim to reduce habitat loss to ancient woodland wherever possible. Where loss is unavoidable, the ancient woodland seedbank should be retained through appropriate topsoil management. This soil should be reused in areas of woodland planting.

5 FIGURES

5.1 FIGURE 1: NVC SURVEY PLAN

APPENDIX

A TARGET NOTES

TARGET NOTE

TN1	Area of semi-natural broad-leaved woodland (replanted)
TN2	Stands of hybrid black poplar within Area 1
TN3	Plantation woodland dominated by field maple adjacent to area designated as ancient woodland
TN4	M42 verge habitats
TN5	Area of pedunculated oak/Scots pine
TN6	Field maple dominated plantations woodland
TN7	M42 verge habitats

APPENDIX

B PHOTOGRAPHS

Photograph 1 – Typical canopy and field layer community within Area 1

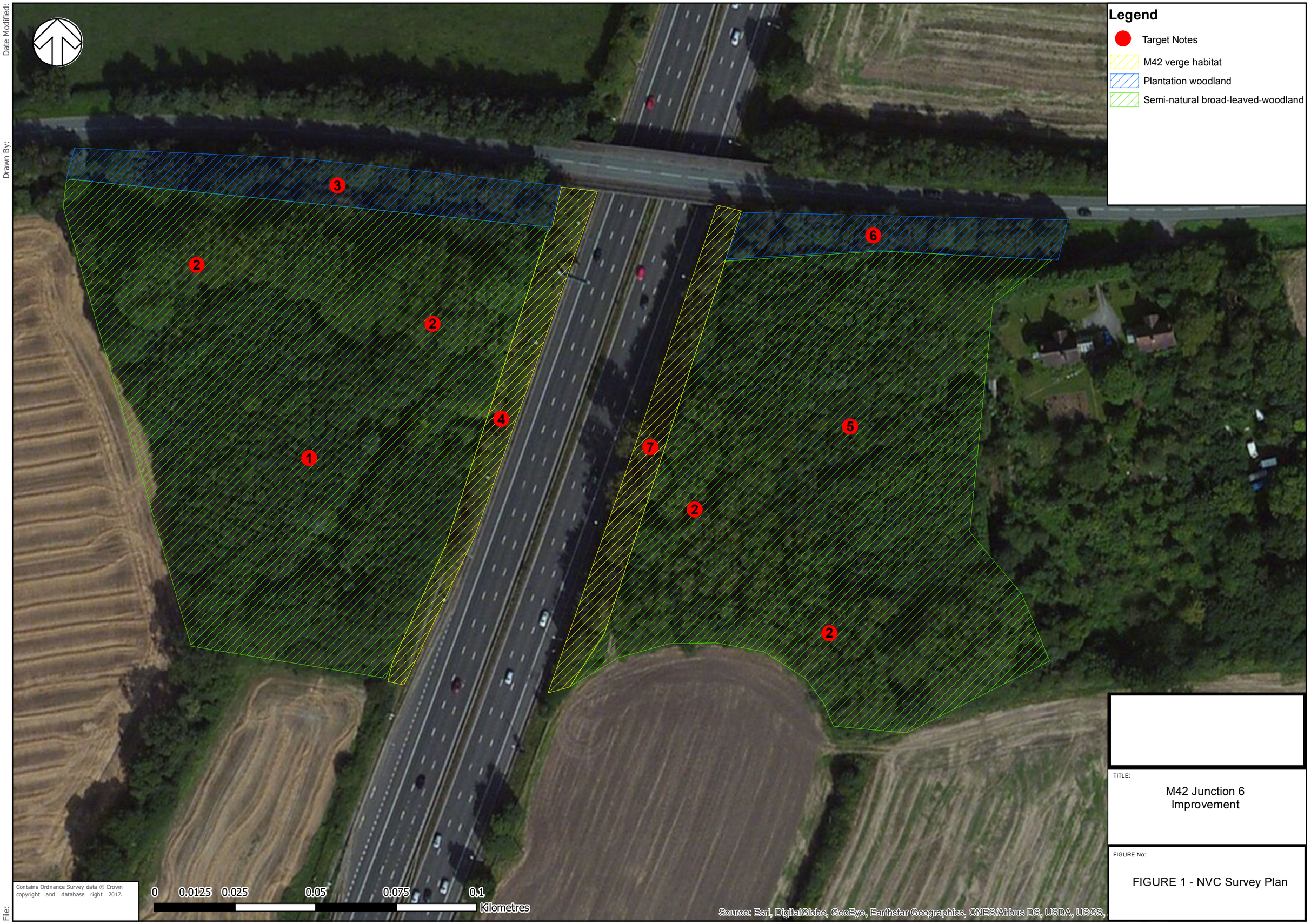
Photograph 2 – Woodland canopy and field layer within Area 2

Photograph 3 – Typical woodland habitat within near vicinity of M42 verge in Area 1

Photograph 4 – Woodland habitat adjacent to M42 verge within Area 2

Date Modified:

Drawn By:



File:

TITLE:

M42 Junction 6 Improvement

FIGURE No:

FIGURE 1 - NVC Survey Plan

Annex G: Figures

NOTES

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.

LEGEND

- LIMITS OF LAND TO BE ACQUIRED OR USED PERMANENTLY OR TEMPORARILY (THE ORDER LIMITS)
- LIMITS OF LAND TO BE TEMPORARILY ACQUIRED FOR SIGNAGE INSTALLATION
- LAND NOT INCLUDED WITHIN THE ORDER LIMITS
- AREAS OF LAND NOT ACCESSED

0 250 500 1,000 1,500 2,000 Metres

FIRST ISSUE	GB / JG	12/12/18	P01	
Revision Details	By / Check	Date	Suffix	

Purpose of Issue: DCO SUBMISSION

Client: Highways England, Floor 5, Two Colmore Square, 38 Colmore Circus, B4 6BN

Development Consent Order Number: TR010027

Project Title: M42 JUNCTION 6 IMPROVEMENT

Drawing Title: FIGURE 9.2A AREAS OF LAND NOT ACCESSIBLE

Designed	Drawn	Checked	Approved	Date
JT	GB	MWH	JG	12/12/18

Internal Project No: 60543032	Suitability: D7
Scale @ A3: 1:25,000	Zone: M42

Drawing Number: Highways England Pin HE551485 | Originator -ACM | Volume -EGN- | Location M42_SW_ZZ_ZZ | Type | Role | Number -DR-DC-0046 | Rev P01

Filename: K:\GIS Management\60543032 - M42 Jct 6 GIS Folder_\GIS\01_Maps\00_Figures\New Template\Ecology Figures\FIGURE 9.2A.mxd

N

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- LAND NOT INCLUDED WITHIN THE ORDER LIMITS
- 50M BUFFER

PHASE 1 HABITAT SURVEY

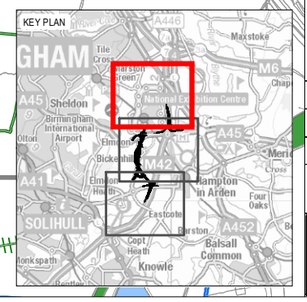
- G2 - RUNNING WATER
- J2.1.2 - INTACT HEDGE - SPECIES-POOR
- J2.3.2 - HEDGE WITH TREES - SPECIES-POOR
- HARD STANDNG
- A1.1.1 - BROADLEAVED WOODLAND - SEMI-NATURAL
- A1.1.2 - BROADLEAVED WOODLAND - PLANTATION
- A1.3.2 - MIXED WOODLAND - PLANTATION
- A2.1 - SCRUB - DENSE/CONTINUOUS
- A2.2 - SCRUB - SCATTERED
- A3.1 - BROADLEAVED PARKLAND/SCATTERED TREES
- B4 - IMPROVED GRASSLAND
- G1 - STANDING WATER
- G2 - RUNNING WATER
- J1.2 - CULTIVATED/DISTURBED LAND - AMENITY GRASSLAND
- J4 - BARE GROUND
- TARGET NOTE

TN22

TN55

SEE SHEET 2

KEY PLAN



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FIRST ISSUE	GB / JG	13/12/18	P01	
Revision Details	By / Check	Date	Suffix	

Purpose of Issue

DCO SUBMISSION

Client

Highways England
Floor 5
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38 Colmore Circus
B4 6BN

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M42 JUNCTION 6 IMPROVEMENT

Drawing Title

FIGURE 9.2B
PHASE 1 HABITAT SURVEY
SHEET 1 OF 3

Designed	Drawn	Checked	Approved	Date
DH	GB	MWH	JG	13/12/18

Internal Project No	Suitability
60543032	D7
Scale @ A3	Zone
1:10,000	M42

Drawing Number				Rev
Highways England Pin	Originator	Volume		
HE551485	-ACM	-EGN-		P01
Location	Type	Role	Number	
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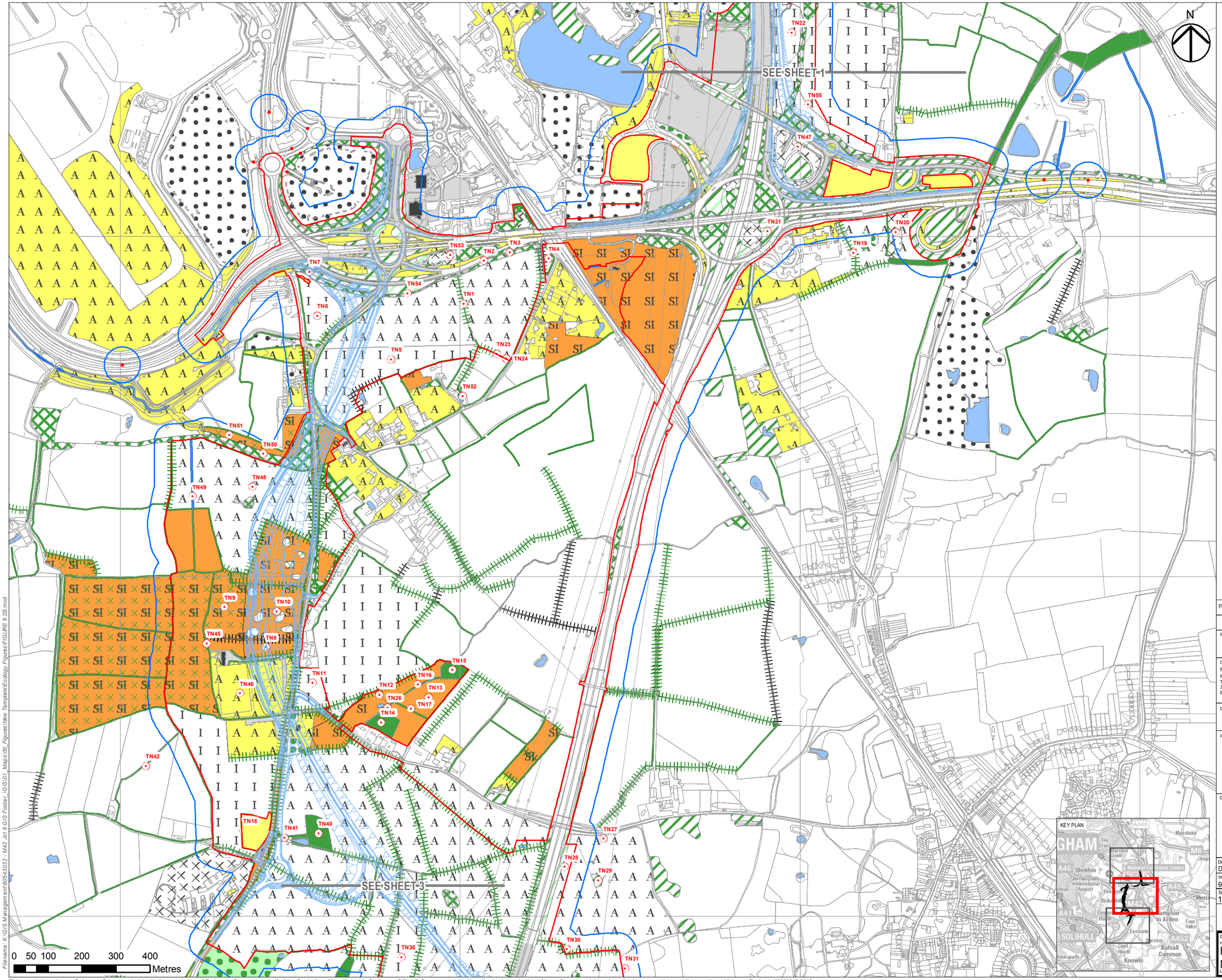

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- LIMITS OF LAND TO BE TEMPORARILY ACQUIRED FOR SIGNAGE INSTALLATION
- LAND NOT INCLUDED WITHIN THE ORDER LIMITS
- 50M BUFFER

PHASE 1 HABITAT SURVEY

- G2 - RUNNING WATER
- J2.1.2 - INTACT HEDGE - SPECIES-POOR
- J2.2.2 - DEFUNCT HEDGE - SPECIES-POOR
- J2.3.2 - HEDGE WITH TREES - SPECIES-POOR
- J2.4 - FENCE
- HARD STANDNG
- A1.1.1 - BROADLEAVED WOODLAND - SEMI-NATURAL
- A1.1.2 - BROADLEAVED WOODLAND - PLANTATION
- A1.2.2 - CONIFEROUS WOODLAND - PLANTATION
- A1.3.1 - MIXED WOODLAND - SEMI-NATURAL
- A1.3.2 - MIXED WOODLAND - PLANTATION
- A2.1 - SCRUB - DENSE/CONTINUOUS
- A2.2 - SCRUB - SCATTERED
- A3.1 - BROADLEAVED PARKLAND/SCATTERED TREES
- B2.1 - NEUTRAL GRASSLAND - UNIMPROVED
- B2.2 - NEUTRAL GRASSLAND - SEMI-IMPROVED
- B4 - IMPROVED GRASSLAND
- B6 - POOR SEMI-IMPROVED GRASSLAND
- G1 - STANDING WATER
- G2 - RUNNING WATER
- J1.1 - CULTIVATED/DISTURBED LAND - ARABLE
- J1.2 - CULTIVATED/DISTURBED LAND - AMENITY GRASSLAND
- J1.3 - CULTIVATED/DISTURBED LAND - EPHEMERAL/SHORT PERENNIAL
- J2.3.2 - HEDGE WITH TREES - SPECIES-POOR
- J3.6 - BUILDINGS
- J4 - BARE GROUND
- TARGET NOTE

KEY PLAN

FIRST ISSUE	GB / JG	13/12/18	P01	
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Purpose of Issue: DCO SUBMISSION

Client: Highways England, Floor 5, Two Colmore Square, 38 Colmore Circus, B4 6BN

Development Consent Order Number: TR010027

Project Title: M42 JUNCTION 6 IMPROVEMENT

Drawing Title: FIGURE 9.2B PHASE 1 HABITAT SURVEY SHEET 2 OF 3

Designed	Drawn	Checked	Approved	Date
DH	GB	MWH	JG	13/12/18

Internal Project No: 60543032	Suitability: D7
Scale @ A3: 1:10,000	Zone: M42

Drawing Number: Highways England Pin: HE551485 | Originator: -ACM | Volume: -EGN- | Location: M42_SW_ZZ_ZZ | Type | Role | Number: -DR-DC-0064 | Rev: P01

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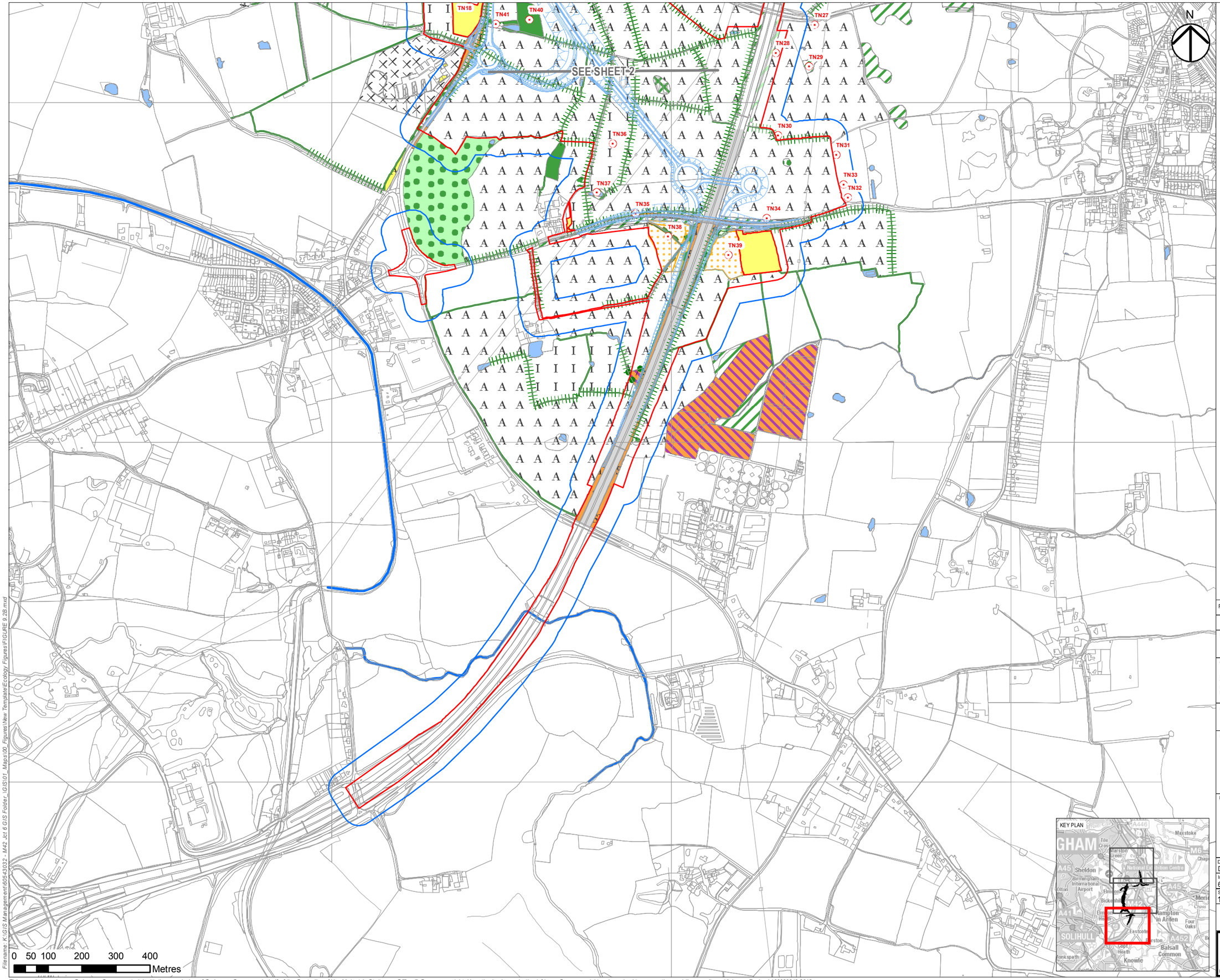

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- LIMITS OF LAND TO BE TEMPORARILY ACQUIRED FOR SIGNAGE INSTALLATION
- LAND NOT INCLUDED WITHIN THE ORDER LIMITS
- 50M BUFFER

PHASE 1 HABITAT SURVEY

- A3.1 - BROADLEAVED PARKLAND/SCATTERED TREES
- G2 - RUNNING WATER
- J2.1.2 - INTACT HEDGE - SPECIES-POOR
- J2.3.2 - HEDGE WITH TREES - SPECIES-POOR
- J2.4 - FENCE
- J2.6 - DRY DITCH
- HARD STANDNG
- ANCIENT WOODLAND
- A1.1.1 - BROADLEAVED WOODLAND - SEMI-NATURAL
- A1.1.2 - BROADLEAVED WOODLAND - PLANTATION
- A1.2.2 - CONIFEROUS WOODLAND - PLANTATION
- A1.3.1 - MIXED WOODLAND - SEMI-NATURAL
- A2.1 - SCRUB - DENSE/CONTINUOUS
- A2.2 - SCRUB - SCATTERED
- A3.1 - BROADLEAVED PARKLAND/SCATTERED TREES
- B2.2 - NEUTRAL GRASSLAND - SEMI-IMPROVED
- B4 - IMPROVED GRASSLAND
- B5 - MARSH/MARSHY GRASSLAND
- F2.1 [AREA OF DENSE TYPHA LATIFOLIA]
- G1 - STANDING WATER
- J1.1 - CULTIVATED/DISTURBED LAND - ARABLE
- J1.2 - CULTIVATED/DISTURBED LAND - AMENITY GRASSLAND
- J1.3 - CULTIVATED/DISTURBED LAND - EPHEMERAL/SHORT PERENNIAL
- J3.6 - BUILDINGS
- J4 - BARE GROUND
- TARGET NOTE

FIRST ISSUE	GB / JG	13/12/18	P01
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Purpose of Issue: DCO SUBMISSION

Client: Highways England
Floor 5
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B4 6BN

Development Consent Order Number: TR010027

Project Title: M42 JUNCTION 6 IMPROVEMENT

Drawing Title: FIGURE 9.2B PHASE 1 HABITAT SURVEY SHEET 3 OF 3

Designed	Drawn	Checked	Approved	Date
DH	GB	MWH	JG	13/12/18

Internal Project No: 60543032	Suitability: D7
Scale @ A3: 1:10,000	Zone: M42

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Rev: P01

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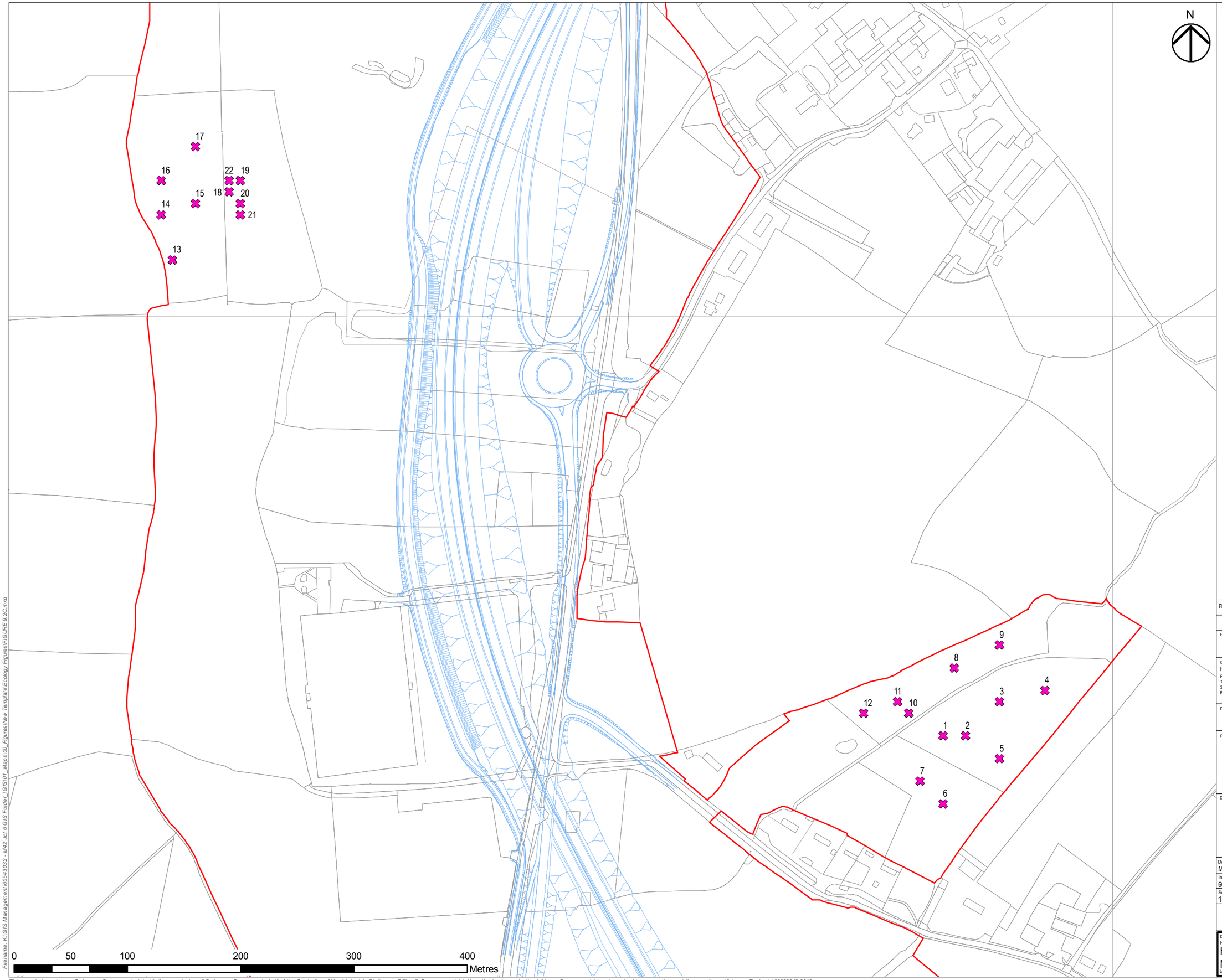

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- LAND NOT INCLUDED WITHIN THE ORDER LIMITS
- QUADRATS

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Purpose of Issue

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Floor 5
Two Colmore Square
38 Colmore Circus
B4 6BN

Development Consent Order Number

TR010027

Project Title

M42 JUNCTION 6 IMPROVEMENT

Drawing Title

FIGURE 9.2C
QUADRATS

Designed	Drawn	Checked	Approved	Date
MWH	GB	MWH	JG	13/12/18

Internal Project No	Suitability
60543032	D7
Scale @ A3	Zone
1:3,000	M42

Drawing Number

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