In Parliament – Session 2022 - 2023

HS2

High Speed Rail (Crewe – Manchester)

Background information and data accompanying SES2 and AP2 ES

Ecology and biodiversity
BID EC-017-00000 SES2 and AP2 ES
Ecological baseline data – other
MA01: Hough to Walley's Green
MA02: Wimboldsley to Lostock Gralam
MA03: Pickmere to Agden and Hulseheath
MA06: Hulseheath to Manchester Airport
MA07: Davenport Green to Ardwick
MA08: Manchester Piccadilly Station

In Parliament – Session 2022 - 2023

HS2

High Speed Rail (Crewe – Manchester)

Background information and data accompanying SES2 and AP2 ES

Ecology and biodiversity
BID EC-017-00000 SES2 and AP2 ES
Ecological baseline data – other
MA01: Hough to Walley's Green
MA02: Wimboldsley to Lostock Gralam
MA03: Pickmere to Agden and Hulseheath
MA06: Hulseheath to Manchester Airport
MA07: Davenport Green to Ardwick
MA08: Manchester Piccadilly Station

Department for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

Telephone: 08081 434 434

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.hs2.org.uk

A report prepared for High Speed Two (HS2) Limited:

ARUP+ ERM | FOSTER + PARTNERS | JACOBS
RAMBOLL | TYPSA | COSTAIN

MWJV
Mott MacDonald | WSP

High Speed Two (HS2) Limited has actively considered the needs of blind and partially sighted people in accessing this document. The text will be made available in full on the HS2 website. The text may be freely downloaded and translated by individuals or organisations for conversion into other accessible formats. If you have other needs in this regard please contact High Speed Two (HS2) Limited.

recycle

Printed in Great Britain on paper containing 100% recycled fibre.

Contents

Tables

1 Introduction

1.1 Structure of this report

1.1.1 This document sets out Background Information and Data (BID) which accompanies the High Speed Two (HS2) High Speed Rail (Crewe – Manchester) Supplementary Environmental Statement 2 (SES2) and Additional Provision 2 Environmental Statement (AP2 ES)[1].

1.1.2 This document sets out baseline data for habitats and species not reported in the BID report[2] (the main BID report) that accompanied the High Speed Two (HS2) High Speed Rail (Crewe – Manchester) Environmental Statement published in 2022[3] (the main ES) or the BID report that accompanied the HS2 High Speed Rail (Crewe – Manchester) Supplementary Environmental Statement 1 (SES1) and Additional Provision 1 Environmental Statement (AP1 ES) published in July 2022[4]. It should be read in conjunction with these documents. For MA01-03 this primarily includes new data gathered since August 2021 and for MA06, MA07 and MA08 new data gathered since February 2021, it also includes data which has become relevant due to spatial changes between the original scheme and AP2 revised scheme.

1.1.3 Baseline data in this document is reported for the following ecological habitats and species:

- habitats;
- hedgerows;
- birds;
- ponds and canals;
- aquatic invertebrates;
- terrestrial invertebrates; and
- otter.

[1] High Speed Two Ltd (2023), High Speed Rail (Crewe – Manchester), *Supplementary Environmental Statement 2 and Additional Provision 2 Environmental Statement.* Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-supplementary-environmental-statement-2-and-additional-provision-2-environmental-statement.

[2] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data.* Available online at: https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement.

[3] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement*. Available online at: https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement.

[4] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data accompanying Supplementary Environmental Statement 1 and Additional Provision 1 Environmental Statement.* Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-supplementary-environmental-statement-1-and-additional-provision-1-environmental-statement.

1.1.4 Baseline data covering other habitats and species are contained in the following SES2 and AP2 ecological baseline data reports:

- Ecological baseline data – amphibian surveys (BID EC-007-00000 SES2 and AP2 ES); and
- Ecological baseline data – bats (BID EC-011-00000 SES2 and AP2 ES).

1.1.5 Baseline badger data are provided in BID EC-014-00000 SES2 and AP2 ES and corresponding BID Ecology and biodiversity Map Book: Map Series EC-12C – Other Protected and Notable Species (3) which accompanies the SES2 and AP2 ES. Note that baseline data for badger are not made publicly available due to the historic persecution of this species.

1.1.6 This report covers the following community areas (CA):

- Hough to Walley's Green (MA01);
- Wimboldsley to Lostock Gralam (MA02);
- Pickmere to Agden and Hulseheath (MA03);
- Hulseheath to Manchester Airport (MA06);
- Davenport Green to Ardwick (MA07); and
- Manchester Piccadilly Station (MA08).

1.1.7 Maps relevant to this report are contained in the accompanying SES2 and AP2 ES Background Information and Data, Ecology and biodiversity Map Book:

- Map Series EC-02 – Phase 1 Habitat (1:10,000);
- Map Series EC-05 – Bats – Roosts;
- Map Series EC-06 – Bats – Activity;
- Map Series EC-08 – Breeding Birds – Protected and Notable Species;
- Map Series EC-09 – Wintering Birds – Protected and Notable Species;
- Map Series EC-10 – Phase 2 Habitat Survey;
- Map Series EC-11 – Other Protected and Notable Species (1); and
- Map Series EC-12 – Other Protected and Notable Species (2).

1.1.8 In order to differentiate between the original scheme and the subsequent changes, the following terms are used:

- 'the original scheme' – the Bill scheme submitted to Parliament in 2022, which was assessed in the main ES;
- 'the SES1 scheme' – the original scheme with any changes described in SES1 that are within the existing powers of the Bill;
- 'the AP1 revised scheme' – the original scheme as amended by SES1 changes and AP1 amendments;

- 'the SES2 scheme' – the original scheme with any changes described in SES1 (submitted in July 2022) and the SES2; and
- 'the AP2 revised scheme' – the original scheme as amended by SES1 and SES2 changes (as relevant) and AP2 amendments.

1.2 Methodology, assumptions and limitations

1.2.1 The assessment scope, key assumptions and limitations are as set out in the main ES Environmental Impact Assessment Scope and Methodology Report (SMR)[5].

[5] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement, Environmental Impact Assessment Scope and Methodology Report,* Volume 5, Appendix CT-001-00001. Available online at: https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement.

2 Habitats

2.1 Introduction

2.1.1 This section sets out ecological baseline data relating to habitats not reported in the main BID report, or the BID report that accompanied the SES1 and AP1 ES. It should be read in conjunction with main BID report, Ecological baseline data – Phase 1 Habitat Survey (see main BID EC-002-00001), which accompanied the main ES, and BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES.

2.2 Methodology

2.2.1 Details of the standard methodology used for extended Phase 1 Habitat Surveys are provided in the Technical note – Ecology and biodiversity – Ecological field survey methods and standards (FSMS), which is included within the SMR which accompanied the main ES.

2.2.2 In 2020, HS2 Ltd agreed revised field survey areas for Phase 1 Habitat Survey with Natural England. These revisions were made in response to stabilisation of boundary of the land required for construction of the original scheme and a reduced need to survey land away from it to understand likely impacts. The survey area for Phase 1 Habitat Survey was reduced from the 250m buffer zone to the 100m buffer zone.

2.2.3 Where possible Phase 1 habitat data has been used to confirm if a Habitat of Principal Importance (HoPI) is likely to be present. However, a judgement on whether a habitat qualifies as a HoPI cannot always be determined; where this is the case, this was stated for each habitat type.

2.2.4 In conjunction with the above, DEFRA's MAGIC map was also used to check if the site is within the priority habitat inventory and whether it falls within ancient woodland. Plant species lists were then assessed against the priority habitats descriptions and species lists provided within UK Biodiversity Action Plan Priority Habitat Descriptions[6].

[6] BRIG (2011), *UK Biodiversity Action Plan: Priority Habitat Descriptions*. JNCC, Peterborough. Available online at: https://hub.jncc.gov.uk/assets/2728792c-c8c6-4b8c-9ccd-a908cb0f1432.

2.2.5 The scoping, desk study exercises and surveys reported in the main ES can be found in BID EC-002-00001, which accompanied the main ES. This section contains the outcomes of Phase 1 Habitat Surveys undertaken between:

- August 2021 and June 2022 inclusive for MA01, MA02 and MA03 which were completed since publication of BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES; and
- February 2021 and June 2022 inclusive for MA06, MA07 and MA08 which were completed since publication of the main BID report, Ecological baseline data – Phase 1 Habitat Survey (see main BID EC-002-00001), which accompanied the main ES.

2.3 Deviations, constraints and limitations

2.3.1 Phase 1 Habitat Surveys were conducted between February 2021 and June 2022. The results of these surveys are reported by habitat type and within a summary table for each community area. Where access restrictions meant that survey was not possible, or incomplete, the broad habitat types were determined from aerial imagery; these areas are reported within the summary tables but are not described fully within the text of this report.

2.4 Baseline

Hough to Walley's Green (MA01)

Introduction

2.4.1 Approximately 62.0% of the area of land required for the construction of the AP2 revised scheme has been subject to Phase 1 Habitat Survey in MA01 by the end of June 2022.

2.4.2 Descriptions of the habitat types that have been subject to Phase 1 Habitat Survey to verify the assumed baseline, as reported in BID report, Ecological baseline data – Phase 1 habitat survey (BID EC-002-00001) which accompanied the main ES, and BID EC-017-00000 SES1 and AP1 ES which accompanied SES1 and AP1 ES, are provided below.

Woodland

2.4.3 An additional area of approximately 0.11ha of additional woodland habitat was ground truthed within the land required for construction of the AP2 revised scheme.

Scrub

2.4.4 An additional area of approximately 0.05ha of dense continuous scrub was ground truthed within the land required for construction of the AP2 revised scheme. It is parallel to the West

Coast Mainline railway, due north of Crewe. The scrub is dominated by dense willow species (*Salix* spp.), with frequent planted cherry (*Prunus* sp.), occasional wild privet (*Ligustrum vulgare)*, creeping thistle (*Cirsium arvense)*, and rarely, rose (*Rosa* sp.). Also in this same locality are smaller patches of dense scrub comprising willow and hawthorn (*Crataegus monogyna)* with occasional creeping thistle. The scrub patches are parallel to the banks of a ditch bordering marshy grassland. The habitat is not a HoPI.

Hedgerows

2.4.5 Hedgerows that comprise 80% native woody species qualify as a HoPI. Details of additionally ground truthed hedgerows that are 'important', and which are located within the land required for the AP2 revised scheme, are provided in Section 3.

2.4.6 An additional 135m of species-poor, intact hedgerow was ground truthed within the land required for construction of the AP2 revised scheme. These hedgerows are north of Crewe, west of the West Coast Mainline; and between the West Coast Mainline and Warmingham Road. The typical species composition includes dominant hawthorn, and occasional blackthorn (*Prunus spinosa*) and dog rose (*Rosa canina agg*.) with an understorey of grasses and great willowherb (*Epilobium hirsutum*).

Parkland and scattered trees

2.4.7 No parkland and scattered tree habitat was identified through additional surveys within the land required for construction of the AP2 revised scheme.

Grassland and marsh

2.4.8 The following additional grassland habitats have been ground truthed within the land required for construction of the AP2 revised scheme. Approximately 0.02ha of improved grassland is present north of the access drive to Moat House Farm, north of Minshull Vernon. It is dominated by perennial rye-grass (*Lolium perenne*), with occasional dandelion (*Taraxacum officinale agg*.), white clover (*Trifolium repens*), and rare common daisy (*Bellis perennis*) and creeping thistle. Approximately 6.7ha of neutral semi-improved grassland is present parallel to the West Coast Mainline railway, due north of Crewe. It is dominated by common bent (*Agrostis capillaris*) Yorkshire fog (*Holcus lanatus*), perennial rye grass, white clover (*Trifolium repens)*, broad-leaved dock (*Rumex obtusifolius*) and creeping thistle. Approximately 0.62ha of marshy grassland is present parallel to the West Coast Mainline railway, due north of Crewe; it is in mosaic with the scrub reported earlier for this area. It comprises a tall sward of abundant false oat-grass (*Arrhenatherum elatius*), with frequent Yorkshire fog, creeping thistle, meadowsweet (*Filipendula ulmaria*), and occasional marsh woundwort (*Stachys palustris*), creeping buttercup (*Ranunculus repens*), red clover (*Trifolium pratense*), lesser stitchwort (*Stellaria graminea*) and with frequent patches of brambles (*Rubus fruticosus agg*.).

2.4.9 Additionally, approximately 0.02ha of swamp was ground truthed within the land required for the construction of the AP2 revised scheme, in the same location as the marshy grassland and scrub already reported. It constitutes a dried-up pond where the marshy grassland transitioned into swamp habitat. The species present include abundant reed canary-grass (*Phalaris arundinacea*), redshank (*Persicaria maculosa*), meadowsweet, occasional greater birds-foot trefoil (*Lotus pedunculatus*), frequent common nettle (*Urtica dioica*) and hard rush (*Juncus inflexus*).

2.4.10 None of these newly ground truthed habitats qualify as a HoPI. However, the marshy grassland/swamp/scrub mosaic is moderately species-rich.

Watercourses

2.4.11 No new watercourses were identified within the land required for the construction of the AP2 revised scheme.

Water bodies

2.4.12 No new standing water habitat was identified within the land required for the construction of the original scheme. In total, there are 26 water bodies within the land required for the construction of the AP2 revised scheme.

Arable and cultivated land

2.4.13 No new arable and cultivated land has been identified within the land required for the construction of the AP2 revised scheme.

Buildings and structures

2.4.14 There are additional areas of buildings comprising of farm and stable buildings located parallel to the West Coast Mainline railway, due north of Crewe.

Updated summary of habitat types within the Hough to Walley's Green area (MA01)

2.4.15 Table 1 provides a summary of the habitat types within the land required for the construction of the AP2 revised scheme in MA01.

Table 1: Habitat types within the land required for the AP2 revised scheme within MA01

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Broadleaved woodland – semi-	0.6	3.0	Y	Y

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
natural				
Broadleaved woodland – plantation	0.2	-	Y	N
Mixed woodland – plantation	0.3	-	Y	N
Scrub – dense/continuous	0.4	3.1	Y	N
Scrub – scattered	<0.1	0.1	Y	N
Hedgerows – intact, native species-rich	1.1	1.0	Y	Y
Hedgerows – intact hedge, native species-poor	6.8	-	Y	Y
Hedgerows – defunct, native species-poor	18.1	-	Y	Y
Hedge and trees – species-rich	2.7	-	Y	Y
Hedge and trees – species-poor	4.5	-	Y	Y
Broadleaved parkland/scattered trees	0.1	0.3	Y	Y
Acid grassland – semi-improved	0.2	-	Y	N
Neutral grassland – unimproved	<0.1	-	Y	N
Neutral grassland – semi-improved	6.7	-	Y	Y
Improved grassland	89.4	2.1	Y	Y
Marsh/marshy grassland	1.5	2.0	Y	Y
Poor semi-improved grassland	9.9	16.8	Y	Y
Other tall herb and fern – ruderal	0.8	-	Y	Y
Swamp	0.2	-	Y	Y
Standing water	0.3	<0.1	Y	Y
Cultivated/disturbed land – arable	8.0	10.2	Y	N

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Cultivated/disturbed land – amenity grassland	<0.1	5.0	Y	Y
Cultivated/disturbed land – ephemeral/short perennial	<0.1	-	Y	N
Introduced shrub	<0.1	-	Y	Y
Buildings	0.2	0.2	Y	Y
Bare ground	1.2	0.7	Y	Y
Other habitat[7]	1.9	31.3	Y	Y

Wimboldsley to Lostock Gralam (MA02)

Introduction

2.4.16 Approximately 70.3% of the area of land required for the construction of the AP2 revised scheme has been subject to Phase 1 Habitat Survey in MA02 by the end of June 2022.

2.4.17 Descriptions of the habitat types that have been subject to Phase 1 Habitat Survey, to verify the assumed baseline, reported in BID report, Ecological baseline data – Phase 1 habitat survey (BID EC-002-00001) which accompanied the main ES, and BID EC-017-00000 SES1 and AP1 ES which accompanied SES1 and AP1 ES, are provided below.

Woodland

2.4.18 An additional area of less than 0.01ha of broadleaved semi-natural woodland was ground truthed within the land required for construction of the AP2 revised scheme. It is located south-west of Middlewich, south of the A530 Nantwich Road. It comprises a line of young to semi-mature broad-leaved trees adjacent to a stream. Species present include occasional pedunculate oak (*Quercus robur*), hazel (*Corylus avellana*), elder (*Sambucus nigra*), ash (*Fraxinus excelsior*) and guelder-rose (*Viburnum opulus*). The habitat qualifies as lowland mixed deciduous woodland HoPI.

[7] The majority of the other habitat is hardstanding.

Scrub

2.4.19 Less than 0.01ha of dense scrub was additionally ground truthed within the land required for construction of the AP2 revised scheme. It is on the west bank of Smoker Brook south of Leonard's and Smoker Wood Local Wildlife Site (LWS). It comprises patches of dense gooseberry (*Ribes uva-crispa*), bramble and snowberry (*Symphoricarpos albus*) with rare broad-leaved bamboo (*Sasa palmata*). This habitat is not a HoPI.

Hedgerows

2.4.20 Hedgerows that comprise 80% native woody species qualify as a HoPI. Details of additionally ground truthed hedgerows that are 'important', and which are located within the land required for the AP2 revised scheme are provided in Section 3. These hedges are mainly located west of the A530 Nantwich Road, both north and south of Clive Green Road. They are also due east of Middlewich along the A54 Holmes Chapel Road. The typical composition of these hedges comprises: dominant hawthorn with mature beech (*Fagus sylvatica*) and Blackthorn and pedunculate oak were frequent and occasional in these hedgerows and elder was rarely recorded.

Parkland and scattered trees

2.4.21 Approximately 0.27ha of parkland and scattered tree habitat has been additionally ground truthed within the land required for construction of the original scheme or the AP2 revised scheme. It is south-west of Middlewich, west of Coalpit Lane and directly south of the River Weaver. The parkland comprises several scattered, mature pedunculate oak trees within improved grassland. This vegetation does not qualify as a HoPI.

Grassland and marsh

2.4.22 Approximately 30.35ha of improved grassland has been additionally ground truthed within the land required for construction of the AP2 revised scheme. This vegetation is south-west of Middlewich, located north and south of Clive Green Lane. it is dominated by perennial rye-grass, with occasional smooth meadow-grass (*Poa pratensis*), common mouse-ear (*Cerastium fontanum*), white clover and creeping buttercup. Thistle and dock species were occasional in the sward and cattle were noted as the key grazing animals. This habitat is not a HoPI.

Watercourses

2.4.23 No new watercourses were identified within the land required for the construction of the original scheme or the AP2 revised scheme.

2.4.24 Less than 0.01ha of running water was additionally ground truthed in the land required for construction of the AP2 revised scheme in this area. It comprises a short section of a tributary of the River Wheelock, south-west of Middlewich and due south of the A530

Nantwich Road. The stream has steep (approximately 75 degree) banks with occasional meadowsweet and great willowherb. It is unlikely to qualify as a HoPI.

Water bodies

2.4.25 There are five new standing water bodies within the land required for the construction of the original scheme. They are located west of the A530 and south-west of Middlewich. In total, there are 82 water bodies within the land required for the construction of the AP2 revised scheme.

Arable and cultivated land

2.4.26 A single field (approximately 0.69ha) of arable and cultivated land has been additionally ground truthed within the land required for the construction of the AP2 revised scheme. It is east of where the West Coast Mainline crosses the Shropshire Union Canal. Bread wheat (*Triticum aestivum*) was the dominant crop.

Buildings and structures

2.4.27 No additional areas of buildings and structures are present within the land required for the construction of the AP2 revised scheme.

Updated summary of habitat types within the Wimboldsley to Lostock Gralam area (MA02)

2.4.28 Table 2 provides a summary of the habitat types within the land required for the construction of the AP2 revised scheme in MA02.

Table 2: Habitat types within the land required for the AP2 revised scheme within MA02

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Broadleaved woodland – semi-natural	11.2	9.1	Y	Y
Broadleaved woodland – plantation	0.4	-	Y	N
Coniferous Woodland – plantation	-	<0.1	Y	N
Mixed woodland – plantation	<0.1	-	Y	N

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Scrub – dense/continuous	1.8	2.1	Y	Y
Scrub – scattered	0.4	-	Y	N
Hedgerows – intact, native species-rich	1.3	35.4	Y	Y
Hedgerows – intact hedge, native species-poor	27.0	-	Y	Y
Hedgerows – defunct, native species-rich	<0.1	-	Y	Y
Hedgerows – defunct hedge, native species-poor	4.8	-	Y	Y
Hedge and trees rows – defunct, native species-rich	2.1	-	Y	Y
Hedge and trees – species-poor	0.2	-	Y	Y
Broadleaved parkland/scattered trees	1.4	0.1	Y	Y
Mixed parkland/scattered trees	1.4	-	Y	Y
Neutral grassland – semi-improved	3.0	0.3	Y	Y
Improved grassland	310.2	5.3	Y	Y
Marsh/marshy grassland	1.8	-	Y	N
Poor semi-improved grassland	13.5	68.0	Y	Y
Bracken – continuous	<0.1	-	Y	N
Bracken – scattered	0.2	-	Y	N
Other tall herb and fern – ruderal	14.8	-	Y	Y

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Swamp	<0.1	-	Y	N
Marginal and inundation – inundation vegetation	0.4	<0.1	Y	N
Standing water	2.2	0.3	Y	Y
Standing water – eutrophic	0.1	-	Y	N
Standing water – mesotrophic	<0.1			N
Running water	1.0	0.8	Y	Y
Spoil	0.2	-	Y	N
Cultivated/disturbed land – arable	114.4	76.1	Y	Y
Cultivated/disturbed land – amenity grassland	0.8	4.8	Y	Y
Cultivated/disturbed land – ephemeral/short perennial	1.8	<0.1	Y	N
Introduced shrub	0.5	-	Y	N
Buildings	0.8	0.2	Y	Y
Bare ground	1.5	1.7	Y	N
Other habitat	5.6	37.1	Y	Y

Pickmere to Agden and Hulseheath (MA03)

Introduction

2.4.29 Approximately 63.5% of the area of land required for the construction of the AP2 revised scheme has been subject to Phase 1 Habitat Survey in MA03 by the end of June 2022.

2.4.30 Descriptions of the habitat types that have been subject to Phase 1 Habitat Survey, to verify the assumed baseline, reported in BID report, Ecological baseline data – Phase 1 habitat survey (BID EC-002-00001) which accompanied the main ES, and BID EC-017-00000 SES1 and AP1 ES which accompanied SES1 and AP1 ES, are provided below.

Woodland

2.4.31 Approximately 1.24ha of broadleaved semi-natural woodland and 0.53ha of mixed semi-natural woodland was additionally ground truthed within the land required for the construction of the AP2 revised scheme. The majority is located in the southern part of Belt Wood LWS, west of Mere. In the broadleaved semi-natural woodland pedunculate oak is abundant with the following occasional species, rowan (*Sorbus aucuparia*), hawthorn and small-leaved lime (*Tilia cordata*), and rare elm (*Ulmus* sp.), common lime (*Tilia x europaea*), and cherry laurel (*Prunus laurocer asus*). The woodland ground layer has frequent bracken (*Pteridium aquilinum*), ivy (*Hedera helix*) and honeysuckle (*Lonicera periclymenum*). This woodland qualifies as lowland mixed deciduous woodland HoPI. The mixed semi-natural woodland contains the above species with the addition of planted pines (*Pinus* sp.) and larch (*Larix* sp.); the mixed woodland is unlikely to qualify as a HoPI. Neither woodland is in the part of Belt Wood LWS that is ancient woodland.

Scrub

2.4.32 Approximately 0.02ha of dense continuous scrub was additionally ground truthed within the land required for construction of the AP2 revised scheme. It is located south of B5391 and School Lane. It comprises of bramble, ash and goat willow (*Salix caprea*). It does not qualify as a HoPI.

Hedgerows

2.4.33 Hedgerows that comprise 80% native woody species qualify as a HoPI. Details of additionally ground truthed hedgerows that are 'important', and which are located within the land required for construction of the AP2 revised scheme are provided in Section 3.

2.4.34 The following hedgerow types were additionally ground truthed within the land required for construction of the AP2 revised scheme in the Agden to Hulseheath area: 505m of species-poor, intact hedgerow; 666m of species-poor, defunct hedgerow; and 1.69km of hedgerow with trees. These hedgerows are broadly distributed throughout the Agden to Hulseheath area with clusters in the following locations: due south of the M6; in farmland both north and south of the A50 Warrington Road; and in farmland near the junction of Hulseheath Lane and Chapel Lane. The composition of these hedgerows is varied. Two typical examples include abundant hawthorn and frequent holly, with rarely recorded hazel, elder, sycamore and garden privet (*Ligustrum ovalifolium*). Another hedge was defunct and dominated by hawthorn with scattered mature pedunculate oak and immature English elm (*Ulmus procera*).

Parkland and scattered trees

2.4.35 Approximately 0.1ha of broadleaved parkland/scattered trees was additionally ground truthed within the land required for construction of the AP2 revised scheme. It comprises a number of small patches of scattered mature and semi-mature trees along road verges and around farmsteads across this area. This vegetation does not qualify as a HoPI.

Grassland and marsh

2.4.36 The following approximate areas of grassland habitat have been additionally ground truthed in the land required for construction of the AP2 revised scheme: 3.8ha of improved grassland; and 2.64ha of poor semi-improved grassland. Improved grassland is present south of the M6 and west of Over Tabley. Typical species include dominant perennial rye-grass with a small number of additional species including dandelion, Yorkshire fog, hard rush (*Juncus inflexus*), red fescue (*Festuca rubra*), thistles, and white clover. Species-poor semi-improved grassland is present south of the A50 Warrington Road, west of Mere. It typically comprises abundant to frequent grasses such as perennial rye-grass, cock's-foot (*Dactylis glomerata*), sweet vernal-grass (*Anthoxanthum odoratum*), soft brome (*Bromus hordeaceus*), rough meadow-grass (*Poa trivialis*) and common herbs such as sorrel (*Rumex acetosa*) and creeping thistle. None of these grasslands constitutes a HoPI.

2.4.37 Less than 0.01ha of marshy grassland is present south of Peacock Lane. No species data is available. However, a 0.03ha area of marginal vegetation was additionally ground truthed 50m north of the marshy grassland, around a pond and is dominated by rushes (*Juncus* sp.), common reed (*Phragmites australis*), occasional water dock (*Rumex hydrolapathum*), yellow-flag iris and marsh marigold (*Caltha palustris*). This vegetation does not qualify as a HoPI.

Watercourses

2.4.38 No new watercourses were identified within the land required for the construction of the original scheme or the AP2 revised scheme.

Water bodies

2.4.39 In total, there are 99 water bodies within the land required for the construction of the AP2 revised scheme.

2.4.40 Seven areas of standing water habitat were additionally ground truthed in the land required for the construction of the AP2 revised scheme totalling approximately 0.06ha. One is north of Peacock Lane and is associated with the marginal vegetation described under the grassland section. It is a small, round pond with stagnant water and a muddy base. It is overshadowed by blackthorn (*Prunus spinosa*) along its southern banks. The remainder are located west of the A556 and north and south of the A50. One pond is located within Belt Wood LWS and has already been described under the woodland section. It is a dry pond

dominated by floating sweet grass (*Glyceria fluitans*) indicating that it must be wet at least part of the year. Occasional and rare species in the pond include bittersweet (*Solanum dulcamara*) and reed canary-grass.

Arable and cultivated land

2.4.41 Approximately 4.33ha of arable and cultivated land has been ground truthed within the land required for the construction of the AP2 revised scheme. This was mainly north of the A50 Warrington Road near Mere Court. Bread wheat was growing in this field.

Buildings and structures

2.4.42 Approximately 0.02ha of buildings were additionally ground truthed in the land required for construction of the AP2 revised scheme comprising farm buildings between Bowden View Land and the A50 Warrington Road.

Updated summary of habitat types within the Pickmere to Agden and Hulseheath area (MA03)

2.4.43 Table 3 provides a summary of the habitat types within the land required for the construction of the AP2 revised scheme in MA03.

Table 3: Habitat types within the land required for the AP2 revised scheme within MA03

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Broadleaved woodland – semi-natural	4.0	4.3	Y	Y
Broadleaved woodland – plantation	0.4	0.3	Y	Y
Coniferous woodland – plantation	-	<0.1	Y	N
Mixed woodland – semi-natural	0.5	<0.1	Y	Y
Mixed woodland – plantation	0.2	0.1	Y	N
Scrub – dense/continuous	0.3	2.3	Y	Y
Scrub – scattered	0.6	0.2	Y	Y
Hedgerows – intact, native species-rich	1.7	31.6	Y	Y

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Hedgerows – intact hedge, native species-poor	10.4	-	Y	Y
Hedgerows – defunct, native species-rich	0.2	-	Y	Y
Hedgerows – defunct, native species-poor	3.1	-	Y	Y
Hedge and trees – species-rich	3.0	-	Y	Y
Hedge and trees – species-poor	12.7	-	Y	Y
Broadleaved parkland/scattered trees	0.2	0.1	Y	Y
Mixed parkland/scattered trees	1.4	-	Y	Y
Neutral grassland – semi-improved	1.2	-	Y	N
Improved grassland	126.7	33.8	Y	Y
Marsh/marshy grassland	0.2	-	Y	Y
Poor semi-improved grassland	40.0	30.0	Y	Y
Bracken – continuous	0.2	-	Y	Y
Other tall herb and fern – ruderal	1.6	<0.1	Y	N
Marginal and inundation – inundation vegetation	<0.1	-	Y	Y
Standing water	1.2	0.5	Y	Y
Standing water – eutrophic	0.6	-	Y	N
Standing water – mesotrophic	0.2	-	Y	N
Running water	0.3	0.7	Y	N
Cultivated/disturbed land – arable	102.0	31.0	Y	Y

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Cultivated/disturbed land – amenity grassland	3.3	8.6	Y	Y
Cultivated/disturbed land – ephemeral/short perennial	<0.1	-	Y	Y
Introduced shrub	0.1	-	Y	N
Buildings	0.4	0.4	Y	Y
Bare ground	1.5	1.5	Y	Y
Other habitat	1.5	24.2	Y	Y

Hulseheath to Manchester Airport (MA06)

Introduction

2.4.44 Approximately 40.9% of the area of land required for the construction of the AP2 revised scheme has been subject to Phase 1 Habitat Survey in MA06 by the end of June 2022.

2.4.45 Descriptions of the habitat types that have been subject to Phase 1 Habitat Survey, to verify the assumed baseline reported in the main BID report, Ecological baseline data – Phase 1 habitat survey (BID EC-002-00001), which accompanied the main ES, are provided below.

Woodland

2.4.46 Approximately 0.98ha of broadleaved semi-natural woodland in the land required for construction of the AP2 revised scheme has been additionally ground truthed. It is present in two locations. The first is on the west bank of the River Bollin, north of the access road to Coppice Farm, due south of Ashley Heath. This woodland contains frequent beech, sycamore (*Acer pseudoplatanus*) and ash; and occasional pedunculate oak, hornbeam (*Carpinus betulus*), hazel and elm. The woodland understory has frequent bramble and occasional holly and hawthorn. The woodland is not ancient woodland but qualifies as lowland mixed deciduous woodland HoPI. The second area of broadleaved semi-natural woodland is narrow and linear and is south-west of Millington Hall, along Agden Brook. It is dominated by hawthorn, with frequent pedunculate oak and occasional sycamore, hazel and bramble. The ground flora includes abundant common nettle, cleavers (*Galium aparine*) and bluebell (*Hyacinthoides non-scripta*). This second woodland is not ancient woodland, but it qualifies as lowland mixed deciduous woodland HoPI.

Scrub

2.4.47 Three areas of scrub were ground truthed within the land required for construction of the AP2 revised scheme, the first is south of the A538 Hale Road, west of its junction with the M56, the second is south-west of Manchester Airport, between Pepper Street and the Mid Cheshire railway and the third is between Boothbank Lane and Millington Lane. Approximately 0.04ha is in the land required for construction of the AP2 revised scheme. No description of the first area of scrub is available, the second is described as containing dense and continuous scrub with willow sp. and bramble. It is likely that the scrub represents scrubbed up pond, there is a swampy understory dominated by rushes (*Juncus* sp.). This habitat does not qualify as a HoPI. The third pond is dominated by willow species fringed by bracken (*Pteridium* sp).

Hedgerows

2.4.48 Hedgerows that comprise 80% native woody species qualify as a HoPI. Details of additionally ground truthed hedgerows that are 'important', and which are located within the land required for the AP2 revised scheme are provided in Section 3.

2.4.49 The following hedgerow types were additionally ground truthed in the land required for the AP2 revised scheme in the Agden to Hulseheath area: 357m of species-poor, intact hedgerow; 59m of species-rich hedgerow with trees; 1.5m of species-poor hedgerow with trees. These hedgerows are clustered in three locations: between Pepper Street and the Mid Cheshire railway; in farmland near Brickhill Lane; and in farmland near Sandbank Lane. The typical composition for one of these hedgerows comprises dominant hawthorn with occasional pedunculate oak and holly with mature sycamore. The species-rich hedge has abundant hawthorn and blackthorn, occasional hazel, English elm, pedunculate oak and dogwood and is parallel to the Mid Cheshire railway.

Parkland and scattered trees

2.4.50 No parkland and scattered tree habitat was identified through additional surveys within the land required for construction of the original scheme or the AP2 revised scheme.

Grassland and marsh

2.4.51 Three grassland types were additionally ground truthed in the land required for construction of the AP2 revised scheme. Firstly, approximately 0.35ha of improved grassland is present in four places: surrounding the scrub reported early for this area; a field north of Hasty Lane, west of the M56 Motorway; west of Castle Mill Lane and a field between Sunbank Lane and the M56 and a field east of Pepper Street. These improved grasslands typically contain abundant perennial rye-grass, Yorkshire fog and cock's-foot with frequent creeping buttercup and ribwort plantain (*Plantago lanceolata*). Secondly, approximately 0.37ha of poor

semi-improved grassland is present. This is present west of the junction between Brickhill Lane and Back Lane, south of Chapel House Farm and between Boothbank Lane and Millington Lane. It contains locally dominant perennial rye-grass; occasional cock's-foot, meadow foxtail (*Alopecurus pratensis*), Yorkshire fog; and rarely recorded, sweet vernal-grass, common mouse-ear, common daisy, white clover and meadow buttercup (*Ranunculus acris*). Neither grassland qualifies as a HoPI. There are three areas of neutral semi-improved grassland (approximately 6.7ha) located east of Wood Lane and north of Sugar Brook.

Watercourses

2.4.52 No new watercourses were identified within the land required for the construction of the original scheme or the AP2 revised scheme.

Water bodies

2.4.53 In total, there are 60 water bodies within the land required for the construction of the AP2 revised scheme.

2.4.54 One area of standing water habitat was additionally ground truthed in the land required for the construction of the AP2 revised scheme totalling approximately 0.02ha. It is located west of junction 6 of the M56. No submerged or emergent vegetation were noted. It has turbid water and muddy shallow banks.

Arable and cultivated land

2.4.55 Approximately 0.28ha of additional arable and cultivated land has been identified within the land required for the construction of the AP2 revised scheme. It is in a range of locations including south of Chapel House Farm, near to grassland described already in this area; near Millington; and adjacent to the scrub described already for this area. It was mainly bread wheat.

Buildings and structures

2.4.56 Several additional areas of buildings and structures were additionally identified in the land required for construction of the AP2 revised scheme. They are south-west of Fairfield Care.

Updated summary of habitat types within the Hulseheath to Manchester Airport area (MA06)

2.4.57 Table 4 provides a summary of the habitat types within the land required for the construction of the AP2 revised scheme in MA06.

Table 4: Habitat types within the land required for the AP2 revised scheme within MA06

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Broadleaved woodland – semi-natural	4.2	26.7	Y	Y
Broadleaved woodland – plantation	2.4	1.7	Y	Y
Coniferous woodland – plantation	0.5	-	Y	N
Mixed woodland – semi-natural	-	<0.1	Y	N
Mixed woodland – plantation	0.8	4.3	Y	Y
Scrub – dense/continuous	2.7	9.3	Y	Y
Scrub – scattered	0.6	-	Y	N
Hedgerows – intact, native species-rich	0.7	44.2	Y	Y
Hedgerows – intact hedge, native species-poor	12.1	-	Y	Y
Hedgerows – defunct, native species-rich	0.3	-	Y	Y
Hedgerows – defunct, native species-poor	0.3	-	Y	Y
Hedge and trees – species-rich	2.7	-	Y	Y
Hedge and trees – species-poor	4.2	-	Y	Y
Broadleaved parkland/scattered trees	0.7	1.1	Y	Y
Mixed parkland/scattered trees	0.1	<0.1	Y	Y
Acid grassland – unimproved	<0.1	-	Y	N
Neutral grassland – unimproved	-	8.4	Y	N

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Neutral grassland – semi-improved	26.4	-	Y	Y
Improved grassland	64.9	3.8	Y	Y
Marsh/marshy grassland	0.9	-	Y	N
Poor semi-improved grassland	46.0	80.5	Y	Y
Bracken – continuous	0.2	-	Y	N
Bracken – scattered	<0.1	-	Y	N
Other tall herb and fern – ruderal	6.3		Y	N
Other tall herb and fern – non ruderal	0.1	-	Y	N
Marginal and inundation – inundation vegetation	0.2	-	Y	N
Standing water	1.1	0.9	Y	Y
Standing water – eutrophic	<0.1	-	Y	N
Standing water – mesotrophic	<0.1	-	Y	N
Running water	0.9	2.5	Y	N
Running water – eutrophic	<0.1	-	Y	N
Running water – mesotrophic	<0.1	-	Y	N
Cultivated/disturbed land – arable	65.8	137.9	Y	Y
Cultivated/disturbed land – amenity grassland	2.7	6.8	Y	Y
Cultivated/disturbed land – ephemeral/short perennial	0.2	-	Y	N
Introduced shrub	0.2	-	Y	N
Buildings	0.4	2.1	Y	Y
Bare ground	1.4	2.1	Y	Y
Other habitat	7.6	52.8	Y	Y

Davenport Green to Ardwick (MA07)

Introduction

2.4.58 Approximately 25.8% of the area of land required for the construction of the AP2 revised scheme has been subject to Phase 1 Habitat Survey in MA07 by the end of June 2022.

2.4.59 Descriptions of the habitat types that have been subject to Phase 1 Habitat Survey, to verify the assumed baseline reported in the main BID report, Ecological baseline data – Phase 1 habitat survey (BID EC-002-00001), which accompanied the main ES, are provided below.

2.4.60 Running water was the only habitat that was additionally ground truthed in the land required for construction of the AP2 revised scheme.

Watercourses

2.4.61 A tributary of the River Mersey, east of Palatine Road was additionally ground truthed within the land required for the construction of the AP2 revised scheme. The watercourse was recorded as having occasional stands of pendulous sedge.

Water bodies

2.4.62 No new standing water habitat was identified within the land required for the construction of the AP2 revised scheme. In total, there is 1 water body within the land required for the construction of the AP2 revised scheme.

Updated summary of habitat types within the Davenport Green to Ardwick area (MA07)

2.4.63 Table 5 provides a summary of the habitat types within the land required for the construction of the AP2 revised scheme in MA07.

Table 5: Habitat types within the land required for the AP2 revised scheme within MA07

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Broadleaved woodland – semi-natural	0.8	2.6	Y	Y
Broadleaved woodland – plantation	-	0.5	Y	Y
Coniferous woodland –	-	0.3	Y	N

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
plantation				
Mixed woodland – semi-natural	-	0.5		Y
Mixed woodland – plantation	-	<0.1	Y	N
Scrub – dense/continuous	1.1	3.0	Y	N
Scrub – scattered	0.3	-	Y	N
Hedgerows – intact, native species-rich	-	<0.1	Y	N
Hedgerows – intact hedge, native species-poor	<0.1	-	Y	N
Broadleaved parkland/scattered trees	0.1	<0.1	Y	N
Neutral grassland – unimproved	0.2	-	Y	N
Neutral grassland – semi-improved	0.7	0.4	Y	N
Improved grassland	-	<0.1	Y	Y
Marsh/marshy grassland	0.9	-		N
Poor semi-improved grassland	1.5	4.4	Y	Y
Other tall herb and fern – ruderal	0.8	-	Y	N
Swamp	<0.1	-		
Standing water	-	<0.1	Y	N
Running water	-	<0.1	Y	N
Cultivated/disturbed land – arable	-	0.1	Y	N
Cultivated/disturbed land – amenity grassland	-	1.8	Y	Y
Cultivated/disturbed land – ephemeral/short perennial	<0.1	0.9	Y	Y
Introduced shrub	-	-	Y	N
Buildings	1.3	2.9	Y	N

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Bare ground	1.1	<0.1	Y	Y
Other habitat	5.8	24.4	Y	Y

Manchester Piccadilly Station (MA08)

Introduction

2.4.64 Approximately 13.0% of the area of land required for the construction of the AP2 revised scheme has been subject to Phase 1 Habitat Survey in MA08 by the end of June 2022.

2.4.65 Descriptions of the habitat types that have been subject to Phase 1 Habitat Survey, to verify the assumed baseline reported in the main BID report, Ecological baseline data – Phase 1 habitat survey (BID EC-002-00001), which accompanied the main ES, are provided below.

2.4.66 No additional habitats were ground truthed in the land required for construction of the AP2 revised scheme.

Updated summary of habitat types within the Manchester Piccadilly Station (MA08)

2.4.67 Table 6 provides a summary of the habitat types within the land required for the construction of the AP2 revised scheme in MA08.

Table 6: Habitat types within the land required for the AP2 revised scheme within MA08

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Broadleaved woodland – semi-natural	0.1	<0.1	Y	Y
Broadleaved woodland – plantation	-	0.7	Y	Y
Scrub – dense/continuous	<0.1	0.3	Y	Y
Broadleaved parkland/scattered trees	-	<0.1	Y	N
Neutral grassland – semi-improved	<0.1	-	Y	N
Acid grassland –	-	-	Y	N

Habitat type	Surveyed area (ha)/length (km) verified during additional surveys	Un-surveyed area (ha)/length (km) interpreted from aerial imagery	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
semi-improved				
Improved grassland	<0.1		Y	N
Poor semi-improved grassland	-	0.4	Y	N
Other tall herb and fern – ruderal	<0.1	-	Y	N
Running water	-	0.2	Y	N
Running water – mesotrophic	<0.1	-	Y	N
Cultivated/disturbed land – amenity grassland	<0.1	2.8	Y	N
Introduced shrub	<0.1	-	Y	N
Buildings	3.5	3.4	Y	N
Bare ground	0.1	-	Y	N
Other habitat	2.0	30.0	Y	N

3 Hedgerows

3.1 Introduction

3.1.1 This section sets out ecological baseline data relating to hedgerows not reported in the main BID document that accompanied the main ES, or the BID report that accompanied the SES1 and AP1 ES. It should be read in conjunction with main BID report, Ecology baseline data – hedgerows (see main BID EC-005-00001), and BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES.

3.2 Methodology

3.2.1 Details of the standard methodology utilised for hedgerow surveys are provided in the Technical note – Ecology and biodiversity – Ecological field survey methods and standards, which is included within the SMR which accompanied the main ES.

3.2.2 In 2020, HS2 Ltd agreed revised field survey areas for hedgerow survey with Natural England. These revisions were made in response to stabilisation of boundary of the land required for construction of the original scheme and a reduced need to survey land away from it to understand likely impacts. The survey area for hedgerow survey was reduced from the 100m buffer zone to the land required for construction of the original scheme / AP2 revised scheme.

3.2.3 The desk study and surveys reported in the main ES can be found in BID EC-005-00001, which accompanied the main ES and BID EC-017-00000 SES1 and AP1 ES which accompanied SES1 and AP1 ES.

3.2.4 This section contains the outcomes of hedgerow surveys undertaken between:

- August 2021 and June 2022 inclusive for MA01, MA02 and MA03 which were completed since publication of BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES; and
- February 2021 and June 2022 inclusive for MA06, MA07 and MA08 which were completed since publication of the main BID report, Ecological baseline data – hedgerows (see main BID EC-005-00001), which accompanied the main ES.

3.2.5 Sites for hedgerow survey were identified as those that are within the land required for the original scheme or the AP2 revised scheme.

3.3 Deviations, constraints and limitations

3.3.1 All hedgerows within the land required for the AP2 revised scheme were identified from aerial photography and were then scoped and surveyed in the field.

3.3.2 Hedgerow surveys can be undertaken at any time of year, but the optimal period is April to October (Department for Environment, Food and Rural Affairs (Defra), 2007)[8]. The hedgerow surveys were conducted in the optimal hedgerow survey period as outlined the FSMS, between April and October of each year.

3.4 Baseline

3.4.1 Eight new important hedgerows were identified as a result of surveys between April 2021 and June 2022.

Hough to Walley's Green (MA01)

3.4.2 Within MA01, a total of 28 hedgerows with a combined length of approximately 4.18km were additionally surveyed to determine whether they meet the Wildlife and Landscape criteria to be considered an 'important' hedgerow under the Hedgerow Regulations 1997. Of those, four qualify as important hedgerows, with a total length of approximately 613m, of which 385m is within the land required for the construction of the AP2 revised scheme and is detailed in Table 7.

3.4.3 One important hedgerow qualifies under criterion six (contains at least five woody species and at least four of the features specified under criterion four). The additional features were that there were no gaps greater than 10% within the hedgerow, more than one mature tree for every 50m of the hedgerow, a bank or wall which supports the hedgerow along at least half of its length, as well as connections scoring 4 points or more. A connection with another hedgerow scores one point and a connection with a pond or a woodland in which the majority of trees are broad-leaved trees scores two points.

3.4.4 Three important hedgerows qualify under criterion seven, which is that the hedgerow is adjacent to a bridleway or footpath, a road used as a public path, or a byway open to all traffic and, that it includes at least four woody species and a least two of the specified features, the additional features were that there were no gaps greater than 10% within the hedgerow, more than one mature tree for every 50m of the hedgerow, as well as, the presence of a ditch along at least half of the hedgerow.

3.4.5 Typical species recorded within important hedgerows in MA01 include alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*), blackthorn (*Prunus spinosa*), elm (*Ulmus species*), hawthorn (*Crataegus monogyna*), hazel (*Corylus avellana*), pedunculate oak (*Quercus robur*) and rose (*Rosa* species).

[8] Department for Environment, Food and Rural Affairs (2007), *Hedgerow Survey Handbook: A standard procedure for local surveys in the UK*, 2nd edition, Defra, London.

3.4.6 No designated sites for which hedgerows are the primary feature of interest were identified within MA01.

Wimboldsley to Lostock Gralam (MA02)

3.4.7 Within MA02, a total of 53 hedgerows with a combined length of approximately 11.3km were additionally surveyed to determine whether they meet the Wildlife and Landscape criteria to be considered an 'important' hedgerow under the Hedgerow Regulations 1997. Of those, one qualifies as an important hedgerow. It has a total length of approximately 90m, all of which is within the land required for the construction of the AP2 revised scheme (Table 7).

3.4.8 The important hedgerow qualifies under criterion six (contains at least five woody species and at least four of the features specified under criterion four). The additional features were that there were no gaps greater than 10% within the hedgerow; there is more than one mature tree for every 50m of the hedgerow; there is a ditch along at least half of the hedgerow and a parallel hedge present within 15m.

3.4.9 Species recorded within important hedgerows in MA02 include blackthorn, hawthorn, hazel, holly (*Ilex aquifolium*) and pedunculate oak.

3.4.10 No designated sites for which hedgerows are the primary feature of interest were identified within MA02.

Pickmere to Agden and Hulseheath (MA03)

3.4.11 Within MA03, a total of 54 hedgerows with a combined length of approximately 8.51km were additionally surveyed to determine whether they meet the Wildlife and Landscape criteria to be considered an 'important' hedgerow under the Hedgerow Regulations 1997. Of those, two qualify as important hedgerows. They have a total length of approximately 361m, of which 61m is within the land required for the construction of the AP2 revised scheme (Table 7).

3.4.12 Both important hedgerows qualify under criterion seven, which is that the hedgerow is adjacent to a bridleway or footpath, a road used as a public path, or a byway open to all traffic and, that it includes at least four woody species and a least two of the specified features. The additional features were that there were no gaps greater than 10% within the hedgerow, more than one mature tree for every 50m of the hedgerow, as well as a parallel hedge within 15m of the hedgerow.

3.4.13 Species recorded within important hedgerows in MA03 include crab apple (*Malus sylvestris*), elder, elm species, hawthorn, hazel, holly, pedunculate oak, rose species and wild privet (*Ligustrum vulgare*).

3.4.14 No designated sites for which hedgerows are the primary feature of interest were identified within MA03.

Hulseheath to Manchester Airport (MA06)

3.4.15 Within MA06, a total of 21 hedgerows with a combined length of approximately 3.11km were additionally surveyed to determine whether they meet the Wildlife and Landscape criteria to be considered an 'important' hedgerow under the Hedgerow Regulations 1997. Of those, one qualifies as an important hedgerow within the AP2 revised scheme. The hedgerow has a total length of approximately 208m, of which 184m is within the land required for the construction of the AP2 revised scheme and is detailed in Table 7.

3.4.16 The single important hedgerow qualifies under criterion seven, which is that the hedgerow is adjacent to a bridleway or footpath, a road used as a public path, or a byway open to all traffic; and that it includes at least four woody species and five additional features. The additional features were that there were no gaps greater than 10% within the hedgerow, more than one mature tree for every 50m of the hedgerow, at least three Schedule 2 species within one metre, in any direction, of the outermost edges of the hedgerow, as well as the presence of a ditch along at least half of the hedgerow and a parallel hedge present within 15m.

3.4.17 Species recorded within the important hedgerow in MA06 include ash, gorse, hawthorn, hazel and holly and rose species.

3.4.18 No designated sites for which hedgerows are the primary feature of interest were identified within MA06.

Davenport Green to Ardwick (MA07)

3.4.19 Within MA07, no additional hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an ‘important’ hedgerow under the Hedgerow Regulations.

Manchester Piccadilly Station (MA08)

3.4.20 Within MA08, no additional hedgerows were surveyed to determine whether they meet the wildlife and landscape criteria to be considered an ‘important’ hedgerow under the Hedgerow Regulations.

Table 7: Summary of hedgerows qualifying as 'important' within MA01 to MA08

Ecology survey code	Centroid OS (Ordinance Survey) grid reference	Survey date	Qualifying criteria 1	Qualifying criteria 2	Qualifying criteria 3	Qualifying criteria 4	Qualifying criteria 5	Qualifying criteria 6	Qualifying criteria 7	CA	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
CH588855_CH616525_L5490_HS1_F006_290622	SJ6928959412	29 June 2022	No	No	No	No	No	Yes	No	MA01	Y	N
CH588855_CH616525_L5490_HS1_F010_280622	SJ6938258952	28 June 2022	No	No	No	No	No	No	Yes	MA01	Y	N
CH331776-CH416832-CH428473-CH433056-CH441867-CH520637-CH589153-CH589154-CH594743-CH595526_L12133_HS1_F006_070921	SJ6948860108	07 September 2021	No	No	No	No	No	No	Yes	MA01	Y	N
CH331776-CH416832-CH428473-CH433056-CH441867-CH520637-CH589153-	SJ6962060813	07 September 2021	No	No	No	No	No	No	Yes	MA01	Y	N

Ecology survey code	Centroid OS (Ordinance Survey) grid reference	Survey date	Qualifying criteria 1	Qualifying criteria 2	Qualifying criteria 3	Qualifying criteria 4	Qualifying criteria 5	Qualifying criteria 6	Qualifying criteria 7	CA	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
CH589154-CH594743-CH595526_L12133_HS1_F002_070921												
CH372922_L5094_HS1_F001_110821	SJ6810765082	11 August 2021	No	No	No	No	No	Yes	No	MA02	Y	N
CH561651_L5128_HS1_F001_131021	SJ7065078230	13 October 2021	No	No	No	No	No	No	Yes	MA03	Y	N
CH400937_CH560604_U202535_L6244_HS1_F002_220622	SJ7114181740	22 June 2022	No	No	No	No	No	No	Yes	MA03	Y	N
Multiple_L46517_HS1_030621_F001	SJ7838481823	03 June 2021	No	No	No	No	No	No	Yes	MA06	Y	N

Table 8: Key to wildlife and landscape criteria used in Table 7

Criteria	Definition
1	Hedgerow is obviously more than 30 years old.
2	Hedgerow currently supports or has desk study records of species protected in Schedules 1, 5 or 8 of the Wildlife and Countryside Act 1981, or red data book species for which relevant data is available.
3	Hedgerow contains at least seven woody species (from schedule 3).
4	Hedgerow contains at least six woody species (from schedule 3) and at least three of the following features identified in Schedule 1 Part II paragraph 7 sub-paragraph 4 of the Hedgerow Regulations 1997, which are: • a bank or wall which supports the hedgerow along at least one half of its length; • gaps which in aggregate do not exceed 10% of the length of the hedgerow; • where the length of the hedgerow does not exceed 50m, at least one standard tree; • where the length of the hedgerow exceeds 50m but does not exceed 100m, at least two standard trees; • where the length of the hedgerow exceeds 100m such number of standard trees (within any part of its length) as would when averaged over its total length amount to at least one for each 50m; • at least three woodland species within 1m, in any direction, of the outermost edges of the hedgerow; • a ditch along at least one half of the length of the hedgerow; • connections scoring four points or more – connection with another hedgerow scores one point and a connection with a pond or a woodland in which the majority of trees are broad-leaved trees scores two points; and a hedgerow is connected with something not only if it meets it but also if it has a point within 10m of it and would meet it if the line of the hedgerow continued; and • a parallel hedge within 15m of the hedgerow.
5	Hedgerow contains at least six woody species (from Schedule 3), including one of the following: • black-poplar tree (*Populus nigra ssp betulifolia*); • large-leaved lime (*Tilia platyphyllos*); • small-leaved lime (*Tilia cordata*); and • wild service-tree (*Sorbus torminalis*);
6	Hedgerow containing at least five woody species and at least four of the features specified under criteria 3.
7	Hedgerow is adjacent to a bridleway or footpath, a road used as a public path, a byway open to all traffic and includes at least four woody species and a least two of the features specified under criteria 3.

4 Protected and Notable Flora

4.1 Introduction

4.1.1 This section sets out ecological baseline data relating to protected and notable flora not reported in the main BID report, or the BID report that accompanied the SES1 and AP1 ES. It should be read in conjunction with main BID report, Ecological baseline data – protected and notable flora (see main BID EC-003-00001), which accompanied the main ES, and BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES.

4.1.2 Targeted habitat surveys have been completed at Oak Mere SSSI, Rixton Clay Pits SSSI and Oakhanger Moss SSSI to record data relevant specifically to the assessment of potential significant effects upon these sites resulting from the AP2 revised scheme. These surveys fall outwith the standard survey scope and are therefore cross referenced in relevant Designated Sites Assessment reports and not reproduced here.

4.2 Methodology

4.2.1 The method used to review protected and notable flora species records arising from desk study and field survey sources may be found in BID EC-003-00001, which accompanied the main ES. This section contains protected and notable flora species records identified between:

- August 2021 and June 2022 inclusive for MA01, MA02 and MA03 since publication of BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES; and
- February 2021 and June 2022 inclusive for MA06, MA07 and MA08 since publication of the main BID report, Ecological baseline data – protected and notable flora (see main BID EC-003-00001), which accompanied the main ES.

4.2.2 Data includes new records resulting from surveys undertaken since production of the above reports, including those relevant to additional land required for the construction of the AP2 revised scheme.

4.3 Deviations, constraints and limitations

4.3.1 Deviations, constraints and limitations are as reported in BID EC-003-00001, which accompanied the main ES.

4.4 Baseline

4.4.1 The study has focussed on any protected and/or notable flora located within 100m of the land required for the AP2 revised scheme or located at greater distance but considered potentially subject to adverse effects.

Desk study

4.4.2 A summary of relevant protected or notable flora recorded during desk studies is provided in Table 9.

Field survey

4.4.3 A summary of relevant protected or notable flora recorded during field surveys is provided in Table 10.

Table 9: Records of protected and notable flora relevant to the assessment obtained during desk study in MA01 to MA03 and MA06 to MA08

Common name	Latin name	Status[9]	Location	Ordnance Survey (OS) grid reference	Distance (m)	CA	Within the land required for the SES2/AP2 revised scheme (Y/N)	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Freiberg's Screw-moss	*Tortula freibergii*	Section 41 NERC Act	Little Bollington	SJ727871	76	MA03	N	Y	N
Freiberg's Screw-moss	*Tortula freibergii*	Section 41 NERC Act	Little Bollington	SJ72728705	16	MA03	N	Y	N
Freiberg's Screw-moss	*Tortula freibergii*	Section 41 NERC Act	Little Bollington	SJ7273587069	Within	MA03	Y	Y	N
Grass vetchling	*Lathyrus nissolia*	Cheshire Rare Plant Register – Locally Rare (Vice County 58)	Birkin Brook LWS Local Wildlife Site	SJ7592584205[10]	Within	MA06	Y	Y	Y

[9] Where the status listed is the same in 'A Vascular Plant Red List for England' and 'The Vascular Plant Red Data List for Great Britain', only 'The Vascular Plant Red Data List for Great Britain' has been referenced.

[10] Grid reference relates to the centre of the Local Wildlife Site, a precise location for the grass vetchling record was not given in the site's citation.

Table 10: Records of protected and notable flora relevant to the assessment obtained during field survey in MA01 to MA03 and MA06 to MA08

Common name	Latin name	Status[11]	Location	Ordnance Survey (OS) grid reference	Distance (m)	CA	Within the land required for the SES2/AP2 revised scheme (Y/N)	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Fern-grass	*Catapodium rigidum*	Cheshire Rare Plant Register – Locally Scarce (Vice County 58)	Lostock Lime Beds	SJ688738	100	MA02	N	Y	N
Great fen-sedge	*Cladium mariscus*	Cheshire Rare Plant Register – Locally Scarce (Vice County 58)	Lostock Lime Beds	SJ688738	100	MA02	N	Y	N
Wild strawberry	*Fragaria vesca*	England Red Data List – Near Threatened	Lostock Lime Beds	SJ688738	100	MA02	N	Y	N
Corn marigold	*Glebionis segetum*	England Red Data List – Vulnerable	Lostock Gralam	SJ7020775933	11	MA02	N	Y	N
Wood sorrell	*Oxalis acetosella*	England Red Data List – Near Threatened	High Legh/Peacock Lane	SJ7212284010	0	MA03	Y	Y	Y
Large-leaved lime	*Tilia platyphyllos*	Nationally Scarce	Near Hoo Green Lane	SJ7116982059	68	MA03	N	Y	N
Wood sorrell	Oxalis acetosella	England Red Data List – Near Threatened	South of Hale Barns near the River Bollin	SJ7964284135	36	MA06	N	Y	Y

[11] Where the status listed is the same in 'A Vascular Plant Red List for England' and 'The Vascular Plant Red Data List for Great Britain', only 'The Vascular Plant Red Data List for Great Britain' has been referenced.

Common name	Latin name	Status[11]	Location	Ordnance Survey (OS) grid reference	Distance (m)	CA	Within the land required for the SES2/AP2 revised scheme (Y/N)	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Wood sorrell	Oxalis acetosella	England Red Data List – Near Threatened	South of Hale Barns near the River Bollin	SJ7968084074	39	MA06	N	Y	Y

4.4.4 Bluebell (*Hyacinthoides non-scripta*) was found to be present in the land required for the construction of the AP2 revised scheme in seven locations as follows:

- in two locations, south of Hale Barns near the River Bollin;
- three records are from woodland near Millington;
- in woodland on Withington Golf Course; and
- south of Hale Barns, north of the M56 Motorway.

4.5 Discussion

Wimboldsley to Lostock Gralam (MA02)

4.5.1 There are no additional desk study records for MA02.

4.5.2 There are four additional field survey records of notable plants within 100m of the land required for construction of the AP2 revised scheme for MA02; they are: fern-grass (*Catapodium rigidum*) and great fen-sedge (*Cladium mariscus*), both of which are Locally Scarce in Cheshire; wild strawberry (*Fragaria vesca*) which is Near Threatened; and, corn marigold (*Glebionis segetum*) which is Vulnerable on the England Red Data List. All of these records were from the vicinity of Loslock Gralam.

4.5.3 No new notable flora records were confirmed in the citations for LWS in or within 100m of the land required for construction of the original scheme or the AP2 revised scheme in MA02.

4.5.4 No new records of ancient or veteran trees are present in the land required for construction of the original scheme or the AP2 revised scheme in MA02.

Pickmere to Agden and Hulseheath (MA03)

4.5.5 The desk study identified a single record within the land required for construction of the AP2 revised scheme in MA03. Freiberg's screw-moss (*Tortula freibergii*) is listed on Section 41 of the Natural Environment and Rural Communities Act and is present at Little Bollington.

4.5.6 The desk study identified two records within 100m of the land required for construction of the AP2 revised scheme in MA03. Both records are of Freiberg's screw-moss which is listed on Section 41 of the Natural Environment and Rural Communities Act, and both records are near to Little Bollington.

4.5.7 Field surveys identified a single record of large-leaved lime (*Tilia platyphyllos*) within 100m of the land required for construction of the AP2 revised scheme in MA03. Large-leaved lime is Nationally Scarce but the specimen recorded is likely to be planted in Cheshire and not of natural origin. A single record of wood sorrell (*Oxalis acetosella*) is present near High

Legh/Peacock Lane, within 100m of the land required for construction of the AP2 revised scheme. Wood sorrel is Near Threatened on the England Red Data List.

4.5.8 No new notable flora records were confirmed in the citations for LWS in or within 100m of the land required for construction of the original scheme or the AP2 revised scheme in MA03.

4.5.9 Two new records of veteran pedunculate oak (*Quercus robur*) are present within 100m of land required for construction of the AP2 revised scheme in MA03, both are in the same location south of Chapel Lane, west of the A556 Chester Road.

Hulseheath to Manchester Airport (MA06)

4.5.10 A single additional desk study record was identified from MA06. Grass vetchling is in the Ashley Brickworks LWS, within 100m of the land required for construction of the AP2 revised scheme. This species is Locally Rare in the Cheshire VC58 Rare Plant Register[12].

4.5.11 Two new notable flora records were identified through field survey in MA06, both are records of wood sorrel and are from land south of Hale Barns near the River Bollin, within 100m of the AP2 revised scheme. Wood sorrel is Near Threatened on the England Red Data List.

4.5.12 A single additional desk study record of grass vetchling was confirmed in Ashley Brickworks LWS this is already described.

4.5.13 No new records of ancient or veteran trees are present in the land required for construction of the original scheme or the AP2 revised scheme.

[12] Botanical Society of Britain and Ireland, Cheshire VC58 County Rare Plant Register (2015). Available online at: https://bsbi.org/cheshire.

5 National Vegetation Classification (NVC) and ancient woodland

5.1 Introduction

5.1.1 This section sets out ecological baseline data relating to National Vegetation Classification (NVC) and ancient woodland surveys not reported in the main BID report, or the BID report that accompanied the SES1 and AP1 ES. It should be read in conjunction with main BID report, Ecological baseline data – National Vegetation Classification (see main BID EC-004-00000), which accompanied the main ES, and BID report, Ecological baseline data – national vegetation classification (see BID EC-004-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES.

5.1.2 Targeted habitat surveys have also been completed at Oak Mere SSSI, Rixton Clay Pits SSSI and Oakhanger Moss SSSI to record data relevant specifically to the assessment of potential significant effects upon these sites resulting from the AP2 revised scheme. These surveys fall outwith the standard NVC survey scope and are therefore cross referenced in relevant Designated Sites Assessment reports and not reproduced here.

5.2 Methodology

5.2.1 The method used to undertake NVC surveys may be found in BID EC-004-00000, which accompanied the main ES. This section contains the outcomes of NVC surveys undertaken between:

- August 2021 and June 2022 inclusive for MA01, MA02 and MA03 which were completed since publication of BID report, Ecological baseline data – national vegetation classification (see BID EC-004-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES; and
- February 2021 and June 2022 inclusive for MA06, MA07 and MA08 which were completed since publication of the main BID report, Ecological baseline data – National Vegetation Classification and ancient woodland (see main BID EC-004-00000), which accompanied the main ES.

5.2.2 A total of eight stands of vegetation were subject to NVC survey within MA01 – MA03 and MA06, as listed in Table 11. The NVC survey stand locations are indicated in the BID, Ecology and biodiversity Map Book: Map Series EC-10 which accompanies SES2 and AP2 ES.

Table 11: Summary of additional NVC surveys undertaken within MA01 – MA06

Ecology survey code	NVC survey stand name	Location	Ordnance Survey (OS) grid reference	Habitat types included in survey	Survey date	CA	Approximate distance from the land required for the AP2 revised scheme (m)	Relevant to SES2 scheme (Y/N)	Relevant to the AP2 revised scheme (Y/N)
CH135902-CH370051-CH152907_L16063-L15942_F001_PH2_150622	Mossbridge Marsh F001	Coppenhall Moss	SJ 70307 58642	Semi-improved grassland	15 June 2022	MA01	Within	Y	N
CH135902-CH370051-CH152907_L16063-L15942_F002_PH2_150622	Mossbridge Marsh F002	Coppenhall Moss	SJ 70326 58624	Semi-improved grassland	15 June 2022	MA01	Within	Y	N
CH539027-CH616525-CH94439_L4910_PH2_160622	Moss Lane Meadow	North of Leighton	SJ 69257 58829	Neutral grassland	9 June 2022	MA01	80	Y	N
CH332601-CH345680-CH502714-CH611619-CH345680-CH502714-CH506149-CH611619_L11044-L17926_F001_PH2_160622	Rudheath Lane Limebeds F001	Rudheath	SJ 68882 73832	Sparsely vegetated/ grassland	16 June 2022	MA02	100	Y	N
CH332601-CH345680-CH502714-CH611619-CH345680-CH502714-CH506149-CH611619_L11044-L17926_F002_PH2_160622	Rudheath Lane Limebeds F002	Rudheath	SJ 68705 74061	Sparsely vegetated/ grassland	16 June 2022	MA02	100	Y	N
CH540633-CH542392-CH603600-	Mill Wood & Castle Wood	Near Thorns Green	SJ 79574 84057	Deciduous Woodland	19 May 2022	MA06	Within	Y	Y

Ecology survey code	NVC survey stand name	Location	Ordnance Survey (OS) grid reference	Habitat types included in survey	Survey date	CA	Approximate distance from the land required for the AP2 revised scheme (m)	Relevant to SES2 scheme (Y/N)	Relevant to the AP2 revised scheme (Y/N)
CH626787_L5218_F001_PH2_190522	F001								
CH540633-CH542392-CH603600-CH626787_L5218_F002_PH2_190522	Mill Wood & Castle Wood F002	Near Thorns Green	SJ 79794 83927	Deciduous Woodland	19 May 2022	MA06	Within	Y	Y
CH325341_L4397_PH2_160522	Rushy Pits Covert	Near Arthill	SJ 73047 85058	Deciduous Woodland	16 May 2022	MA06	Adjacent	Y	N

5.2.3 NVC survey stands which are Ancient Woodland Inventory (AWI) sites[13] or ancient woodland were subject to a search for vascular plant species that are typically more prevalent in ancient[14] rather than secondary woodlands[15,16]. In particular, the survey involved a search for those ancient woodland plant indicator species that exhibit strong affinity to such sites on the basis of the list compiled by Rose (1999)[17] in consultation with other professional botanists. A total of three stands were surveyed for ancient woodland plant indicator species within MA01 – MA03 and MA06, as described in Table 12.

[13] Sites identified on Natural England's Ancient Woodland Inventory. Available online at: https://naturalengland-defra.opendata.arcgis.com/.

[14] Ancient woodland sites are those that have had continuity of woodland cover since at least AD 1600.

[15] Peterken, G.F. (1974), *A method for assessing woodland flora for conservation for using Indicator Species.* Biological Conservation, 6, P239-245.

[16] Thompson, R.J., Butcher, W.G., Williams, P. & Warren, M. (2003), *The use of vascular plants as indicators of ancient woodland in Somerset: The development of a county specific list*, Somerset Archaeology and Natural History.

[17] Rose, F. (1999), *Indicators of ancient woodland: The use of vascular plants in evaluating ancient woods for nature conservation*, British Wildlife, 10(4), P241-251.

Table 12: Summary of ancient woodland plant indicator species surveys undertaken within MA01 – MA06

Ecology survey code	Survey stand name	Location	OS grid reference	Habitat types included in survey	Survey date	CA	Approximate distance from the land required for the AP2 revised scheme (m)	Relevant to SES1 scheme (Y/N)	Relevant to AP2 revised scheme (Y/N)
CH540633-CH542392-CH603600-CH626787_L5218_F001_PH2_190522	Mill Wood & Castle Wood F001	Near Thorns Green	SJ7957484057	Lowland mixed deciduous woodland	19 May 2022	MA06	Within	Y	Y
CH540633-CH542392-CH603600-CH626787_L5218_F002_PH2_190522	Mill Wood & Castle Wood F002	Near Thorns Green	SJ7979483927	Lowland mixed deciduous woodland	19 May 2022	MA06	Within	Y	Y
CH325341_L4397_PH2_160522	Rushy Pits Covert	Near Arthill	SJ7304785058	Lowland mixed deciduous woodland	16 May 2022	MA06	Adjacent	Y	N

5.3 Deviations, constraints and limitations

5.3.1 Deviations, constraints and limitations are as reported in BID EC-004-00000, which accompanied the main ES.

5.4 Baseline

5.4.1 This section sets out ecological baseline data relating to additional habitats where NVC and ancient woodland survey is merited that are located within or adjacent to the land required for the AP2 revised scheme or located at greater distance but considered potentially subject to adverse effects. It should be read in conjunction with main BID report, Ecological baseline data – National Vegetation Classification and ancient woodland (see BID EC-004-00000), which accompanied the main ES and BID report, Ecological baseline data – NVC and ancient woodland (see BID EC-004-00000), which accompanied SES1 and AP1 ES.

Hough to Walley's Green (MA01)

Mossbridge Marsh (CH135902-CH370051-CH152907_L16063-L15942_F001_PH2_150622)

Site description and reasons for selection for survey

5.4.2 Semi-improved grassland adjacent to Mossbridge Marsh Local Wildlife Site (LWS).

Vegetation communities present

5.4.3 Yorkshire fog (*Holcus Lanatus*) and crested dog's-tail (*Cynosurus cristatus*) were frequent with occasional soft rush (*Juncus effusus*). The field was being grazed by cattle during the survey with some patches grazed short. There was no evidence of serious damage caused through poaching. The site is directly to the east of Mossbridge Marsh LWS, separated by an overgrown public footpath. The habitat is attributed to MG10a *Holcus lananatus-Juncus effusus* grassland typical sub-community. The TABLEFIT 'goodness of fit' result was 80% in support of NVC community MG10a.

5.4.4 Table 13 sets out the NVC survey data from Mossbridge Marsh LWS F001.

Table 13: NVC survey data from Mossbridge Marsh (CH135902-CH370051-CH152907_L16063-L15942_F001_PH2_150622)

Species	Quadrat locations					Constancy (Domin range)[18]
	Q1	Q2	Q3	Q4	Q5	
Ground flora (4m x 4m)						
Ranunculus acris	7	6	8	7	7	V (6-8)
Ranunculus repens	6	6	7	7	6	V (6-7)
Cynosurus cristatus	8	7	8	6	5	V (5-8)
Holcus lanatus	5	6	7	5	7	V (5-7)
Lolium perenne	6	7	6	6	5	V (5-7)
Alopecurus pratensis	4	4	4	5	5	V (4-5)
Anthoxanthum odoratum	3	2	2	2	4	V (2-4)
Poa pratensis	3	2	3	4	3	V (2-4)
Trifolium repens	3	2	3	3	3	V (2-3)
Poa trivialis	2	-	3	3	4	IV (2-4)
Juncus effusus	1	2	-	2	-	III (1-2)
Cerastium fontanum	-	1	2	-	-	II (1-2)
Festuca rubra	-	-	-	-	3	I (3-3)
Rumex crispus	-	-	-	-	2	I (2-2)
Schedonorus pratensis	-	-	-	-	2	I (2-2)
Cirsium arvense	-	-	2	-	-	I (2-2)
Deschampsia cespitosa	-	-	-	2	-	I (2-2)
Cardamine pratensis	1	-	-	-	-	I (1-1)

[18] This column summarises the maximum and minimum Domin abundance score and the number of quadrats in which a sample was present: V = five quadrats; IV = four quadrats; III = three quadrats; II = two quadrats; I = one quadrat. The Domin scale is as follows: 10 = 91–100%; 9 = 76–90%; 8 = 51–75%; 7 = 34–50%; 6 = 26–33%; 5 = 11–25%; 4 = 4–10%; 3 = <4% (many individuals); 2 = <4% (several individuals); 1 = <4% (few individuals).

Mossbridge Marsh (CH135902-CH370051-CH152907_L16063-L15942_F002_PH2_150622)

Site description and reasons for selection for survey

5.4.5 Semi-improved grassland adjacent to Mossbridge Marsh Local Wildlife Site (LWS).

Vegetation communities present

5.4.6 The surveyed stands consisted of rush dominated areas which comprised approximately 20% of the survey area. These were within grass dominated vegetation which was sampled separately (see F001). Soft rush was dominant with frequent Yorkshire fog. This habitat was attributed to MG10a *Holcus lanatus-Juncus effusus* grassland typical sub-community. The TABLEFIT 'goodness of fit' result was 80% with NVC community MG10a.

5.4.7 Table 14 sets out the NVC survey data from Mossbridge Marsh LWS F002.

Table 14: NVC survey data from Mossbridge Marsh (CH135902-CH370051-CH152907_L16063-L15942_F002_PH2_150622)

Species	Quadrat locations					Constancy (Domin range)[18]
	Q1	Q2	Q3	Q4	Q5	
Ground flora (4m x 4m)						
Juncus effusus	10	9	8	8	10	V (8-10)
Holcus lanatus	5	6	5	6	4	V (4-6)
Alopecurus pratensis	5	5	4	5	5	V (4-5)
Ranunculus repens	4	5	6	5	2	V (2-6)
Poa trivialis	4	4	4	3	-	IV (3-4)
Carex hirta	-	4	2	5	-	III (2-5)
Ranunculus acris	2	-	2	-	-	II (2-2)
Deschampsia cespitosa	-	-	-	-	5	I (5-5)
Schedonorus pratensis	3	-	-	-	-	I (3-3)
Cynosurus cristatus	-	-	3	-	-	I (3-3)
Epilobium ciliatum	-	2	-	-	-	I (2-2)
x Schedolium loliaceum	-	-	2	-	-	I (2-2)
Lolium perenne	-	-	-	2	-	I (2-2)

Moss Lane Meadow LWS (CH539027-CH616525-CH94439_L4910_PH2_160622)

Site description and reasons for selection for survey

5.4.8 Neutral grassland which constitutes Moss Lane Meadow (LWS).

Vegetation communities present

5.4.9 The field had been recently mown and perennial ryegrass and Yorkshire fog were frequent with occasional meadow foxtail. Sweet vernal grass (*Anthoxanthum odoratum*) was recorded within one quadrat, diversity of herbs was poor with rare species including dandelion (*Taraxacum officinale agg*.), white clover (*Trifolium repens*), red clover (*Trifolium pratense*) and meadow buttercup (*Ranunculus acris*). This habitat was attributed to MG7d *Lolium perenne* hay-meadow *Alopecurus pratensis* sub-community. The TABLEFIT 'goodness of fit' result was 76% with NVC community MG7d.

5.4.10 Table 15 sets out the NVC survey data from Moss Lane Meadow LWS F001.

Table 15: NVC survey data from Moss Lane Meadow LWS (CH614901_L5388_F001_PH2_090621)

Species	Quadrat locations					Constancy (Domin range) [18]
	Q1	Q2	Q3	Q4	Q5	
Ground flora (4m x 4m)						
Holcus lanatus	8	7	8	8	5	V (5-8)
Lolium perenne	7	5	5	4	5	V (4-7)
Ranunculus repens	7	6	6	5	4	V (4-7)
Alopecurus pratensis	4	6	5	-	6	V (4-6)
Juncus effusus	2	1	2	-	2	IV (1-2)
Agrostis capillaris	-	-	3	4	3	III (3-4)
Ranunculus acris	-	2	-	3	3	III (2-3)
Trifolium repens	-	-	3	2	3	III (2-3)
Taraxacum officinale agg.	-	3	-	-	-	II (3-3)
Rumex obtusifolius	3	2	-	-	-	II (2-3)
Cardamine pratense	-	2	-	3	-	II (2-3)
Dactylis glomerata	2	-	2	-	-	II (2-2)
Rumex crispus	-	-	-	2	2	II (2-2)
Centaurea nigra	-	4	-	-	-	I (4-4)
Cerastium fontanum	-	-	-	-	3	I (3-3)
Rumex acetosa	-	2	-	-	-	I (2-2)
Anthoxanthum odoratum	-	-	2	-	-	I (2-2)
Salix sp. seedlings	1	-	-	7	-	I (1-7)

Species	Quadrat locations					Constancy (Domin range) [18]
	Q1	Q2	Q3	Q4	Q5	
Trifolium pratense	-	-	1	-	-	I (1-1)

Wimboldsley to Lostock Gralam (MA02)

Rudheath Lane Limebeds LWS (CH332601-CH345680-CH502714-CH611619-CH345680-CH502714-CH506149-CH611619_L11044-L17926_F001_PH2_160622)

Site description and reasons for selection for survey

5.4.11 A former industrial site comprising atypical ephemeral/short perennial, calcareous and neutral grassland contained within Rudheath Lane Limebeds LWS.

Vegetation communities present

5.4.12 The area comprised short grassland across flat ground on soft calcareous substrate, from which quadrats were taken. The grassland exhibited many species that were typical of calcareous grassland but with taller, more neutral grassland dominated by red fescue (*Festuca rubra*) and false oat-grass (*Arrhenatherum elatius*) on bunds/slopes surrounding the limebeds. The slopes also supported abundant hedge mustard (*Sisymbrium officinale*) with lesser amounts of weld (*Reseda luteola*). The flat ground showed signs of periodic inundation with frequent pointed spear-moss (*Calliergonella cuspidate*) and creeping bent (Agrostis stolonifera). There were several drainage channels across the land, although all were dry at the time of the survey. A small stand of saw sedge (*Cladium mariscus*), an unusual species for north-west England, was present in the south-east of this stand but was not present in the sampled vegetation. The habitat recorded was a poor fit to any of the semi-natural habitats described by NVC descriptions and was most closely comparable to three open habitat vegetation communities. The TABLEFIT 'goodness of fit' result was 32% with NVC community OV25a *Urtica dioica-Cirsium arvense* open habitat *Holcus lanatus-Poa annua* subcommunity and 28% with both OV28 *Agrostis stolonifera-Ranunculus repens* community and OV19d *Poa annua-Matricaria perforata* open habitat *Chamomilla suavolens-Plantago major* subcommunity.

5.4.13 Table 16 sets out the NVC survey data from Rudheath Lane Limebeds LWS F001.

Table 16: NVC survey data from Rudheath Lane Limebeds LWS (CH332601-CH345680-CH502714-CH611619-CH345680-CH502714-CH506149-CH611619_L11044-L17926_F001_PH2_160622)

Species	Quadrat locations					Constancy (Domin range) [18]
	Q1	Q2	Q3	Q4	Q5	
Ground flora (4m x 4m)						
Agrostis stolonifera	8	8	8	7	8	V (7-8)
Festuca ovina	6	5	6	6	5	V (5-6)
Cirsium arvense	5	4	5	2	3	V (2-5)
Preissia quadrata	-	3	3	4	3	IV (3-4)
Calliergonella cuspidata	5	5	4	2	-	IV (2-5)
Prunella vulgaris	-	3	2	2	5	IV (2-5)
Jacobaea vulgaris	-	3	2	3	2	IV (2-3)
Taraxacum officinale agg.	-	1	5	4	5	IV (1-5)
Centaurium erythraea	-	4	3	-	5	III (3-5)
Fissidens dubius	-	2	-	5	1	III (1-5)
Lysimachia arvensis	-	-	3	-	2	II (2-3)
Bryum sp.	-	1	-	2	-	II (1-2)
Leontodon autumnalis	-	-	-	2	1	II (1-2)
Carex flacca	6	-	-	-	-	I (6-6)
Holcus lanatus	-	2	-	-	-	I (2-2)
Myosotis arvensis	-	2	-	-	-	I (2-2)
Dactylorhiza praetermissa	-	2	-	-	-	I (2-2)
Linum catharticum	-	-	-	-	2	I (2-2)
Cirsium vulgare	-	-	-	-	2	I (2-2)
Galium sp.	-	1	-	-	-	I (1-1)

Rudheath Lane Limebeds LWS (CH332601-CH345680-CH502714-CH611619-CH345680-CH502714-CH506149-CH611619_L11044-L17926_F002_PH2_160622)

Site description and reasons for selection for survey

5.4.14 A former industrial site comprising atypical ephemeral/short perennial, calcareous and neutral grassland contained within Rudheath Lane Limebeds LWS.

Vegetation communities present

5.4.15 Patches of tall ruderal vegetation located within the short grassland described in F001 and differentiated by the presence of frequent hastate orache (*Atriplex prostrata*). The vegetation was a poor fit to any of the semi-natural habitats described by NVC descriptions and was

most closely comparable to three open habitat vegetation communities. The TABLEFIT 'goodness of fit' result was 43% with NVC community OV25 *Urtica dioica-Cirsium arvense* open habitat community and 28% with OV28 *Agrostis stolonifera-Ranunculus repens* community.

5.4.16 Table 17 sets out the NVC survey data from Rudheath Lane Limebeds LWS F002.

Table 17: NVC survey data from Rudheath Lane Limebeds LWS (CH332601-CH345680-CH502714-CH611619-CH345680-CH502714-CH506149-CH611619_L11044-L17926_F002_PH2_160622)

Species	Quadrat locations					Constancy (Domin range) [18]
	Q1	Q2	Q3	Q4	Q5	
Ground flora (4m x 4m)						
Agrostis stolonifera	9	6	8	7	8	V (6-9)
Atriplex prostrata	7	8	7	6	5	V (5-8)
Cirsium arvense	5	4	6	5	4	V (4-6)
Epilobium hirsutum	4	5	3	4	3	V (3-5)
Epilobium ciliatum	4	3	4	5	5	V (1-5)
Sisymbrium officinale	3	4	1	2	1	V (1-4)
Urtica dioica	-	3	4	4	5	IV (3-5)
Ranunculus sceleratus	2	2	-	3	4	IV (2-4)
Salix seedlings	2	-	-	-	-	I (2-2)
Juncus inflexus	-	-	2	-	-	I (2-2)
Persicaria maculosa	-	-	2	-	-	I (2-2)
Spergularia marina	-	-	-	1	-	I (1-1)

Rudheath Lane Limebeds LWS (CH332601-CH345680-CH502714-CH611619-CH345680-CH502714-CH506149-CH611619_L11044-L17926_F003_PH2_160622)

Site description and reasons for selection for survey

5.4.17 A former industrial site comprising atypical ephemeral/short perennial, calcareous and neutral grassland contained within Rudheath Lane Limebeds LWS.

Vegetation communities present

5.4.18 The remainder of the sampled vegetation at Rudheath Lane Limebeds LWS consisted of a mosaic of taller vegetation than F001 and F002. It was not subject to quadrat sampling due to the small-scale mosaic of the vegetation. Tall ruderal and tall grassland species were present along the south-western boundary with the access track which was dominated in patches by nettles, cleavers (*Galium aparine*) and thistles (mostly creeping thistle) but with lesser amounts of spear thistle (*Cirsium vulgare*) and marsh thistle (*Cirsium palustre*). Grasses within this area included Yorkshire-fog, tufted hairgrass (*Deschampsia cespitosa*), tall fescue

(*Festuca arundinacea*), false oat-grass, cock's-foot (*Dactylis glomerata*) and reed canary-grass (*Phalaris arundinacea*). Small patches of Russian comfrey (*Symphytum* × *uplandicum*), hogweed (*Heracleum sphondylium*) and field horsetail (*Equisetum arvense*) were also present. Further north-east, the vegetation changed to species and communities typical of wetter habitats, with some dense patches of hard rush (*Juncus inflexus*) and several large patches of shorter vegetation dominated by creeping bent and marsh foxtail. These areas show a strong affinity to the MG13 *Agrostis stolonifera-Alopecurus geniculatus* grassland community. Also present was a large expanse consisting almost entirely of common spike-rush (*Eleocharis palustris*). This area was assigned to the S19 Eleocharis palustris swamp community. This wetter area also contained water figwort, common fleabane and false fox-sedge. A group of southern marsh orchids was also present, within species-poor red fescue-dominated grassland.

Hulseheath to Manchester Airport (MA06)

Mill Wood & Castle Wood (CH540633-CH542392-CH603600-CH626787_L5218_F001_PH2_190522)

Site description and reasons for selection for survey

5.4.19 The woodland at Mill Wood & Castle Wood LWS is all on Natural England's Priority Habitats Inventory (PHI). Part of the woodland which was previously surveyed is on Natural England's Ancient Woodland Inventory (AWI).

Vegetation communities present

5.4.20 The surveyed habitat was a strip of woodland along a ditch that extended from a larger area of woodland. The canopy included pedunculate oak (*Quercus robur*), sycamore (*Acer pseudoplatanus*), hawthorn (*Crataegus monogyna*) and ash (*Fraxinus excelsior*). Understorey includes hawthorn, elder (*Sambucus nigra*), blackthorn (*Prunus spinosa*), hazel (*Corylus avellana*) and rose (*Rosa* sp). In the south the ground flora was dominated by nettle and bare ground with greater diversity at wider northern part where it included ramsons (*Allium ursinum*), red campion (*Silene dioica*), garlic mustard (*Alliaria petiolata*), lesser celandine (*Ficaria verna*), ivy (*Hedera helix*), wood avens (*Geum urbanum*), cuckoo pint (*Arum maculatum*), wood dock (*Rumex sanguineus*), wood speedwell (*Veronica montana*), dog's mercury (*Mercurialis perennis*) and wood anemone (*Anemone nemorosa*). Due to the mostly poor-quality ground flora and narrow canopy, only one quadrat (in which the canopy sample was smaller than recommended) was undertaken. This habitat was attributed to W8b *Fraxinus excelsior-Acer Campestre-Mercurialis perennis* woodland subcommunity *Anemone nemorosa*, with which the TABLEFIT 'goodness of fit' was 74%. The sampled vegetation qualified as lowland deciduous woodland HoPI.

5.4.21 Eight vascular plant species that are indicative of ancient woodland were recorded (either incidentally or in quadrats): ramsons (*Allium ursinum*), holly (*Ilex aquifolium*), wood speedwell, wood anemone, bluebell, wood sorrel (*Oxalis acetosella*), pignut (*Conopodium majus*) and dog's mercury.

5.4.22 Table 18 sets out the NVC survey data from Mill Wood & Castle Wood F001.

Table 18: NVC survey data from Mill Wood & Castle Wood (CH540633-CH542392-CH603600-CH626787_L5218_F001_PH2_190522)

Species	Quadrat locations					Constancy (Domin range) [18]
	Q1	Q2	Q3	Q4	Q5	
Canopy Layer (10m x 10m)						
Acer pseudoplatanus	9	-	-	-	-	I (9-9)
Quercus robur	7	-	-	-	-	I (7-7)
Understorey / Shrub Layer (10m x 10m)						
Corylus avellana	5	-	-	-	-	I (5-5)
Crataegus monogyna	4	-	-	-	-	I (4-4)
Ulmus sp.	2	-	-	-	-	I (2-2)
Ilex aquifolium	2	-	-	-	-	I (2-2)
Fraxinus excelsior	1	-	-	-	-	I (1-1)
Field / Ground Flora Layer (4m X 4m)						
Allium ursinum	7	-	-	-	-	I (7-7)
Anemone nemorosa	6	-	-	-	-	I (6-6)
Mercurialis perennis	6	-	-	-	-	I (6-6)
Holcus mollis	6	-	-	-	-	I (6-6)
Mnium hornum	6	-	-	-	-	I (6-6)
Kindbergia praelonga	6	-	-	-	-	I (6-6)
Rubus fruticosus agg.	3	-	-	-	-	I (3-3)
Conopodium majus	3	-	-	-	-	I (3-3)
Galium aparine	2	-	-	-	-	I (2-2)
Hyacinthoides non-scripta	2	-	-	-	-	I (2-2)
Dryopteris dilatata	2	-	-	-	-	I (2-2)
Hedera helix	2	-	-	-	-	I (2-2)
Oxalis acetosella	1	-	-	-	-	I (1-1)
Melica uniflora	1	-	-	-	-	I (1-1)

Mill Wood & Castle Wood (CH540633-CH542392-CH603600-CH626787_L5218_F002_PH2_190522)

Site description and reasons for selection for survey

5.4.23 Mill Wood & Castle Wood LWS. The woodland is all on Natural England's PHI. Part of the woodland which was previously surveyed is on Natural England's AWI.

Vegetation communities present

5.4.24 An area of broad-leaved woodland to the south of the River Bollin. The canopy comprised mostly pedunculate oak and sycamore, with ash also present. Regrowth of sycamore and ash dominated the shrub layer. The ground layer contained several species typical of W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland, including wood speedwell, yellow pimpernel (*Lysimachia nemorum*), lesser celandine, wood avens, wood anemone, bluebell and enchanter's nightshade (*Circaea lutetiana*). This habitat was attributed to W8b *Fraxinus excelsior- Acer Campestre- Mercurialis perennis* woodland subcommunity *Anemone nemorosa*, with which the TABLEFIT 'goodness of fit' was 38%. The sampled vegetation qualified as lowland deciduous woodland HoPI.

5.4.25 Nine vascular plant species that are indicative of ancient woodland were recorded (either incidentally or in quadrats): ramsons, holly, wood speedwell, yellow pimpernel, wood anemone, bluebell, wood sorrel, primrose (*Primula vulgaris*) and dog's mercury.

5.4.26 Table 19 sets out the NVC survey data from Mill Wood & Castle Wood F002.

Table 19: NVC survey data from Mill Wood & Castle Wood (CH540633-CH542392-CH603600-CH626787_L5218_F002_PH2_190522)

Species	Quadrat locations					Constancy (Domin range) [18]
	Q1	Q2	Q3	Q4	Q5	
Canopy Layer (10m x 10m)						
Quercus robur	7	8	8	8	9	V (7-9)
Acer pseudoplatanus	6	6	7	6	5	V (5-7)
Fraxinus excelsior	7	6	5	2	-	IV (2-7)
Betula pendula	5	5	5	-	-	III (5-5)
Understorey / Shrub Layer (10m x 10m)						
Acer pseudoplatanus	3	2	3	-	4	V (2-4)
Fraxinus excelsior	3	3	2	-	2	IV (2-3)
Crataegus monogyna	4	3	3	-	-	III (3-4)
Ilex aquifolium	-	-	1	2	2	III (1-2)
Quercus robur	1	1	-	-	-	II (1-1)
Prunus spinosa	1	1	-	-	-	II (1-1)

Species	Quadrat locations					Constancy (Domin range) [18]
	Q1	Q2	Q3	Q4	Q5	
Field / Ground Flora Layer (4m X 4m)						
Impatiens glandulifera	7	8	9	8	6	V (6-9)
Galium aparine	4	5	4	7	7	V (4-7)
Ficaria verna	3	6	7	7	7	V (3-7)
Veronica montana	6	7	-	8	7	IV (6-8)
Geum urbanum	-	4	2	2	1	IV (1-4)
Rubus fruticosus agg.	4	-	4	-	6	III (4-6)
Urtica dioica	5	5	2	-	-	III (2-5)
Poa trivialis	8	6	-	-	-	II (6-8)
Silene dioica	-	-	-	6	8	II (6-8)
Anemone nemorosa	-	-	6	-	6	II (6-6)
Dryopteris dilatata	-	-	-	3	7	II (3-7)
Lysimachia nemorum	2	-		4	-	II (2-4)
Rumex sanguineus	2	2	-	-	-	II (2-2)
Lolium perenne	6	1	-	-	-	II (1-6)
Epilobium hirsutum	6	-	-	-	-	I (6-6)
Stellaria holostea	-	-	-	6	-	I (6-6)
Juncus effusus	5	-	-	-	-	I (5-5)
Ranunculus repens	4	-	-	-	-	I (4-4)
Hyacinthoides non-scripta	-	-	-	4	-	I (4-4)
Holcus mollis	-	-	3	-	-	I (3-3)
Holcus lanatus	2	-	-	-	-	I (2-2)
Circaea lutetiana	-	-	1	-	-	I (1-1)

Rushy Pits Covert (CH325341_L4397_PH2_160522)

Site description and reasons for selection for survey

5.4.27 Rushy Pits Covert LWS. The woodland is all on Natural England's PHI.

Vegetation communities present

5.4.28 Broadleaved woodland dominated by sycamore and frequent pedunculate oak with evidence of use for pheasant rearing. The understory comprised sycamore regrowth with localised hazel, holly and elder. The ground flora was poor with areas of bracken (*Pteridium aquilinum*) and broad buckler-fern (*Dryopteris dilatata*), bramble and scattered bluebell. Several ponds were recorded within the woodland which were linked by dry ditches. The canopy around the ponds was limited to grey willow (*Salix cinerea*) with rare alder (*Alnus glutinosa*). Ground flora was largely absent but, where present, comprised rare bittersweet

floating sweet grass (*Glyceria fluitans*) and soft rush. Due to the absence of ground flora the ponds were excluded from NVC analysis. Rushy Pits Covert was of insufficient size for 50x50m quadrats and as such 10x10m quadrats were used. This habitat was attributed to W10 *Quercus robur-Pteridium aquilinum-Rubus fruticosus agg* woodland, with which TABLEFIT 'goodness of fit' was 59% with 50% in support of W10a typical subcommunity. The sampled vegetation qualified as lowland deciduous woodland HoPI.

5.4.29 Two vascular plant species that are indicative of ancient woodland were recorded (either incidentally or in quadrats): holly and bluebell.

5.4.30 Table 20 sets out the NVC survey data from Rushy Pits Covert.

Table 20: NVC survey data from Rushy Pits Covert (CH540633-CH542392-CH603600-CH626787_L5218_F002_PH2_190522)

Species	Quadrat locations					Constancy (Domin range) [18]
	Q1	Q2	Q3	Q4	Q5	
Canopy Layer (10m x 10m)						
Acer pseudoplatanus	7	10	8	9	9	V (7-10)
Quercus robur	8	4	9	7	7	V (4-8)
Betula pendula	-	1	-	-	1	II (1-1)
Understorey / Shrub Layer (10m x 10m)						
Acer pseudoplatanus	2	2	4	4	4	V (2-4)
Sambucus nigra	-	-	1	-	4	II (1-4)
Rhododendron sp.	4	-	-	-	-	I (4-4)
Ilex aquifolium	-	3	-	-	-	I (3-3)
Corylus avellana	-	-	2	-	-	I (2-2)
Field / Ground Flora Layer (4m X 4m)						
Dryopteris dilatata	7	7	7	7	6	V (6-7)
Pteridium aquilinum	4	3	9	-	6	IV (3-9)
Hyacinthoides non-scripta	4	1	2	-	2	IV (1-4)
Kindbergia praelonga	-	4	3	3	-	III (3-4)
Acer pseudoplatanus	1	3	-	-	2	III (1-3)
Holcus mollis	-	-	-	6	2	II (2-6)
Digitalis purpurea	-	1	-	-	2	II (1-2)
Galium aparine	-	-	-	1	1	II (1-1)
Rubus fruticosus	-	-	-	6	-	I (6-6)
Polytrichum commune	-	4	-	-	-	I (4-4)
Poa annua	-	-	-	-	3	I (3-3)

6 Breeding Birds

6.1 Introduction

6.1.1 This section sets out ecological baseline data relating to breeding birds not reported in the main BID documents that accompanied the main ES, or the BID report that accompanied the SES1 and AP1 ES. It should be read in conjunction with the main BID report, Ecological baseline data – breeding and wintering birds (see main BID EC-009-00001), which accompanied the main ES, and BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES.

6.2 Methodology

General breeding bird survey

6.2.1 Details of the standard methodology utilised for bird surveys are provided in the Technical note – Ecology and biodiversity – Ecological field survey methods and standards, which is included within the SMR5 which accompanied the main ES.

6.2.2 The scoping, desk study exercises and surveys reported in the main ES can be found in BID EC-009-00001, which accompanied the main ES. This section contains the outcomes of surveys undertaken between:

- August 2021 and June 2022 inclusive for MA01, MA02 and MA03 which were completed since publication of BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES; and
- February 2021 and June 2022 inclusive for MA06, MA07 and MA08 which were completed since publication of the main BID report, Ecological baseline data – breeding and wintering birds (see main BID EC-009-00001), which accompanied the main ES.

6.2.3 Five breeding bird survey visits were undertaken in one location at Chapel Lane to Agden Bridge Farm (BB1_BT13-A-E). Survey visits were carried out on 29 March, 12 April, 10 May, 24 May and 7 June 2022. This transect location is in Millington, Cheshire at OS grid reference SJ72088516 within community area MA03. It includes parkland, woodland, improved grassland and arable fields partially within the land required for the AP2 revised scheme, relevant to SES2, but not related to AP2 scheme amendments.

6.3 Identification of species most relevant to the assessment

6.3.1 Notable bird species are those that are listed on:

- Annex 1 of the Birds Directive[19];
- Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[20];
- Rare Breeding Birds Panel (RBBP) Species List[21];
- Section 41 of the National Environment and Rural Communities Act 2006 (species of principal importance)[22];
- Cheshire Local Biodiversity Action Plan (LBAP)[23];
- Birds of Conservation Concern (Red and Amber species)[24];
- Cheshire and Wirral Ornithological Society annual bird report[25] regional breeding status ('very rare', 'rare', 'scarce' or 'uncommon'); and/or
- county rare or scarce species listed in Table 7 of the Cheshire Wildlife Trust's selection criteria for sites of county biological importance[26].

6.3.2 Records of notable species are summarised for each site in Section 6.5.

6.4 Deviations, constraints and limitations

6.4.1 No deviations to the standard methodology were applied and, subject to the constraints and limitations identified in the following section, all surveys were conducted as per the standard methodology provided in the Technical note – Ecology and biodiversity – Ecological FSMS, which is included within the SMR5 which accompanied the main ES.

---

[19] Directive 2009/147/EC of the European Parliament and of the council of 30 November 2009 on the Conservation of Wild Birds, European Parliament and Council, Brussels.

[20] *Wildlife and Countryside Act 1981*, Chapter 69. Her Majesty's Stationery Office, London. Available online at: https://www.legislation.gov.uk/ukpga/1981/69/pdfs/ukpga_19810069_en.pdf.

[21] Rare Breeding Birds Panel (RBBP) (2018), *RBBP Species List*. Available online at: https://rbbp.org.uk/wp-content/uploads/2020/11/2018-Report-summary-table.pdf.

[22] *Natural Environment and Rural Communities Act 2006*, Chapter 16. Her Majesty's Stationery Office, London.

[23] Cheshire Wildlife Trust (2007), Cheshire region Biodiversity Action Plan. Available online at: https://www.cheshirewildlifetrust.org.uk/biodiversity.

[24] Stanbury, A. et al. (2021), *The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain*. British Birds, 114, P723-747.

[25] Cheshire and Wirral Ornithological Society (2022), *Cheshire and Wirral Bird Report 2020*. CAWOS.

[26] Giles, R. (2014), *Local Wildlife Site Selection Criteria for the Cheshire Region*, Cheshire Wildlife Trust, Malpas.

6.4.2 Surveys of BB1_BT13 Chapel Lane to Agden Bridge Farm were undertaken in 2022 because only two visits could be carried out in 2021 due to access restrictions. The data from 2021 are presented in BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES. Observations from 2021 surveys can be used to inform interpretation of survey results from 2022, but data cannot be aggregated across years.

6.4.3 Access for surveying was limited to land where landowner permission was obtained and from public rights of way (PRoW) (except where access for survey was refused).

6.4.4 Survey access to the transects was limited by restrictions. Consequently, survey coverage was restricted at BB1_BT13 Chapel Lane to Agden Bridge Farm and no surveys were completed at BB1_BT11 Ashley or BB1_CT01 Withington and Didsbury Golf Course. This has restricted the area covered by surveys at Chapel Lane to Agden Bridge Farm, but the data provide a representative sample of species associated with the habitats present.

6.5 Baseline

Pickmere to Agden and Hulseheath (MA03)

Chapel Lane to Agden Bridge Farm (BB1_BT13)

6.5.1 Five survey visits were carried out at Chapel Lane to Agden Bridge Farm between 29 March and 7 June 2022. In total, 37 bird species were recorded including 18 notable species. Breeding territories of 13 species were recorded, of which four are notable, these are listed in Table 21.

Table 21: Notable birds recorded during the surveys at Chapel Lane to Agden Bridge Farm (BB1_BT13)

Common name	Scientific name	Status	Estimated number of breeding territories	Number of survey visits during which the species were recorded (out of the total)	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Dunnock	*Prunella modularis*	Amber list, Species of Principal Importance	1	4 (5)	Y	N
Skylark	*Alauda arvensis*	Red list, Species of Principal Importance, Cheshire	1	2 (5)	Y	N

Common name	Scientific name	Status	Estimated number of breeding territories	Number of survey visits during which the species were recorded (out of the total)	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
		LBAP				
Tree Sparrow	*Passer montanus*	Red list, Species of Principal Importance, Cheshire LBAP	1	2 (5)	Y	N
Wren	*Troglodytes troglodytes*	Amber list	4	5 (5)	Y	N

6.5.2 Desk study records for the Chapel Lane to Agden Bridge Farm area are presented in the main BID report (BID EC-009-00001) under the Park Farm to Agden Brow (BB1_BT05) area as both transects cover land parallel to the same section of the route.

7 Wintering birds

7.1 Introduction

7.1.1 This section sets out ecological baseline data relating to wintering bird surveys not reported in the main BID documents that accompanied the main ES. It should be read in conjunction with the main BID report, Ecological baseline data – breeding and wintering birds (see main BID EC-009-00001), which accompanied the main ES.

7.2 Methodology

7.2.1 Details of the standard methodology used for wintering bird surveys are provided in the Technical note – Ecology and biodiversity – Ecological field survey methods and standards, which is included within the SMR5 which accompanied the main ES.

7.2.2 The scoping, desk study exercises and surveys reported in the main ES can be found in BID EC-009-00001, which accompanied the main ES. This section contains the outcomes of surveys undertaken that were not reported in the BID document that accompanied the main ES. This is either because the survey reporting process had not been completed to inform the assessment within the main ES, or because the surveys have been undertaken since production of the main ES.

7.2.3 Wintering bird survey visits were undertaken in one location at Withington & Didsbury Golf Course (WB1_CT01-A-B). Five visits were planned, but there were fewer visits due to access constraints. Survey visits were carried out on 28 January and 25 February 2021. This transect location is in Didsbury, Manchester at OS grid reference SJ83479072 within community area MA07. It includes golf course and river habitats partially within the land required for the AP2 revised scheme, relevant to SES2, but not related to AP2 scheme amendments.

7.3 Identification of species most relevant to the assessment

7.3.1 Notable bird species are those that are listed on:

- Annex 1 of the Birds Directive[27];
- Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[28];

[27] Directive 2009/147/EC of the European Parliament and of the council of 30 November 2009 on the Conservation of Wild Birds, European Parliament and Council, Brussels.

- Section 41 of the National Environment and Rural Communities Act 2006 (species of principal importance)[29];
- Greater Manchester Local Biodiversity Action Plan (LBAP)[30];
- Birds of Conservation Concern (Red and Amber species)[31]; and/or
- Cheshire and Wirral Ornithological Society annual bird report[32] status ('very rare', 'rare', 'scarce' or 'uncommon')[33].

7.3.2 Records of notable species are summarised for each site in Section 7.5.

7.4 Deviations, constraints and limitations

7.4.1 No deviations to the standard methodology were applied and, subject to the constraints and limitations identified in the following section, all surveys were conducted as per the standard methodology provided in the Technical note – Ecology and biodiversity – Ecological field survey methods and standards, which is included within the SMR which accompanied the main ES.

7.4.2 Access for surveying was limited to land where landowner permission was obtained and from public rights of way (PRoW) (except where access for survey was refused).

7.4.3 Survey access to the transect was limited by restrictions. Consequently, only two visits were completed at BB1_CT01. This is likely to have had a significant effect on the completeness of data for BB1_CT01.

[28] *Wildlife and Countryside Act 1981*, Chapter 69. Her Majesty's Stationery Office, London. Available online at: https://www.legislation.gov.uk/ukpga/1981/69/pdfs/ukpga_19810069_en.pdf.

[29] *Natural Environment and Rural Communities Act 2006*, Chapter 16. Her Majesty's Stationery Office, London.

[30] Greater Manchester Biodiversity Action Plan https://gmlrc.org/projects/gm_bap/ [accessed July 2022].

[31] Stanbury, A. et al. (2021), *The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain*. British Birds, 114, P723-747.

[32] Cheshire and Wirral Ornithological Society (2022), *Cheshire and Wirral Bird Report 2020*. CAWOS.

[33] No up to date bird report is available for Manchester, so data for Cheshire has been used, being geographically similar, but taking account of local variations.

7.5 Baseline

Davenport Green to Ardwick (MA07)

Withington and Didsbury Golf Course (BB1_CT01) Wintering bird survey

7.5.1 Two survey visits were carried out at Withington and Didsbury Golf Course between 28 January and 25 February 2021. In total, 43 bird species were recorded including 20 notable species. Table 22 provides a summary of notable species recorded.

Table 22: Notable wintering bird survey records during the surveys at Withington and Didsbury Golf Course (WB1_CT01)

Common name	Scientific name	Status	Maximum count of individuals during the survey period	Number of survey visits during which the species were recorded (out of the total)	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Black-headed Gull	*Chroicocephalus ridibundus*	Amber list	70	2 (2)	Y	Y
Chiffchaff	*Phylloscopus collybita*	Cheshire scarce winter visitor	1	1 (2)	Y	Y
Common Gull	*Larus canus*	Amber list	1	1 (2)	Y	Y
Dunnock	*Prunella modularis*	Amber list, Species of Principal Importance	2	2 (2)	Y	Y
Goosander	*Mergus merganser*	Cheshire Uncommon winter visitor	7	2 (2)	Y	Y
Greenfinch	*Chloris chloris*	Red list	1	2 (2)	Y	Y
Grey Wagtail	*Motacilla cinerea*	Amber list	2	2 (2)	Y	Y
House Sparrow	*Passer domesticus*	Red list, Species of Principal Importance	3	1 (2)	Y	Y
Kestrel	*Falco tinnunculus*	Amber list	1	1 (2)	Y	Y
Lesser Black-backed Gull	*Larus fuscus*	Amber list	3	1 (2)	Y	Y

Common name	Scientific name	Status	Maximum count of individuals during the survey period	Number of survey visits during which the species were recorded (out of the total)	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Little Gull	*Hydrocoloeus minutus*	Schedule 1, RBBP, Cheshire Scarce coastal migrant	1	1 (2)	Y	Y
Mallard	*Anas platyrhynchos*	Amber list	14	2 (2)	Y	Y
Mediterranean Gull	*Ichthyaetus melanocephalus*	Amber list, Schedule 1, RBBP, Annex 1, Cheshire Scarce visitor	3	1 (2)	Y	Y
Redwing	*Turdus iliacus*	Amber list, Schedule 1, RBBP	30	1 (2)	Y	Y
Rook	*Corvus frugilegus*	Amber list	1	1 (2)	Y	Y
Song Thrush	*Turdus philomelos*	Amber list	2	2 (2)	Y	Y
Starling	*Sturnus vulgaris*	Red list, Species of Principal Importance	18	1 (2)	Y	Y
Stock Dove	*Columba oenas*	Amber list	2	2 (2)	Y	Y
Woodpigeon	*Columba palumbus*	Amber list	5	2 (2)	Y	Y
Wren	*Troglodytes troglodytes*	Amber list	1	2 (2)	Y	Y

8 Pond and canal survey

8.1 Introduction

8.1.1 This section sets out ecological baseline data relating to pond and canal surveys not reported in the main BID documents that accompanied the main ES, or the BID report that accompanied the SES1 and AP1 ES. It should be read in conjunction with main BID report, Ecological baseline data – amphibian and pond and canal surveys (see main BID EC-007-00001), which accompanied the main ES, and BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES.

8.2 Methodology

8.2.1 Details of the standard methodology used for pond and canal surveys are provided in the Technical note – Ecology and biodiversity – Ecological field survey methods and standards (FSMS), which is included within SMR which accompanied the main ES.

8.2.2 The scoping and desk study exercises and surveys reported in the main ES can be found in the main BID report, Ecological baseline data – amphibian and pond and canal surveys (BID EC-007-00001), which accompanied the main ES. This section contains the outcomes of surveys undertaken between:

- August 2021 and June 2022 inclusive for MA01, MA02 and MA03 which were completed since publication of BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES; and
- February 2021 and June 2022 inclusive for MA06, MA07 and MA08 which were completed since publication of the main BID report, Ecological baseline data – pond and canal surveys (see main BID EC-007-00001), which accompanied the main ES.

8.2.3 Survey methodology followed a tiered system from high to low detail, based upon the anticipated value of the resource, the proximity of the resource to land required for the AP2 revised scheme, and the potential for impacts. The most detailed survey is the National Pond Survey (NPS), followed by Predictive System for Multimetrics (PSYM) and then by Rapid Assessment (RA) protocols. PSYM and NPS methods collect detailed macro-invertebrate, macrophyte, chemical and physical data, whereas the RA method only includes survey of macro-invertebrates to family level. Of the three methods, the NPS protocol involves the greatest survey effort, comprising three separate visits, detailed site information and macro-invertebrates identified to species level for most groups, while PSYM requires only a single visit and family level macro-invertebrate identification.

8.2.4 Ponds were initially identified from review of Ordnance Survey and aerial mapping data through the pond selection process used for amphibian survey. The appropriate level of

pond survey was based on information provided by the Habitat Suitability Index data gathered during the amphibian surveys, or detail from Phase 1 Habitat Survey or scoping surveys and site photographs (see Phase 1 Habitat Survey in Background Information and Data: BID-EC-002-00001 which accompanied the main ES, and BID EC-017-00000 SES1 and AP1 ES, which accompanied the SES1 and AP1 ES).

8.2.5 PSYM outputs were provided by the Freshwater Habitats Trust, formerly Pond Conservation Trust.

8.2.6 A summary of locations at which pond and canal surveys were undertaken within MA01 to MA03 and MA06 to MA08 is provided in Table 23 (RA) and Table 24 (PSYM) and shown in BID, Ecology and biodiversity Map Book: Map Series EC-11 which accompanies SES2 and AP2 ES.

8.2.7 Recorded macrophyte (aquatic plant) species were reviewed against the relevant checklists/rare plant register: The Vascular Plant Red Data List for Great Britain[34], Species of Principal Importance in England[35], and the Cheshire VC58 Rare Plant Register[36] to review status from a local perspective.

8.2.8 The BID, Ecology and biodiversity Map Book: Map Series EC-11 which accompanies SES2 and AP2 ES shows the locations of the ponds and canals that were subject to field survey. A total of 21 ponds were surveyed using RA methodology and 12 ponds were surveyed using PSYM methodology. None of the surveyed ponds were considered to be of sufficient ecological value or diversity to warrant further survey using NPS methods and were adequately assessed using PSYM. As a result, no NPS results are presented.

Table 23: Summary of completed RA surveys undertaken

Ecology survey code	Survey site name	Feature type and survey type	Survey date(s)	CA	Approximate distance and orientation from land required for the AP2 revised scheme	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
CH81069_L15765_PS1_Pond914_191021	Pond914	Pond	19 October 2021	MA01	1m east	Y	Y
CH81069_L15765_PS1_Pond162	Pond1625	Pond	19 October 2021	MA01	27m east	Y	Y

[34] The Vascular Plant Red Data List for Great Britain (2006). Available online at: http://archive.jncc.gov.uk/page-3354.

[35] Natural Environment and Rural Communities Act 2006. Available online at: http://www.legislation.gov.uk/ukpga/2006/16/section/41.

[36] Botanical Society of Britain and Ireland, Cheshire VC58 County Rare Plant Register (2015). Available online at: https://bsbi.org/cheshire.

Ecology survey code	Survey site name	Feature type and survey type	Survey date(s)	CA	Approximate distance and orientation from land required for the AP2 revised scheme	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
5_191021							
CH616525_CH651619_L5228_PS1_Pond45_201021	Pond45	Pond	20 October 2021	MA01	25m north-west	Y	Y
CH616525_CH651619_L5228_PS1_Pond46_201021	Pond46	Pond	20 October 2021	MA01	16m west	Y	Y
Multiple_L5487_PS1_Pond70_231121	Pond70	Pond	23 November 2021	MA02	7m south-east	Y	Y
Multiple_L5487_PS1_Pond69_231121	Pond69	Pond	23 November 2021	MA02	33m south-east	Y	Y
CH568808_L5404_PS1_Pond86_231121	Pond86	Pond	23 November 2021	MA02	15m east	Y	Y
Multiple_L5257_PS1_Pond1609_290622	Pond1609	Pond	29 June 2022	MA02	36m west	Y	Y
CH405623-CH580618_L15878_PS1_Pond922_290622	Pond922	Pond	29 June 2022	MA02	29m north-west	Y	Y
CH512447_L5343_PS1_Pond832_231121	Pond832	Pond	23 November 2021	MA02	17m south	Y	Y
CH512447_L5343_PS1_Pond105_231121	Pond105	Pond	23 November 2021	MA02	1m north	Y	Y
Multiple_L5531_PS1_Pond1538_241121	Pond1538	Pond	24 November 2021	MA02	21m south	Y	Y
U201948_L17950_PS1_Pond315_290622	Pond315	Pond	29 June 2022	MA03	5m north-west	Y	Y
CH131342-CH434587_L5118_PS1_Pond319_290622	Pond319	Pond	29 June 2022	MA03	14m north	Y	Y

Ecology survey code	Survey site name	Feature type and survey type	Survey date(s)	CA	Approximate distance and orientation from land required for the AP2 revised scheme	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Multiple_L5232_PS1_Pond325_290622	Pond325	Pond	29 June 2022	MA03	4m east	Y	Y
CH517829_L6291_PS1_Pond1756_210921	Pond1756	Pond	21 September 2021	MA03	39m east	Y	Y
Multiple_L5235_PS1_Pond409_220921	Pond409	Pond	22 September 2021	MA03	40m north-west	Y	Y
CH601656_L5054_PS1_Pond497_220921	Pond497	Pond	22 September 2021	MA03	35m west	Y	Y
Multiple_L46431_PS1_Pond2906_260521	Pond2906	Pond	26 May 2021	MA06	33m south	Y	Y
CH230809_L21079_PS1_Pond952_190521	Pond952	Pond	19 May 2021	MA06	46m north-west	Y	Y
Multiple_L5796_PS1_Pond443_220921	Pond443	Pond	22 September 2021	MA06	10m north	Y	Y

Table 24: Summary of completed PSYM surveys undertaken

Ecology survey code	Survey site name	Feature type and survey type	Survey date(s)	CA	Approximate distance and orientation from land required for the AP2 revised scheme	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Multiple_L5333_PS2_Pond846_070622	Pond846	Pond	7 June 2022	MA02	Within	Y	Y
Multiple_L5333_PS2_Pond101_070622	Pond101	Pond	7 June 2022	MA02	Within	Y	Y
Multiple_L5333_PS2_Pond99_070622	Pond99	Pond	7 June 2022	MA02	Within	Y	Y
CH131342-CH434587_L51	Pond317	Pond	8 June 2022	MA03	Within	Y	Y

Ecology survey code	Survey site name	Feature type and survey type	Survey date(s)	CA	Approximate distance and orientation from land required for the AP2 revised scheme	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
18_PS2_Pond317_080622							
CH131342-CH434587_L5118_PS2_Pond318_080622	Pond318	Pond	8 June 2022	MA03	Within	Y	Y
U206247_L5466_PS2_Pond377_090622	Pond377	Pond	9 June 2022	MA03	Within	Y	Y
CH586994-CH587547_L5198_PS2_Pond387_090622	Pond387	Pond	9 June 2022	MA03	Adjacent west	Y	Y
CH275490_L5859_PS2_Pond428_090622	Pond428	Pond	9 June 2022	MA03	Within	Y	Y
Multiple_L5290_PS2_Pond458_090622	Pond458	Pond	9 June 2022	MA03	Within	Y	Y
CH153264_L46533_PS2_Pond1807_090622	Pond1807	Pond	9 June 2022	MA06	Within	Y	Y
Multiple_L5290_PS2_Pond1601_090622	Pond1601	Pond	9 June 2022	MA06	Within	Y	Y
L5290_PS2_Pond1602_090622	Pond1602	Pond	9 June 2022	MA06	Within	Y	Y

8.3 Deviations, constraints and limitations

8.3.1 Screening for the pond habitat methodologies described above was dependent on access availability and detail provided within Phase 1 Habitat Survey and/or amphibian survey, from Habitat Suitability Index assessment.

8.3.2 Deviations from the methodology occurred as a result of seasonal and land access constraints. For example, the number or timing of seasonal visits for the ponds surveyed using the PYSM method was dependent on the time at which land access became available for survey, and the receipt of initial survey data from either Phase 1 Habitat Survey or amphibian survey that identified the need for this detailed method.

8.3.3 In some instances, land access was granted but ponds were found to be inaccessible due to the presence of barbed wire fencing, fast flowing or deep watercourse(s), and/or dense terrestrial vegetation. In such cases, surveys were not conducted as to do so would have compromised the safety of surveyors.

8.3.4 The Ecological FSMS specifies that ponds for survey will lie within the land required for the construction of the original scheme or within a 100m buffer. In a deviation from the FSMS, the buffer was reduced to 50m for the AP2 revised scheme. This deviation from the FSMS was agreed with Natural England.

8.4 Baseline

Hough to Walley's Green (MA01)

8.4.1 A total of four ponds were surveyed within MA01 between August 2021 and June 2022, inclusive. All four ponds were located within a 50m buffer of the land required for the AP2 revised scheme and were surveyed using RA methodology. No ponds were surveyed using PSYM methodology.

Rapid Assessment (RA)

8.4.2 RA surveys were undertaken on four ponds within MA01, see Table 25.

Table 25: Summary of completed RA surveys undertaken in MA01[37]

Ecology survey code	Pond description	Invertebrates									Quality score	Quality band	Approximate distance and orientation from land required for the AP2 revised scheme and NGR (centre point)
		Caddis (Tricoptera)	Alderflies (Megaloptera), dragonflies and damselflies (*Odonata*)	Water beetles (Coleoptera)	Water bugs (Hemiptera)	Mayflies (Ephemeroptera)	Shrimps (Amphipoda)	Water slaters (Isopoda)	Water snails (Gastropoda)	Worms (Oligochaeta), fly larvae (Diptera) and leeches (Hirudinea)			
CH81069_L15765_PS1_Pond914_191021	78m^2 Pond in grazed livestock (horses) field. Moderate emergent macrophyte cover. Duckweed (*Lemna* sp.) recorded. Invasive non-native species Himalayan balsam (*Impatiens glandulifera*) present around pond margins.	0	0, 0, 0	1	1	1	1	1	1	1	19	Moderate	1m east SJ7035758038
CH81069_L15765_PS1_Pond1625_191021	Pond dry at time of survey.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	27m east SJ7038458048
CH616525_CH651619_L5228_PS1_Pond45_201021	602m^2 Heavily shaded pond in woodland. Lots of leaf litter. No submerged macrophytes visible.	0	0, 0, 0	0	1	0	0	1	0	1	7	Low	25m north-west SJ6914860114

[37] 1 = present, 0 = absent

Ecology survey code	Pond description	Invertebrates									Quality score	Quality band	Approximate distance and orientation from land required for the AP2 revised scheme and NGR (centre point)
		Caddis (Tricoptera)	Alderflies (Megaloptera), dragonflies and damselflies (*Odonata*)	Water beetles (Coleoptera)	Water bugs (Hemiptera)	Mayflies (Ephemeroptera)	Shrimps (Amphipoda)	Water slaters (Isopoda)	Water snails (Gastropoda)	Worms (Oligochaeta), fly larvae (Diptera) and leeches (Hirudinea)			
	Duckweed recorded.												
CH616525_CH651619_L5228_PS1_Pond46_201021	Pond dry at time of survey.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	16m west SJ6914860148

Discussion

8.4.3 Pond CH81069_L15765_PS1_Pond914_191021 was within the moderate quality band for RA and was found to support a macroinvertebrate community of moderate taxon richness. High scoring taxa such as caddisfly (Tricoptera), alderfly (Megaloptera), dragonfly or damselfly (Odonata) larvae were not recorded in the pond. Commonly occurring taxa such as water beetles (Coleoptera), water bugs (Hemiptera), mayfly (Ephemeroptera) larvae, water slaters (Isopoda), shrimps (Amphipoda), snails (Gastropoda), worms (Oligochaeta) and leeches (Hirudinea) were recorded.

8.4.4 Pond CH616525_CH651619_L5228_PS1_Pond45_201021 was within the low quality band for RA, only supporting water beetles and commonly occurring snails, worms and leeches. Taxon richness was low. The pond was heavily shaded by surrounding woodland. Shading limits the growth of macrophytes, which would otherwise improve water quality and provide habitat for macroinvertebrates. Additionally, the decomposition of leaf litter in the pond may cause anoxia, which is not generally tolerated by high scoring taxa.

Wimboldsley to Lostock Gralam (MA02)

8.4.5 A total of 12 ponds were surveyed within MA02 between August 2021 and June 2022, inclusive. Of these:

- nine ponds located within a 50m buffer of the land required for the AP2 revised scheme were surveyed using RA methodology; and
- three ponds located within the land required for the AP2 revised scheme were surveyed using PSYM methodology.

Rapid Assessment (RA)

8.4.6 RA surveys were undertaken on eight ponds within MA02, see Table 26.

Table 26: Summary of completed RA surveys undertaken in MA02[38]

Ecology survey code	Pond description	Invertebrates									Quality score	Quality band	Approximate distance and orientation from land required for the AP2 revised scheme and NGR (centre point)
		Caddis (Tricoptera)	Alderflies (Megaloptera), dragonflies and damselflies (Odonata)	Water beetles (Coleoptera)	Water bugs (Hemiptera)	Mayflies (Ephemeroptera)	Shrimps (Amphipoda)	Water slaters (Isopoda)	Water snails (Gastropoda)	Worms (Oligochaeta), fly larvae (Diptera) and leeches (Hirudinea)			
Multiple_L5487_PS1_Pond70_231121	402m^2 Pond in livestock field. Surrounded by soft rush (*Juncus effusus*). Connected to Pond69.	1	0, 0, 0	1	1	1	1	1	1	1	33	Moderate	7m south-east SJ6890062298
Multiple_L5487_PS1_Pond69_231121	128m^2 Pond in livestock field. Connected to Pond70.	1	0, 0, 0	1	0	1	1	1	1	1	28	Moderate	33m south-east SJ6892262300
CH568808_L5404_PS1_Pond86_231121	446m^2 Pond located in wooded area beside livestock field. Water level very low at time of survey. Large amount of leaf litter and woody debris. Fly tipping.	0	0, 0, 0	0	0	0	0	0	0	1	1	Low	15m east SJ6896263670
Multiple	Pond dry at time of survey.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	36m west

[38] 1 = present, 0 = absent

Ecology survey code	Pond description	Invertebrates									Quality score	Quality band	Approximate distance and orientation from land required for the AP2 revised scheme and NGR (centre point)
		Caddis (Tricoptera)	Alderflies (Megaloptera), dragonflies and damselflies (Odonata)	Water beetles (Coleoptera)	Water bugs (Hemiptera)	Mayflies (Ephemeroptera)	Shrimps (Amphipoda)	Water slaters (Isopoda)	Water snails (Gastropoda)	Worms (Oligochaeta), fly larvae (Diptera) and leeches (Hirudinea)			
_L5257_PS1_Pond1609_290622													SJ6795364304
CH405623-CH580618_L15878_PS1_Pond922_290622	78m^2 Artificial garden pond. Shallow, turbid water with a silty substrate and filamentous algae. Dense reed cover and emergent macrophytes recorded.	1	0, 1, 1	1	1	0	1	0	1	1	47	Good	29m north-west SJ6805364980
CH512447_L5343_PS1_Pond832_231121	844m^2 Pond in livestock field. Partially surrounded by trees. Rushes and reeds round margins.	0	0, 0, 0	1	1	0	1	1	1	1	18	Moderate	17m south SJ6807065416
CH512447_L5343_PS1_Pond105_231121	697m^2 Pond in livestock field. Dense common bulrush cover (*Typha latifolia*) and some duckweed (*Lemna* sp.).	0	0, 0, 0	0	1	0	1	1	1	1	13	Low	1m north SJ6813165481
Multiple_L5531_PS1_Pond1538_241121	2994m^2 Large pond located in garden. Partially surrounded by	1	0, 0, 1	1	1	1	1	1	1	1	48	Good	21m south SJ6744068316

Ecology survey code	Pond description	Invertebrates									Quality score	Quality band	Approximate distance and orientation from land required for the AP2 revised scheme and NGR (centre point)
		Caddis (Tricoptera)	Alderflies (Megaloptera), dragonflies and damselflies (Odonata)	Water beetles (Coleoptera)	Water bugs (Hemiptera)	Mayflies (Ephemeroptera)	Shrimps (Amphipoda)	Water slaters (Isopoda)	Water snails (Gastropoda)	Worms (Oligochaeta), fly larvae (Diptera) and leeches (Hirudinea)			
	mature trees. Macrophytes present along margins. Large amount of leaf litter.												

Predictive System for Multimetrics (PSYM)

8.4.7 PSYM surveys were undertaken on three ponds within MA02, see Table 27.

Table 27: Summary of the results of the PSYM surveys for MA02

Ecology survey code	Pond/canal description	Plants			Invertebrates			General Quality Assessment (GQA)	Approximate distance and orientation from land required for the AP2 revised scheme and NGR (centre point)
		Number of submerged and emergent plant species	Trophic ranking score for submerged and emergent plants	Number and species of uncommon plant species	Average Score Per Taxon (ASPT)	Number of dragonfly (*Odonata*) and alderfly (*Megaloptera*) families	Number of beetle (*Coleoptera*) families		
Multiple_ L5333_PS2_Pond 846_070622	Pond dry at time of survey.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Within SJ6811464982
Multiple_ L5333_PS2_Pond 101_070622	Pond dry at time of survey.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Within SJ6814364985
Multiple_ L5333_PS2_Pond 99_070622	152m^2 Pond in livestock field. No submerged or emergent macrophytes. Low marginal macrophyte cover.	4	10.00	0	4.33	0	1	Very poor	Within SJ6815764991

Discussion

8.4.8 Pond CH405623-CH580618_L15878_PS1_Pond922_290622 was within the good quality band for RA and was found to support a macroinvertebrate community of high taxon richness. High scoring caddisfly, dragonfly and damselfly larvae were recorded. Commonly occurring water beetles, water bugs, freshwater shrimp, water snails, worms and leeches were recorded.

8.4.9 Pond Multiple_ L5531_PS1_Pond1538_241121 was within the good quality band for RA and was found to support a macroinvertebrate community of high taxon richness. High scoring caddisfly and damselfly larvae were recorded. Commonly occurring water beetles, water bugs, mayfly larvae, freshwater shrimp, water slaters, water snails, worms and leeches were recorded.

8.4.10 Pond Multiple_L5487_PS1_Pond70_231121 and Multiple_L5487_PS1_Pond69_231121 are discussed together due to their proximity and connection at the time of survey. Both ponds were within the moderate quality band for RA and found to support a macroinvertebrate community of moderate taxon richness. High scoring caddisfly larvae were recorded. Commonly occurring water beetles, water bugs, mayfly larvae, freshwater shrimp, water slaters, water snails, worms and leeches were recorded.

8.4.11 Pond CH512447_L5343_PS1_Pond832_231121 was within the moderate quality band for RA and was found to support a macroinvertebrate community of moderate taxon richness. High scoring taxa such as caddisfly, alderfly, dragonfly or damselfly larvae were not recorded in the pond. Commonly occurring taxa such as water beetles, water bugs, mayfly larvae, water slaters, snails, worms and leeches were recorded.

8.4.12 The remaining ponds where RA was undertaken in MA02 were assessed to be in the low quality band. Higher scoring taxa such as caddisfly, alderfly, dragonfly or damselfly larvae were not recorded in any of these ponds. Only commonly occurring taxa were recorded, and taxon richness was low.

8.4.13 Most of these ponds were situated in heavily shaded areas, such as woodland. Shading often precludes the growth of other macrophytes which would otherwise improve water quality. Lots of leaf litter and silty substrates also reduce water quality and increase turbidity, creating less favourable conditions for higher scoring taxa.

8.4.14 Other ponds were within fields frequently used by livestock, and not fenced off for protection. Livestock were able to access the ponds, creating physical damage and disturbance to the margins and substrate, as well as pollution through defecation which reduces water quality and creates less favourable conditions for higher scoring taxa.

8.4.15 Pond Multiple_ L5333_PS2_Pond99_070622 did not support any plant species of conservation concern, as listed within the Cheshire VC58 Rare Plant Register, the Vascular Plant Red Data List, or listed as Species of principal Importance. Four species of plant were

recorded, remote sedge (*Carex remota*), soft rush (*Juncus effusus*), yellow flag (*Iris pseudacorus*) and bittersweet nightshade (*Solanum dulcamara*). The pond supported a macroinvertebrate community of very low taxon richness, comprising commonly occurring water beetles (Hydrophilidae), freshwater shrimp (Gammaridae) and midge larvae (Chironomidae). The ASPT score suggested probable moderate pollution and the PSYM quality category for the pond was assessed as very poor.

Pickmere to Agden and Hulseheath (MA03)

8.4.16 A total of 14 ponds were surveyed within MA03 between August 2021 and June 2022, inclusive. Of these:

- six ponds located within a 50m buffer of the land required for the AP2 revised scheme were surveyed using RA methodology; and
- six ponds located within the land required for the AP2 revised scheme were surveyed using PSYM methodology.

Rapid Assessment (RA)

8.4.17 RA surveys were undertaken on six ponds within MA03, see Table 28.

Table 28: Summary of the results of the RA surveys for MA03[39]

Ecology survey code	Pond description	Invertebrates									Quality score	Quality band	Approximate distance and orientation from land required for the AP2 revised scheme and NGR (centre point)
		Caddis (Tricoptera)	Alderflies (Megaloptera), dragonflies and damselflies (*Odonata*)	Water beetles (Coleoptera)	Water bugs (Hemiptera)	Mayflies (Ephemeroptera)	Shrimps (Amphipoda)	Water slaters (Isopoda)	Water snails (Gastropoda)	Worms (Oligochaeta), fly larvae (Diptera) and leeches (Hirudinea)			
U201948_L17950_PS1_Pond315_290622	Pond dry at time of survey.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5m north-west SJ7041780053
CH131342-CH434587_L5118_PS1_Pond319_290622	945m^2 Pond in field. Heavily shaded by surrounding trees. Leaf litter and woody debris. No submerged macrophytes.	0	0, 0, 0	0	0	0	1	1	0	1	7	Low	14m north SJ7060180091
Multiple_L5232_PS1_Pond325_290622	1147m^2 Pond in livestock field. Heavily shaded by surrounding trees. Turbid water. No submerged macrophytes.	0	0, 0, 0	0	1	0	0	1	0	1	7	Low	4m east SJ7081180395
CH517829_L6291_PS1_Pond1756_210921	51m^2 Pond adjacent to field. Moderately shaded by bankside trees. Dense	0	0, 0, 1	1	0	0	0	1	1	0	22	Moderate	39m east SJ7135080642

[39] 1 = present, 0 = absent

Ecology survey code	Pond description	Invertebrates									Quality score	Quality band	Approximate distance and orientation from land required for the AP2 revised scheme and NGR (centre point)
		Caddis (Tricoptera)	Alderflies (Megaloptera), dragonflies and damselflies (*Odonata*)	Water beetles (Coleoptera)	Water bugs (Hemiptera)	Mayflies (Ephemeroptera)	Shrimps (Amphipoda)	Water slaters (Isopoda)	Water snails (Gastropoda)	Worms (Oligochaeta), fly larvae (Diptera) and leeches (Hirudinea)			
	duckweed cover.												
Multiple_ L5235_PS1_Pond 409_220921	268m^2 Pond in woodland. Heavily shaded by surrounding trees. Turbid water. Low water level. No submerged macrophytes.	0	0, 0, 0	1	0	0	1	1	0	1	12	Low	40m north-west SJ7122883546
CH601656_L5054 _PS1_Pond497_2 20921	Pond dry at time of survey.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35m west SJ7163684847

Predictive System for Multimetrics (PSYM)

8.4.18 PSYM surveys were undertaken on six ponds within MA03, see Table 29.

Table 29: Summary of the results of the PSYM surveys for MA03

Ecology survey code	Pond/canal description	Plants			Invertebrates			General Quality Assessment (GQA)	Approximate distance and orientation from land required for the AP2 revised scheme and NGR (centre point)
		Number of submerged and emergent plant species	Trophic ranking score for submerged and emergent plants	Number and species of uncommon plant species	Average Score Per Taxon (ASPT)	Number of dragonfly (*Odonata*) and alderfly (*Megaloptera*) families	Number of beetle (*Coleoptera*) families		
CH131342-CH434587_L5118_PS2_Pond317_080622	300m^2 Pond in fenced-off area of field. Surrounded by trees and scrub. Some duckweed. No emergent or submerged macrophytes.	3	9.50	0	3.25	0	1	Very poor	Within SJ7059880083
CH131342-CH434587_L5118_PS2_Pond318_080622	346m^2 Pond in fenced-off area of field. Surrounded by trees and scrub. Some duckweed. Tree / scrub growing in centre of pond. Some duckweed. No emergent or submerged macrophytes.	3	9.67	0	3.75	0	1	Very poor	Within SJ7057680111
U206247_L5466_PS2_Pond377_090622	Pond dry at time of survey	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Within SJ7140582644
CH586994-CH587547_L5198_PS2_Pond387_090622	798m^2 Pond in arable field. Fly tipping in pond. Noticeable odour and oil sheen. Himalayan balsam (*Impatiens glandulifera)* around pond margin. No submerged or emergent macrophytes.	3	9.00	0	3.75	0	2	Very poor	Within SJ7211183152

Ecology survey code	Pond/canal description	Plants			Invertebrates			General Quality Assessment (GQA)	Approximate distance and orientation from land required for the AP2 revised scheme and NGR (centre point)
		Number of submerged and emergent plant species	Trophic ranking score for submerged and emergent plants	Number and species of uncommon plant species	Average Score Per Taxon (ASPT)	Number of dragonfly (*Odonata*) and alderfly (*Megaloptera*) families	Number of beetle (*Coleoptera*) families		
CH275490_L5859_PS2_Pond428_090622	Pond dry at time of survey	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Within SJ7215283804
Multiple_L5290_PS2_Pond458_090622	342m^2 Pond in livestock field. Margins poached and fully grazed. No submerged or emergent macrophytes.	1	0.00	0	4.00	0	1	Very poor	Within SJ7193884260

Discussion

8.4.19 Pond CH517829_L6291_PS1_Pond1756_210921 was within the moderate quality band for RA and was found to support a macroinvertebrate community of low taxon richness. High scoring damselfly larvae were recorded. Commonly occurring water beetles, water slaters and water snails were recorded.

8.4.20 The remaining ponds where RA was undertaken within MA03 were assessed to be in the low quality band. Higher scoring taxa such as caddisfly, alderfly, dragonfly or damselfly larvae were not recorded in any of these ponds. Only more common taxa were recorded, and taxon richness was low.

8.4.21 All of these ponds were situated in areas where nearby trees provided extensive shading. Shading often precludes the growth of macrophytes, which would improve water quality and provide habitat for macroinvertebrates. Silty substrate and the presence of leaf litter also reduce water quality and increase turbidity, creating less favourable conditions for higher scoring taxa.

8.4.22 Pond CH131342-CH434587_L5118_PS2_Pond317_080622 did not support any plant species of conservation concern, as listed within the Cheshire VC58 Rare Plant Register, the Vascular Plant Red Data List, or listed as Species of Principal Importance. Four species of plant were recorded: remote sedge, soft rush, bittersweet nightshade and common duckweed (*Lemna minor*). The pond supported a macroinvertebrate community of very low taxon richness, comprising commonly occurring diving beetles (Dytiscidae), freshwater bivalve molluscs (Sphaeriidae), water slaters (Asellidae) and midge larvae. The ASPT score suggested probable severe pollution and the PSYM quality category for the pond was assessed as very poor.

8.4.23 Pond CH131342-CH434587_L5118_PS2_Pond318_080622 did not support any plant species of conservation concern, as listed within the Cheshire VC58 Rare Plant Register, the Vascular Plant Red Data List, or listed as Species of Principal Importance. Four species of plant were recorded, remote sedge, bittersweet nightshade, common duckweed and brooklime (*Veronica beccabunga*). The pond supported a macroinvertebrate community of very low taxon richness, comprising commonly occurring water boatmen (Corixidae), water beetles (Hydrophilidae), water slaters and midge larvae. Rat-tailed maggot (Syrphidae) was also recorded. The ASPT score suggested probable severe pollution and the PSYM quality category for the pond was assessed as very poor.

8.4.24 Pond CH586994-CH587547_L5198_PS2_Pond387_090622 did not support any plant species of conservation concern, as listed within the Cheshire VC58 Rare Plant Register, the Vascular Plant Red Data List, or listed as Species of Principal Importance. Four species of plant were recorded, soft rush, common duckweed, great willowherb (*Epilobium hirsutum*) and Himalayan balsam (*Impatiens glandulifera*). Himalayan balsam is an invasive non-native species. The pond supported a macroinvertebrate community of very low taxon richness, comprising commonly occurring water beetles (Hydrophilidae), diving beetles, water slaters

and midge larvae. The ASPT score suggested probable severe pollution and the PSYM quality category for the pond was assessed as very poor.

8.4.25 Pond Multiple_ L5290_PS2_Pond458_090622 did not support any plant species of conservation concern, as listed within the Cheshire VC58 Rare Plant Register, the Vascular Plant Red Data List, or listed as Species of Principal Importance. Soft rush was the only plant species recorded. The pond supported a macroinvertebrate community of very low taxon richness, comprising commonly occurring water boatmen, water beetles (Hydrophilidae) and midge larvae. The ASPT score suggested probable moderate pollution and the PSYM quality category for the pond was assessed as very poor.

Hulseheath to Manchester Airport (MA06)

8.4.26 A total of four ponds were surveyed within MA06 between January 2021 and June 2022, inclusive. Of these:

- three ponds located within a 50m buffer of the land required for the AP2 revised scheme were surveyed using RA methodology; and
- three ponds located within the land required for the AP2 revised scheme were surveyed using PSYM methodology.

Rapid Assessment (RA)

8.4.27 RA surveys were undertaken on three ponds within MA06, see Table 30.

Table 30: Summary of the results of the RA surveys for MA06[40]

Ecology survey code	Pond description	Invertebrates									Quality score	Quality band	Approximate distance and orientation from land required for the AP2 revised scheme and NGR (centre point)
		Caddis (Tricoptera)	Alderflies (Megaloptera), dragonflies and damselflies (Odonata)	Water beetles (Coleoptera)	Water bugs (Hemiptera)	Mayflies (Ephemeroptera)	Shrimps (Amphipoda)	Water slaters (*Isopoda*)	Water snails (Gastropoda)	Worms (Oligochaeta), fly larvae (Diptera) and leeches (Hirudinea)			
Multiple_ L46431_PS1_Pond2906_260521	585m^2 Pond in fenced-off area adjacent to field. Unshaded. Submerged and emergent macrophytes. Some filamentous algae.	1	0, 1, 1	1	1	1	0	1	0	1	47	Good	33m south SJ7860181589
CH230809_L21079_PS1_Pond952_190521	84m^2 Unshaded, man-made, garden pond. High diversity of submerged and emergent macrophytes.	1	0, 1, 1	1	1	1	0	1	1	1	53	Excellent	46m north-west SJ7246283787
Multiple_ L5796_PS1_Pond443_220921	686m^2 Pond in woodland. Heavily shaded. Algae at surface. Turbid	0	0, 0, 0	1	1	0	1	1	0	1	17	Low	10m north SJ7888383982

[40] 1 = present, 0 = absent

Ecology survey code	Pond description	Invertebrates									Quality score	Quality band	Approximate distance and orientation from land required for the AP2 revised scheme and NGR (centre point)
		Caddis (Tricoptera)	Alderflies (Megaloptera), dragonflies and damselflies (Odonata)	Water beetles (Coleoptera)	Water bugs (Hemiptera)	Mayflies (Ephemeroptera)	Shrimps (Amphipoda)	Water slaters (*Isopoda*)	Water snails (Gastropoda)	Worms (Oligochaeta), fly larvae (Diptera) and leeches (Hirudinea)			
	water. Low diversity of submerged and emergent macrophytes. Low water level. Leaf litter and woody debris.												

Predictive System for Multimetrics (PSYM)

8.4.28 PSYM surveys were undertaken on three ponds within MA06, see Table 31.

Table 31: Summary of the results of the PSYM surveys for MA06

Ecology survey code	Pond/canal description	Plants			Invertebrates			General Quality Assessment (GQA)	Approximate distance and orientation from land required for the AP2 revised scheme and NGR (centre point)
		Number of submerged and emergent plant species	Trophic ranking score for submerged and emergent plants	Number and species of uncommon plant species	Average Score Per Taxon (ASPT)	Number of dragonfly (*Odonata*) and alderfly (*Megaloptera*) families	Number of beetle (*Coleoptera*) families		
CH153264_L46533_PS2_Pond1807_090622	Pond dry at time of survey	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Within SJ7778082277
Multiple_L5290_PS2_Pond1601_090622	Pond dry at time of survey	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Within SJ7219484306
L5290_PS2_Pond1602_090622	Pond dry at time of survey	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Within SJ7218384312

Discussion

8.4.29 Pond CH230809_L21079_PS1_Pond952_190521 was within the excellent quality band for RA and was found to support a macroinvertebrate community of high taxon richness. High scoring caddisfly, dragonfly and damselfly larvae were recorded. Commonly occurring water beetles, water bugs, mayfly larvae, water slaters, water snails, worms and leeches were recorded.

8.4.30 Pond Multiple_ L46431_PS1_Pond2906_260521 was within the good quality band for RA and was found to support a macroinvertebrate community of high taxon richness. High scoring caddisfly, dragonfly and damselfly larvae were recorded. Commonly occurring water beetles, water bugs, mayfly larvae, water slaters, worms and leeches were recorded.

8.4.31 Pond Multiple_ L5796_PS1_Pond443_220921 was within the low quality band for RA, only supporting water beetles, water bugs, freshwater shrimp and commonly occurring water slaters, worms and leeches. Taxon richness was moderate. The pond was heavily shaded by surrounding woodland. Shading limits the growth of macrophytes, which would otherwise improve water quality and provide habitat for macroinvertebrates. Additionally, the decomposition of leaf litter in the pond may cause anoxia, which is not generally tolerated by high scoring taxa.

9 Aquatic Invertebrates

9.1 Introduction

9.1.1 This section sets out ecological baseline data relating to aquatic invertebrates not reported in the main BID documents that accompanied the main ES. It should be read in conjunction with main BID report, Ecological baseline data – white clawed crayfish and other invertebrates (see main BID EC-012-00001), which accompanied the main ES.

9.2 Methodology

9.2.1 Details of the standard methodology used for aquatic invertebrates are provided in the Technical note – Ecology and biodiversity – Ecological field survey methods and standards, which is included within the SMR[5] which accompanied the main ES. This SES2 and AP2 ES should be read in conjunction with the main ES.

9.2.2 The scoping and desk study exercises and surveys reported in the main ES can be found in the BID EC-012-00001, that accompanied the main ES. This section contains the outcomes of surveys undertaken that were not reported in the main BID document that accompanied the main ES. This is either because the survey reporting process had not been completed to inform the assessment within the main ES, or because the surveys have been undertaken since production of the main ES.

9.2.3 Invertebrate samples were identified to standard mixed-taxon level. The results were then used to calculate pressure-specific biotic indices for each site:

- Whalley, Hawkes, Paisley and Trigg (WHPT) metric – used as an indicator of general degradation including organic pollution in watercourses;
- WHPT Average Score Per taxon (ASPT) – used as an indicator of organic pollution and more reliable than WHPT alone in cases of low taxon richness for watercourses;
- WHPT Number of Taxa (N-Taxa) – used as an indicator of aquatic invertebrate diversity;
- Proportion of Sediment-sensitive Invertebrates (PSI) – used to indicate the level of sedimentation at a site (flowing water only);
- Lotic Invertebrate index for Flow Evaluation (LIFE) – used to evaluate the flow regime at a site (flowing water only);
- Community Conservation Index (CCI) – used to indicate the conservation value of aquatic invertebrates at a site (flowing and still water); and
- Ecological Quality Ratios (EQR) – calculated from the River Invertebrate Classification Tool (RICT) to assign a Water Framework Directive (WFD) class.

9.2.4 A summary of locations at which aquatic invertebrate surveys were undertaken between July 2021 and June 2022 inclusive within MA01 to MA03, and between January 2021 and June 2022 inclusive within MA06 to MA08, is provided in Table 32 and shown in the BID, Ecology and biodiversity Map Book: Map Series EC-12 which accompanies SES2 and AP2 ES.

Table 32: Summary of aquatic invertebrate field surveys undertaken

Ecology survey code	Watercourse name	Feature type	Survey date	CA	Approximate distance and orientation from land required for the AP2 revised scheme	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Multiple_L5841_IA1_250522	Tributary of Timperley Brook 1	Stream	25 May 2022	MA06	28m north-west	Y	Y
Multiple_L5157_IA1_160421	Fairywell Brook	Main river	16 April 2021	MA07	66m north-west	Y	Y

9.2.5 Table 33 summarises the biotic indices calculated for the aquatic invertebrate survey locations for MA06 and MA07. No surveys were undertaken in MA01 to MA03 between July 2021 and June 2022 inclusive. Additionally, no surveys were undertaken in MA08 between January 2021 and June 2022 inclusive. The table includes notable taxa with a conservation score of 7 and greater and invasive non-native species, where identified. Species with of a lower conservation score (5 and 6) are mentioned in the text only.

Table 33: Summary of biotic indices calculated for aquatic invertebrate survey locations

Ecology survey code	Watercourse / Water body	CA	Total number of taxa in sample	Total abundance in sample	WHPT score	ASPT	N-Taxa	LIFE (family)	CCI	PSI	PSI interpretation	Notable taxa
Multiple_ L5841_IA1_250522	Tributary of Timperley Brook 1	MA06	11	503	47.7	4.34	8	6.13	1.0	30.0	Sedimented	None
Multiple_L5157_IA1_160421	Fairywell Brook	MA07	13	26	24.3	4.10	6	6.00	9.0	22.2	Sedimented	None

9.3 Deviations, constraints and limitations

9.3.1 Due to changing land access permissions, survey sites were only sampled in spring. Ideally, invertebrate samples would be collected in both spring and autumn of the same calendar year for the calculation of robust EQRs. Biotic indices calculated from the single-season data are presented here. However, they cannot be used directly to indicate environmental quality or deterioration in surveyed watercourses as they have not been contextualised by the calculation of EQRs.

9.4 Baseline

Hulseheath to Manchester Airport (MA06)

Tributary of Timperley Brook 1

9.4.1 Tributary of Timperley Brook 1 is within the land required for construction of the AP2 revised scheme.

9.4.2 The site surveyed in spring 2022 was located within a small area of broadleaved woodland. The watercourse was approximately 0.75m wide and 0.07m deep at the point of survey. Flow was low over a mixed substrate of boulders, cobbles and pebbles. No channel or habitat features were recorded as being present.

9.4.3 A total of 503 individual specimens were counted in the sample from 11 taxa. Eight taxa were WHPT scoring. The WHPT score was calculated as 47.7 and the WHPT ASPT was calculated as 4.34.

9.4.4 The CCI of 1.0 indicates that the aquatic invertebrate assemblage of the site was of low conservation value. The LIFE metric indicates that flow was slow. The PSI metric indicates that the site was sedimented.

9.4.5 Freshwater shrimp (*Gammarus pulex/fossarum agg.*) was the most abundant taxon recorded in the spring 2022 sample. Worms (Oligochaeta) and non-biting midge larvae (Chironomidae) were also relatively abundant.

Davenport Green to Ardwick (MA07)

Fairywell Brook

9.4.6 Fairywell Brook will be intersected by the AP2 revised scheme.

9.4.7 The site surveyed in spring 2021 was approximately 0.75m wide and 0.04m deep. There was no perceptible flow at the time of survey. The site was characterised as being a ditch. The bed substrate was recorded as silt.

9.4.8 Overall abundance was low. A total of 26 individual specimens were counted in the sample from 13 taxa. Eight taxa were WHPT scoring. The WHPT score was calculated as 24.3 and the WHPT ASPT was calculated as 4.10.

9.4.9 The CCI of 9.0 indicates that the aquatic invertebrate assemblage of the site was of moderate conservation value. The LIFE metric indicates that flow was sluggish. The PSI metric indicates that the site was sedimented.

9.4.10 The most abundant taxa were freshwater bivalve molluscs (Sphaeriidae), diving beetles (Dystiscidae) and non-biting midge larvae (Chironomidae).

10 Otter

10.1 Introduction

10.1.1 This section sets out ecological baseline data relating to otters not reported in the main BID document that accompanied the main ES, or the BID report that accompanied the SES1 and AP1 ES. It should be read in conjunction with main BID report, Ecological baseline data – otter and water vole (see main BID EC-010-00001), which accompanied the main ES, and BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES.

10.2 Methodology

10.2.1 Details of the standard methodology used for otter surveys are provided in the Technical note – Ecology and biodiversity – Ecological field survey methods and standards, which is included within the SMR[5] which accompanied the main ES.

10.2.2 The scoping and desk study exercises and surveys reported in the main ES can be found in BID EC-010-00001, which accompanied the main ES. This section contains the outcomes of surveys undertaken between:

- August 2021 and June 2022 inclusive for MA01, MA02 and MA03 which were completed since publication of BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES; and
- February 2021 and June 2022 inclusive for MA06, MA07 and MA08 which were completed since publication of the main BID report, Ecological baseline data – otter and water vole (see main BID EC-010-00001), which accompanied the main ES.

10.2.3 Desk study records are presented in the main ES BID report as no new records have been provided for the sites subject to survey in 2021 and 2022.

10.2.4 Table 34 summarises those sites that were subject to additional survey for otter.

Table 34: Summary of sites subject to additional otter survey

Watercourse or water body and site name	Feature type	OS grid reference (start and finish)	Level of access within required extent	Ecology survey code	Survey dates	CA	Distance from the land required for construction of the AP2 revised scheme (m) and orientation	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
Wade Brook	River	SJ70487336 to SJ68527434	Moderate	BT11-S001	13 January 2022 9 June 2022	MA02	Within	Y	Y
Tributary of Peover Eye	River	SJ70547516 to SJ70767529	Moderate	BT10_S011	13 January 2022	MA02	Within	Y	Y
Tributary of Smoker Brook 2	River	SJ71027620 to SJ70997664	Moderate	BT10_S001	13 January 2022	MA03	Within	Y	Y
Tabley Brook and Tributary 2	River	SJ70827861 to SJ71167906 and SJ70617125 to SJ79797973	Moderate	BT09_S006 and BT08_S001	11 January 2022 12 January 2022	MA03	Within	Y	Y
Sugar Brook	River	SJ78878163 to SJ76818330	Low	BT20_S001	7 July 2021	MA06	Within	Y	Y
River Bollin	River	SJ79628406 to SJ79628411	Low	BT03_S008	29 September 2021	MA06	Within	Y	Y
Drain to M56 1	Drain	SJ79817993 to SJ84628474	Low	BT03_S002	29 September 2021	MA06	Within	Y	Y

10.3 Deviations, constraints and limitations

10.3.1 Every effort was made to establish as complete a picture as possible of otter activity and to fully record the presence of otters and their resting places. However, the following constraints and limitations were encountered:

- field surveys were limited to locations where landowner permission had been obtained. As a result, surveys were not undertaken at potentially suitable locations due to landowner access restrictions;
- surveys were carried out from both banks of the watercourse where possible. However, at some locations access or health and safety constraints prevented this;
- at some locations, topography and vegetation structure restricted surveys by reducing access and visibility, therefore there is the potential for evidence to have been under-recorded;
- in order to complete the maximum number of surveys within the available survey timeframe, some surveys were completed during periods when water levels were high and/or after periods of heavy rainfall. While signs of otter activity can still be detected under such conditions, evidence may be under recorded as field signs may have been washed away or be less visible, thus reducing the confidence in negative results obtained during these surveys;
- due to limitations regarding land access within the available survey timeframe, it was not possible to carry out four survey visits to all sites or to carry out surveys at three-monthly intervals. This resulted in fewer opportunities for encountering otter field signs in a restricted survey season. Evidence of otter activity at the sites where fewer surveys were carried out, or where the interval between surveys was shorter, may be under recorded for these sites. This reduces the confidence in any negative results obtained during surveys at these sites; and
- due to significant land access constraints, a deviation was approved whereby otter surveys were undertaken only along those watercourses and on those water bodies within 100m (instead of 300m) of the land required for the construction of the AP2 revised scheme. Where watercourses were at least in part within the land required for the construction of the AP2 revised scheme, watercourses were subject to surveys to a 300m (instead of 2km) extent both upstream and downstream of where they cross the land required for the construction of the AP2 revised scheme.

10.3.2 Otters are highly mobile, range over large distances, therefore, in drawing conclusions on the presence of otters on watercourses/water bodies within each of the CAs a precautionary approach has been adopted, taking into consideration the above deviations, constraints and limitations. For example, where access was restricted, or where fewer than four surveys were possible, if suitable habitat exists then it has been assumed that otters are present.

10.4 Baseline

10.4.1 Stretches of watercourses or water bodies were scoped out from detailed otter survey where there was a lack of suitable habitat (rivers, streams and large water bodies) within and up to 100m of land required for the AP2 revised scheme. Scoping-out decisions took account of the presence of barriers to dispersal, availability of suitable terrestrial breeding habitats, adjoining land use, level of disturbance, depth, flow and width of watercourse, connectivity and pollution.

Hough to Walley's Green (MA01)

10.4.2 No additional otter surveys were carried out on watercourses crossed by land required for the AP2 revised scheme in MA01 between August 2021 and June 2022 inclusive.

Wimboldsley to Lostock Gralam (MA02)

10.4.3 Surveys were undertaken on two watercourses (Wade Brook and an unnamed tributary of the Peover Eye) between August 2021 and June 2022 inclusive. Although suitable habitat for otter was present, no holts or potential holts were recorded. No evidence of otter was recorded. Despite the lack of evidence of presence, otter is considered likely to utilise all watercourses within MA02 for foraging and/or commuting. This is consistent with the main BID document that accompanied the main ES (see main BID EC-010-00001) and the BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES, where only limited signs of activity were reported.

Wade Brook

10.4.4 Two surveys with a moderate level of access to the watercourse were undertaken from the southern bank only in 2022. No evidence of otter activity was recorded. Within and adjacent to the land required for the AP2 revised scheme, there was suitable terrestrial breeding habitat in the proximity of the watercourse. This includes woodland habitat within the land required for the construction of the AP2 revised scheme. A potential laying up site was recorded at SJ702773445 during surveys carried out in June 2022, within the land required for the AP2 revised scheme.

10.4.5 Although field surveys returned no evidence of otter activity, due to the presence of suitable habitat and the connectivity with the Trent and Mersey Canal, it is assumed that they will make use of the Wade Brook for foraging and commuting. This is consistent with the main BID document that accompanied the main ES (see main BID EC-010-00001), and with the

results of the Fifth National Otter Survey[41], which states that otter is widely distributed to the south of Warrington and Manchester but at a low population level.

Unnamed Tributary of the Peover Eye

10.4.6 A single survey with moderate access to the watercourse was undertaken in 2022. No evidence of otter activity was recorded. Field surveys were obscured by vegetation, restricting access, which may have caused some signs to be missed.

10.4.7 Within and adjacent to the land required for the AP2 revised scheme, there was extensive suitable terrestrial breeding habitat in the proximity of the watercourse. This includes Plumley Lime Beds Site of Special Scientific Interest (SSSI), Mill Wood, Winnington Wood, Peas Wood, Smoker Wood and Leonard's Wood. Despite the lack of evidence of otter activity from surveys carried out in 2022, it is considered that otter will make use of the interconnected Smoker Brook, Peover Eye and Wincham Brook for foraging and as corridors for movement in addition to breeding. This is consistent with the results of the main BID document that accompanied the main ES (see main BID EC-010-00001), and with the results of the Fifth National Otter Survey[32], which states that otter is widely distributed to the south of Warrington and Manchester but at a low population level.

Pickmere to Agden and Hulseheath (MA03)

10.4.8 Surveys were undertaken on three watercourses (Smoker Brook Tributary 2, Tabley Brook and Tributary of Tabley Brook 2) between August 2021 and June 2022 inclusive. Although suitable habitat for otter was present, no holts or potential holts were recorded. Evidence of otter presence was restricted to a possible spraint along Tabley Brook 40m east of the land required for the AP2 revised scheme. This is in line with the limited evidence reported in the main BID document that accompanied the main ES (see main BID EC-010-00001). Despite the limited evidence of presence recorded, otter is considered likely to utilise all watercourses within MA03 for foraging and/or commuting.

10.4.9 This is consistent with main BID document that accompanied the main ES (see main BID EC-010-00001) and the BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES, where only limited signs of activity were reported.

Smoker Brook Tributary 2

10.4.10 A single survey with a moderate level of access to the watercourse was undertaken in 2022. No evidence of otter activity was recorded. Field surveys were obscured by dense vegetation,

[41] Environment Agency (2010), *Fifth otter survey of England 2009 – 2010*.

restricting access which may have caused some signs to be missed. Although adjacent woodland provides suitable breeding cover, the water level was low, limiting foraging and breeding opportunities.

10.4.11 Within and adjacent to the land required for the AP2 revised scheme, there was extensive suitable terrestrial breeding habitat in the proximity of the watercourse, including Winnington Wood, Peas Wood, Smoker Wood and Leonard's Wood. Despite the lack of evidence of otter activity from surveys carried out in 2022, it is assumed that otter will make use of the interconnected Trent and Mersey Canal, Wincham Brook, Smoker Brook and Peover Eye, for foraging and as a corridor for movement. This is consistent with the main BID document that accompanied the main ES (see main BID EC-010-00001), the BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES and with the results of the Fifth National Otter Survey[32], which states that otter is widely distributed to the south of Manchester but at a low population level.

Tabley Brook and Tributary 2

10.4.12 A single survey with a moderate level of access was undertaken for Tabley Brook and the associated Tributary 2 in 2022. Signs of otter were restricted to a single possible spraint recorded at SJ70957898, approximately 40m east of land required for the AP2 revised scheme. Access constraints meant that the Brook could only be viewed from a distance and therefore some signs may have been missed.

10.4.13 Whilst surveyed habitats within the land required for the revised AP2 scheme were disturbed by cattle and are largely unsuitable for breeding, Tabley Book is connected to suitable terrestrial breeding habitat in the proximity of the watercourses. This includes that of Tableypipe Wood, Square Wood, Kennel Wood and Belt Wood. Given the lack of field signs recorded, breeding is considered unlikely.

10.4.14 Evidence of otter presence in the wider Smoker Brook catchment was recorded in 2018 and 2019, including three potential holts recorded close to Tabley Brook. Whilst there was no evidence of breeding recorded for Tabley Brook, and despite the lack of evidence of otter activity from surveys carried out in 2022, it is assumed that otter will make use of the watercourse for foraging and as a corridor for movement. This is consistent with the main BID document that accompanied the main ES (see main BID EC-010-00001), the BID report, Ecological baseline data – other (see BID EC-017-00000 SES1 and AP1 ES), which accompanied SES1 and AP1 ES and with the Fifth National Otter Survey[32] which states that otter is widely distributed to the south of Manchester but at a low population level. Further, evidence of otter presence in the wider River Bollin catchment has been known since at least 1995[32].

Hulseheath to Manchester Airport (MA06)

10.4.15 Surveys were undertaken on three watercourses (Sugar Brook, Drain to M56 1 and River Bollin) between February 2021 and June 2022 inclusive. Although suitable habitat for otter was present, no holts or potential holts were recorded. No evidence of otter activity was recorded. Despite the limited evidence of presence recorded in 2021-2022 and evidence restricted to five potential holts close to the River Bollin and three along Millington Clough in the main BID document (see BID EC-010-00001), otter is considered likely to utilise the majority of watercourses within MA06 for foraging and/or commuting. Due to a lack of suitable habitat and connectivity with the wider landscape, otter is considered absent from the Drain to M56 1 (BT03_S002).

10.4.16 This is consistent with main BID document that accompanied the main ES (see main BID EC-010-00001), where only limited signs of activity were reported.

Sugar Brook

10.4.17 A single survey with a low level of access was undertaken in 2022. No evidence of otter presence was recorded. Field surveys were obscured by vegetation, restricting access to the watercourse banks, which may have caused some signs to be missed.

10.4.18 Within and adjacent to the land required for the AP2 revised scheme there was suitable terrestrial breeding habitat in the proximity of the watercourse. The Brook is connected to suitable terrestrial breeding habitat including Rostherne Mere SSSI and Ramsar site to the south. Evidence of otter presence in the wider River Bollin catchment has been known since at least 1995[32]. Despite the lack of evidence of activity from surveys carried out in 2022, it is assumed that otter will make use of the river and adjacent water bodies for foraging and as a corridor for movement. This is consistent with the main BID document that accompanied the main ES (see main BID EC-010-00001), the SES1/AP1 BID and with the results of the Fifth National Otter Survey[32], which states that otter is present at low population levels on most of the rivers and canals in this area.

River Bollin

10.4.19 A single survey with a low level of access was undertaken in September 2021. No evidence of otter presence was recorded. Field surveys were obscured by vegetation, including dense stands of Himalayan balsam, restricting access, which may have caused some signs to be missed.

10.4.20 Within and adjacent to the land required for the AP2 revised scheme there was extensive suitable terrestrial breeding habitat in the proximity of the watercourses. This includes broadleaved woodland located at Cotterill Clough SSSI, Mill Wood (including Mill Wood and Castle Mill Local Wildlife Site) and Sunbank Wood. However, given the limited field signs, breeding is considered unlikely. Evidence of otter presence in the wider River Bollin

catchment has been known since at least 1995 and despite the lack of evidence of activity from surveys carried out in 2021, it is assumed that otter will make use of the river for foraging and as a corridor for movement. This is consistent with the main BID document that accompanied the main ES (see main BID EC-010-00001), and with the results of the Fifth National Otter Survey[32], which states that otter is present at low population levels on most of the rivers and canals in this area.

Drain to M56 1

10.4.21 A single survey with a low level of access was undertaken in September 2021. No evidence of otter presence was recorded. Field surveys were obscured by vegetation, restricting access to the watercourse banks, which may have caused some signs to be missed. The suitability of the watercourse for foraging and commuting was limited by poor connectivity with the wider landscape, coupled with low water levels. As such, it is considered that otter is absent from the watercourse.

Davenport Green to Ardwick (MA07)

10.4.22 No additional otter surveys were carried out on watercourses crossed by land required for the AP2 revised scheme in MA07 between January 2021 and June 2022 inclusive.

Manchester Piccadilly Station (MA08)

10.4.23 No additional otter surveys were carried out on watercourses crossed by land required for the AP2 revised scheme in MA08 between January 2021 and June 2022 inclusive.

11 Terrestrial invertebrates

11.1 Introduction

11.1.1 This section sets out ecological baseline data relating to terrestrial invertebrates not reported in the main BID document that accompanied the main ES. It should be read in conjunction with main BID report, Ecological baseline data – white-clawed crayfish and other invertebrates (see main BID EC-012-00001), which accompanied the main ES.

11.2 Methodology

11.2.1 Details of the standard methodology used for invertebrate surveys are provided in the Technical note – Ecology and biodiversity – Ecological field survey methods and standards (FSMS), which is included within the SMR which accompanied main ES. The ISIS assessment system detailed in the FSMS has been superseded by a newer assessment system by Natural England called Pantheon[48], which includes a larger species pool for assessment and provides a more robust assessment. Surveys were conducted in June 2022.

11.2.2 Following the approach outlined in the FSMS, the requirement for detailed invertebrate surveys has been based on:

- the results of a desk study;
- interpretation of aerial photography and Phase 1 Habitat Surveys to identify habitats that may be suitable for breeding or that may be important for maintenance of at least one part of an invertebrate's life cycle (e.g. foraging habitat, overwintering habitat for eggs/larvae etc.); and
- screening of sites using expert opinion.

11.2.3 Desk study records relating to terrestrial invertebrates are presented in the main ES BID report, as no new records have been provided for the sites subject to survey in 2021 and 2022.

11.2.4 The status of species of conservation concern was taken from the Joint Nature Conservation Committee database of species designations[42].

11.2.5 Initial conservation assessments of species were largely based on rarity, whilst subsequent to 2001, IUCN criteria[43] have been applied to selected groups of invertebrates based on a degree of threat rather than rarity. The process of re-assessment is ongoing and not all

[42] Joint Nature Conservation Committee. Available online at: http://jncc.defra.gov.uk/page-3408.

[43] International Union for Conservation of Nature (2001), IUCN Red List Categories and Criteria, Version 3.1, Gland, Switzerland. Available online at: http://www.iucnredlist.org.

invertebrates have been reassessed. Consequently, the two criteria for assessment are currently in place. Where groups of invertebrates have been reassessed the most current IUCN criteria[44] are used.

11.2.6 Notable species, i.e. those of conservation concern, are defined as follows:

- Nationally Notable – species known or likely to be present in 16 – 100 10km squares of the Ordnance Survey National Grid in the UK. For some invertebrate species this is further refined as Notable-A (Na) for species thought to occur in 30 or fewer 10km squares and Notable-B (Nb) for those thought to occur in 31 – 100 10km squares of the National Grid;
- Nationally Scarce – a term now largely superseding Nationally Notable and defined as species in 16 – 100 10km squares of the National Grid;
- Nationally Rare – defined as species that occur in 15 or fewer 10km squares of the National Grid in Britain and is used in Site of Special Scientific Interest (SSSI) designation and common standards monitoring[45];
- Red Data Book species – species occurring in fewer than 16 10km squares of the National Grid, divided as:
  - endangered (Red Data Book 1) for species known from a single population or in continuous recent decline and now known from five or fewer 10km squares;
  - vulnerable (Red Data Book 2) likely to become endangered (Red Data Book 1) if causal factors continue;
  - rare (Red Data Book 3) species at risk but not qualifying as vulnerable;
  - Red Data Book K for species insufficiently known but likely to qualify at least as rare;
  - these are respectively abbreviated as RDB1, RDB2, RDB3 and RDBK;
- IUCN criteria can be applied to Nationally Scarce and Nationally Rare species dependent on degree of threat, which is defined as follows:
  - Critically Endangered (CR), based on Area of Occupancy (AoO) of a single location or range of less than 10km^2;
  - Endangered (EN), based on an AoO of at least 2 locations and up to five hectads[46] and a range of less than 500km^2;

[44] International Union of Conservation of Nature (2012), IUCN Red List Categories and Criteria, Version 3.1, 2nd Edition, IUCN Species and Survival Commission, Gland, Switzerland. Available online at: http://www.iucnredlist.org.

[45] Some statuses are placed in square brackets, e.g. [Nationally Rare] to reflect the unreliability of a status that is still awaiting formal review (Webb et. al, 2018).

[46] A hectad is a grid square 10km by 10km (i.e. 100km^2) used in the determination of animal or plant species distribution.

  - Vulnerable (VU), based on an AoO of five to 10 hectads and a range of less than 2,000km^2;
  - Near Threatened (NT), where the species does not currently qualify as Critically Endangered, Endangered or Vulnerable but could do so in the future if current decline factors continue;
  - Least Concern (LC), applied to widespread species not considered under threat;
  - Data Deficient (DD)[47], is included for species for which limited distribution / population data are available for assessment; and
- Species of Principal Importance as listed in Section 41 of the National Environment and Rural Communities Act, 2006.

11.2.7 The Pantheon system[48] is used to allocate species to assemblage types and to allow a standardised comparison of the habitats of importance at sites. Pantheon gives the habitat requirements, broad assemblage type and (for more specialist species) a Specific Assemblage Type (SAT) for most species. For certain groups such as *Aculeate Hymenoptera* (bees, ants and wasps) statuses in Pantheon are currently being revised and the most recent status is provided for those species. For species not included in Pantheon, the habitat requirements were taken from authoritative field guides or other literature.

11.2.8 Table 35 summarises those locations where surveys for terrestrial invertebrates were undertaken between January 2021 and June 2022. This information is cross referenced to the BID, Ecology and biodiversity Map Book: Map Series EC-11, which accompanies SES2 and AP2 ES, with Ecology survey code abbreviated for consistency with the main ES terrestrial invertebrate data.

[47] The alder leaf beetle *Agelastica alni* is included in the Data Deficient category having previously been extinct but re-established since 2000. Current evidence on NBN Atlas suggests it is increasing its range and is now recorded in excess of 100 km^2 in Britain and is therefore more common than a Nationally Scarce or Nationally Rare status.

[48] Pantheon is an analytical tool developed by Natural England and the Centre for Ecology and Hydrology to assist in the study of invertebrates. Available online at: http://www.brc.ac.uk/pantheon/.

Table 35: Summary of terrestrial invertebrate field surveys undertaken

Ecology survey code	Survey site name	Location	Centroid OS grid reference	Habitat types included in survey	Survey date(s)	CA	Distance from the land required for the AP2 revised scheme (m) and orientation	Relevant to SES2 (Y/N)	Relevant to AP2 (Y/N)
L5212	Land north of Millington Clough	North of Millington Clough	SJ72338483	Grazed fields with deciduous woodland	30 June 2022	MA06	Within	Y	Y
L5841	Flaxhigh Covert	North-east of Hale Barns	SJ80138569	Mixed woodland	29 June 2022	MA06	Within	Y	Y

11.3 Deviations, constraints and limitations

11.3.1 As set out in the FSMS, standard survey methodology was followed, and 2022 surveys were carried out on sunny, warm days with light breeze.

11.3.2 Delays in granting access resulted in a delayed field season and it was not possible to undertake spring invertebrate surveys in 2021 at MA06 sites detailed in Section 11.4 until 2022.

11.4 Baseline

11.4.1 No additional terrestrial invertebrate surveys were carried out on land required for the AP2 revised scheme in MA01, MA02, or MA03, between August 2021 and June 2022 inclusive.

11.4.2 Similarly, no additional terrestrial invertebrate surveys were carried out on land required for the AP2 revised scheme in MA07 or MA08 between January 2021 and June 2022 inclusive.

Hulseheath to Manchester Airport (MA06)

Notable/protected species recorded

11.4.3 Field surveys within MA06 recorded one notable species, the [Nationally Rare] (DD) alder leaf beetle, which is an arboreal species recorded from the woodland to the north of Millington Clough and Flaxhigh Covert.

Discussion and summary

11.4.4 The land to the north of Millington Clough is an area of low intensity cattle pasture fringed by remnant deciduous woodland and riparian margin habitats including tall ruderals and within the land required for the construction of the AP2 revised scheme. Surveys in this location recorded 104 terrestrial invertebrate species, including the alder leaf beetle ([Nationally Rare] (DD)). The remaining species recorded were common and widespread and typical of the habitat types present within the surveyed areas. Four SATs[49] (F001 – scrub edge, F002 – rich flower resource, A211 – heartwood decay and A212 – bark & sapwood decay) are present but none qualify as being in favourable condition.

11.4.5 Flaxhigh Covert is a small mixed woodland to the north-east of Hale Barns and within the land required for the construction of the AP2 revised scheme. Surveys in this location

[49] The Pantheon system is used to allocate species to assemblage types and to allow a standardised comparison of the habitats of importance at sites. Pantheon gives the habitat requirements, broad assemblage type and (for more specialist species) a Specific Assemblage Type (SAT) for most species.

recorded 59 terrestrial invertebrate species. The species were common and widespread and typical of the habitat types present within the surveyed areas. Three SATs[49] (F002 – rich flower resource, A211 – heartwood decay and A213 – fungal fruiting bodies) are present but none qualify as being in favourable condition.

Table 36: Protected and/or notable invertebrate species identified during terrestrial invertebrate survey in MA06

Ecology survey code	Common name	Scientific name	Status	Survey site name/ location	Habitat	Survey date(s)	CA
L5212	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Land north of Millington Clough	Arboreal (esp. alder)	20 August 2020 and 30 June 2022	MA06
L5841	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Flaxhigh Covert	Arboreal (esp. alder)	29 June 2022	MA06

11.4.6 Using Pantheon, the quality of a SAT can be determined by the number of the specialist species occurring within it. If the number of specialist species exceeds the benchmark for a given habitat, then the assemblage type is said to be in a favourable condition and therefore a qualifying SAT at the site concerned.

11.4.7 Table 37 provides a summary of habitats identified for sites from Pantheon which contained qualifying assemblages of terrestrial invertebrates within MA06 for which surveys were undertaken between January 2021 and June 2022 inclusive.

Table 37: Pantheon qualifying Specific Assemblage Types represented based on terrestrial invertebrate survey results within MA06

Ecology survey code	Survey site name/ location	Number of Pantheon SAT represented	Qualifying SAT recorded	CA
L5212	Land north of Millington Clough	4	None	MA06
L5841	Flaxhigh Covert	3	None	MA06

12 References

Botanical Society of Britain and Ireland, Cheshire VC58 County Rare Plant Register (2015). Available online at: https://bsbi.org/wp-content/uploads/dlm_uploads/Cheshire_RDB_2015.pdf.

BRIG (2011). UK Biodiversity Action Plan: Priority Habitat Descriptions. JNCC, Peterborough. Available online at: UK Biodiversity Action Plan: Priority Habitat Descriptions (2008, revised 2011) | JNCC Resource Hub.

Cheffings, C.M. & Farrell, L. (Eds), Dines, T.D., Jones, R.A., Leach, S.J., McKean, D.R., Pearman, D.A., Preston, C.D., Rumsey, F.J., Taylor, I. (2005), *The Vascular Plant Red Data List for Great Britain*. Species Status 7: 1-116. Joint Nature Conservation Committee, Peterborough. Available online at: The Vascular Plant Red Data List for Great Britain (jncc.gov.uk).

Cheshire and Wirral Ornithological Society (2022), *Cheshire and Wirral Bird Report 2020*. Available online at: www.cawos.org.

Cheshire Wildlife Trust (2007), Cheshire region Biodiversity Action Plan. Available online at: https://www.cheshirewildlifetrust.org.uk/biodiversity.

Department for Environment, Food and Rural Affairs (2007), *Hedgerow Survey Handbook: A standard procedure for local surveys in the UK*, 2nd edition, Defra, London.

Directive 2009/147/EC of the European Parliament and of the council of 30 November 2009 on the Conservation of Wild Birds, European Parliament and Council, Brussels.

Environment Agency (2010), *Fifth otter survey of England 2009 – 2010*.

Giles, R. (2014), *Local Wildlife Site Selection Criteria for the Cheshire Region*, Cheshire Wildlife Trust, Malpas.

GMLRC, Greater Manchester Local Record Centre (2009), *Greater Manchester Biodiversity Action Plan*. Available online at: https://gmlrc.org/projects/gm_bap/.

High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data.* Available online at: https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement.

High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Background Information and Data accompanying Supplementary Environmental Statement 1 and Additional Provision 1 Environmental Statement.* Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-supplementary-environmental-statement-1-and-additional-provision-1-environmental-statement.

High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement*. Available online at: https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement.

High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement, Environmental Impact Assessment Scope and Methodology Report,* Volume 5, Appendix CT-001-00001. Available online at: https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement.

High Speed Two Ltd (2023), High Speed Rail (Crewe – Manchester), *Supplementary Environmental Statement 2 and Additional Provision 2 Environmental Statement.* Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-supplementary-environmental-statement-2-and-additional-provision-2-environmental-statement.

International Union for Conservation of Nature (2001), IUCN Red List Categories and Criteria, Version 3.1, Gland, Switzerland. Available online at: http://www.iucnredlist.org.

International Union of Conservation of Nature (2012), IUCN Red List Categories and Criteria, Version 3.1, 2nd Edition, IUCN Species and Survival Commission, Gland, Switzerland. Available online at: http://www.iucnredlist.org.

Joint Nature Conservation Committee. Available online at: http://jncc.defra.gov.uk/page-3408.

Natural Environment and Rural Communities Act 2006. Available online at: http://www.legislation.gov.uk/ukpga/2006/16/section/41.

Peterken, G.F. (1974), *A method for assessing woodland flora for conservation for using Indicator Species.* Biological Conservation, 6, P239-245.

Rare Breeding Birds Panel (RBBP) (2018), *RBBP Species List*. Available online at: https://rbbp.org.uk/wp-content/uploads/2020/11/2018-Report-summary-table.pdf.

Rose, F. (1999), *Indicators of ancient woodland: The use of vascular plants in evaluating ancient woods for nature conservation*, British Wildlife, 10(4), P241-251.

Sites identified on Natural England's Ancient Woodland Inventory. Available online at: https://naturalengland-defra.opendata.arcgis.com/.

Stanbury, A. et al. (2021), *The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain*. British Birds, 114, P723-747.

Thompson, R.J., Butcher, W.G., Williams, P. & Warren, M. (2003), *The use of vascular plants as indicators of ancient woodland in Somerset: The development of a county specific list*, Somerset Archaeology and Natural History.

Webb, J., Heaver, D., Lott, D., Dean, H.J., van Breda, J., Curson, J., Harvey, M.C., Gurney, M., Roy, D.B., van Breda, A., Drake, M., Alexander, K.N.A. and Foster, G. (2018), Pantheon – database version 3.7.6. Available online at: http://www.brc.ac.uk/pantheon/.

Wildlife and Countryside Act (1981 as amended). Available online at: https://www.legislation.gov.uk/ukpga/1981/69/contents.

High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA
Freephone: 08081 434 434
Minicom: 08081 456 472
Email: HS2enquiries@hs2.org.uk