In Parliament – Session 2021 - 2022

HS2

High Speed Rail (Crewe – Manchester)

Background information and data

Ecology and biodiversity

BID EC-012-00001

Ecological baseline data - white-clawed crayfish and other invertebrates

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Department for Transport

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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

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1 Introduction

1.1.1 This report presents a summary of the baseline data relating to:

- terrestrial invertebrates;
- aquatic invertebrates; and
- white-clawed crayfish (*Austropotamobius pallipes*).

1.1.2 Baseline data have been collected for the Proposed Scheme in relation to the following community areas (CA):

- Hough to Walley's Green (MA01);
- Wimboldsley to Lostock Gralam (MA02);
- Pickmere to Agden and Hulseheath (MA03);
- Broomedge to Glazebrook (MA04);
- Risley to Bamfurlong (MA05);
- Hulseheath to Manchester Airport (MA06);
- Davenport Green to Ardwick (MA07); and
- Manchester Piccadilly Station (MA08).

1.1.3 This report should be read in conjunction with Map Series EC-11 and EC-12 in the Background Information and Data, Ecology Map Book.

1.1.4 The Environmental Statement[1] should be referred to for details of the ecology impact assessment.

[1] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement*. Available online at https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement.

2 Terrestrial invertebrates

2.1 Methodology

2.1.1 Details of the standard methodology utilised for invertebrate surveys are provided in Technical Note – Ecology and biodiversity – Ecological Field Survey Methods and Standards (FSMS) included in the Environmental Impact Assessment Scope and Methodology Report (SMR) (see Environmental Statement, Volume 5, Appendix CT-001-00001)[2]. The methods employed were sweep netting, aerial netting, beating, and hand searching of suitable habitats. All surveys were undertaken between June and September 2018, May to September 2019, August to September 2020 and May 2021.

2.1.2 In addition to surveys of specific sites judged to be of high potential value for invertebrates, some survey work was carried out at sites representative of the agricultural habitat within the land required for the construction of the Proposed Scheme.

2.1.3 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.

2.1.4 Desk study records relating to terrestrial invertebrates for the land required for the construction of the Proposed Scheme were obtained from Greater Manchester Record Centre[3], rECOrd (the Local Biological Records Centre serving Cheshire, Halton, Warrington and Wirral - 'the Cheshire Region')[4] and the British Arachnological Society[5].

2.1.5 Along much of the route corridor the data search has been analysed to within 100m of land required for the construction of the Proposed Scheme, although a greater distance is considered, where appropriate (up to 2km).

[2] 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-phase-2b-crewe-manchester-environmental-statement.

[3] GMLRC, Greater Manchester Local Record Centre. Available online at: https://www.gmwildlife.org.uk/.

[4] rECOrd, *Local Biological Records Centre serving Cheshire*. Available online at: http://www.record-lrc.co.uk.

[5] Burkmar, R. and Gallon, R. (2019), *Sibianor larae Logunov, 2001 a Salticidae New to Britain, with Notes on Heliophanus dampfi Schenkel, 1923 and Other Spiders from Holcroft Moss SSSI*, Newsletter of the British Arachnological Society, 144, P2-12.

2.1.6 The status of species of conservation concern was taken from the Joint Nature Conservation Committee database of species designations[6].

2.1.7 Initial conservation assessments of species were largely based on rarity, whilst subsequent to 2001, IUCN criteria[7] 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 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[8] are used.

2.1.8 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[9];
- 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:

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

[7] International Union for Conservation of Nature (2001), IUCN Red List Categories and Criteria, Version 3.1, Gland, Switzerland.

[8] 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.

[9] 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).

- 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[10] and a range of less than 500km^2;
- 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)[11], 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.

2.1.9 Survey work was undertaken between June and September 2018, May and September 2019, August and September 2020 and May 2021. The sampling methods for each habitat followed those proposed by Drake et al. (2007)[12], largely based on sweep and aerial netting, beating and hand searching. Each site was subject to a visual appraisal with one or more stations selected for direct survey. The number of stations was decided according to the size of the site, variety of habitats and the likely species present and their importance. At each station, sampling was undertaken for 50 minutes comprising 30 minutes of hand searching and 20 minutes netting, although this was modified according to the professional judgement of the surveyor. The range of species surveyed largely comprised the target taxa listed by Drake et al. (2007).

2.1.10 The Pantheon system[13] 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 species not included in Pantheon, the habitat requirements were taken from authoritative field guides or other literature.

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

[11] 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.

[12] Drake, C.M., Lott, D.A., Alexander, K.N.A. & Webb, J. (2007), *Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation*, Natural England, Sheffield.

[13] 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/.

2.1.11 Table 1 summarises those locations where surveys for terrestrial invertebrates were undertaken. This information is cross referenced to the accompanying Ecology Map Series EC-11.

Table 1: 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	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
L16111	Near Ironstile Farm	West of Ironstile Farm	SJ70265757	Agricultural improved grassland with scrub edges	28 June 2018	MA01	Within
L5895	Near Spring Plantation	South of Spring Plantation	SJ69685862	Tall ruderal assemblage	28 June 2018	MA01	Within
L5044	Field near Newfield Hall Farm	West of alignment and north of Newfield Hall Farm	SJ68566206	Deciduous woodland	20 June 2018	MA02	Within
L5340	Small Rookery and Wimboldsley Woods	East of Shropshire Union Canal	SJ67846388	Deciduous woodland listed on Ancient Woodland Inventory and improved grassland	4 July 2018	MA02	Within
L5394	Lea Hall	East of Lea Hall	SJ68466408	Deciduous woodland	20 June 2018	MA02	Within
L5382	Yew-Tree Farm	East of Clive Hall Farm	SJ68386586	Mature trees with deadwood	28 June 2018	MA02	Within
L5474	Oak Wood	North of Oldhall Farm	SJ68096781	Deciduous woodland	10 May 2019, 12 July 2019 and 16 September 2019	MA02	Adjacent
L5405	River Dane crossing	South of River Dane crossing	SJ6840 6767	Grazed improved grassland with occasional semi-mature trees	18 July 2018	MA02	Within
L4946	Western banks of Trent and Mersey Canal	North-east of Bostock Hall	SJ68506870	Deciduous woodland	12 July 2019 and 16 September 2019	MA02	Within
L5061	Land between Trent and Mersey Canal and River	North-east of Bostock Hall	SJ68236887	Deciduous woodland and scrub	4 July 2018 and 13 August 2020	MA02	Within

Ecology survey code	Survey site name	Location	Centroid OS grid reference	Habitat types included in survey	Survey date(s)	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
	Dane						
L5168	Banks of Trent and Mersey Canal (west bank)	North-east of Bostock Hall	SJ68276904	Deciduous woodland	31 July 2018, 10 June 2019 and 30 July 2019	MA02	Within
L5168	Banks of Trent and Mersey Canal (east bank)	North-east of Bostock Hall	SJ68286904	Deciduous woodland	13 August 2020, 4 September 2020 and 20 May 2021	MA02	Within
L4926	Banks of Trent and Mersey Canal (north bank)	North of Whatcroft	SJ68167026	Deciduous woodland	18 September 2018 and 30 July 2019	MA02	Within
L5344	Marshall's Gorse	Track off Davenham Road to the north	SJ68477172	Deciduous woodland and improved grassland with occasional mature trees	19 July 2018	MA02	Within
L5489	Long Wood	East of Plumley Lime Beds Nature Reserve	SJ70197492	Deciduous woodland	20 June 2018	MA02	Within
L5855	Winnington Belt	South of A559	SJ70297541	Deciduous woodland listed on the Ancient Woodland Inventory	13 August 2020	MA02	Adjacent and east
L5935	Winnington Wood	Track off Manchester Road	SJ70057566	Deciduous woodland listed on the Ancient Woodland Inventory	5 July 2018, 18 September 2018 and 31 July 2019	MA02	Within
L5197	Peas Wood	Adjacent to Linnards Road	SJ70347576	Deciduous woodland	5 July 2018, 10 June 2019 and 30 July 2019	MA02	Within
L43004	Leonard's Wood	East of Higher Wincham	SJ70127012	Deciduous woodland listed on the Ancient Woodland Inventory	10 May 2019, 12 July 2019 and	MA03	Within

Ecology survey code	Survey site name	Location	Centroid OS grid reference	Habitat types included in survey	Survey date(s)	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
					16 September 2019		
L8877	Smoker Wood	North-east of Lostock Gralam	SJ70707614	Deciduous woodland listed on the Ancient Woodland Inventory	13 August 2020, 4 September 2020 and 20 May 2021	MA03	Within
L5250	Woodside Farm	North-east of Woodside Farm	SJ71738385	Grazed improved agricultural farmland with an isolated woodland	26 June 2018	MA03	Within
L4736	Broom Manor	South of Peacock Lane	SJ72078398	Deciduous woodland	20 June 2018	MA03	Within
L6113	Fox Covert	North-west of Lower Carr Green Farm	SJ70818861	Deciduous woodland surrounded by grazed grassland	19 July 2018	MA04	Within
L5831	Saracen's Head Inn	North-west of Mossbrow Farm	SJ70638937	Deciduous woodland with dense scrub	20 June 2018	MA04	Within
L5926	Part of Coroner's Wood	East of Millbank Hall Farm	SJ7069 9090	Deciduous woodland listed on the Ancient Woodland Inventory	19 September 2018, 10 May 2019 and 29 July 2019	MA04	Adjacent
L21077	Rixton Glazebrook Community Hall	Between A57 and Manchester Rd at Hollins Green	SJ69859119	Grassland and deciduous woodland margin	31 July 2018	MA04	Within
L21024	Part of woodland off Bank Street, Glazebrook	South-west of Glazebrook	SJ69229228	Scrub woodland	3 May 2019, 31 July 2019 and 30 September 2019	MA04	Within
L21219	Glazebrook Moss	South-west of Holcroft Moss SSSI	SJ68519256	Deciduous woodland	28 June 2018	MA04	Within

Ecology survey code	Survey site name	Location	Centroid OS grid reference	Habitat types included in survey	Survey date(s)	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
L5934	Glazebrook Moss	South-east of Glazebrook Moss	SJ68699285	Deciduous woodland	28 June 2018	MA04	Within
L2044	Grassland west of Holcroft Moss SSSI	West of Holcroft Moss SSSI	SJ68279315	Improved grassland and scattered scrub	26 June 2018	MA05	Within
L21217	Holcroft Moss SSSI	South of M62	SJ68479327	Open bog moss area	10 July 2018, 19 September 2018 and 10 June 2019	MA05	Adjacent
L21396	Land west of Holcroft Moss SSSI	South of M62	SJ67909309	Grassland, scrub and trees	26 June 2018	MA05	Within
L4513	Woodland south-west of Hole Mill Farm	North of M62	SJ67799344	Deciduous woodland	26 June 2018	MA05	Within
L5938	Culcheth Linear Park	North of Blakeley Farm	SJ64229502	Agricultural field margin and hedges	26 June 2018	MA05	Within
L5876	Culcheth Linear Park	North of Blakeley Farm	SJ63869568	Deciduous woodland	14 August 2020	MA05	Within
L21387	White's Farm	Southern rail verge south of White's Farm	SJ63569624	Scrub habitat	26 June 2018	MA05	Within
L6051	Disused railway line near Birchalls Farm	South of the A580	SJ63519667	Deciduous woodland and dense scrub	3 May 2019, 30 July 2019 and 30 August 2019	MA05	Within
L21114	Birchalls Farm	South of Lowton St Mary's	SJ63199730	Deciduous woodland	26 June 2018	MA05	Within
L10041	Woodland south-east of Warren	Lowton Common	SJ62909800	Deciduous woodland	26 June 2018	MA05	Within

Ecology survey code	Survey site name	Location	Centroid OS grid reference	Habitat types included in survey	Survey date(s)	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
	Croft Farm						
L6039	Woodland south-east of Warren Croft Farm	Lowton Common	SJ62799807	Deciduous woodland	26 June 2018	MA05	Within
L5141	Windy Bank Brook	South-east of Aye Bridge Farm	SJ60879986	Deciduous woodland	26 June 2018	MA05	Within
L6100	Aye Bridge Farm	East of Viridor Wood	SD60130035	Grassland and scrub	26 June 2018	MA05	Within
L5332	Abram Flashes	South-east of Bamfurlong	SD60300125	Reedbed, tall herb swamp, and marshy grassland	14 August 2020 and 4 September 2020	MA05	Within
L5290	Millington Clough Woodland	West of Moss House Farm	SJ72078419	Grazed fields with deciduous woodland	20 August 2020	MA06	Within
L5290	Moss House Farm	Near Broom Manor	SJ72118419	Grazed fields with hedgerows	5 July 2018	MA06	Within
L5212	Land north of Millington Clough	North of Millington Clough	SJ72338483	Grazed fields with deciduous woodland	20 August 2020 and 29 September 2020	MA06	Within
L5425	Birkin Farm	Adjacent to Stock Farm	SJ76298422	Deciduous woodland	20 June 2018	MA06	Within
L4921	Mobberly Road	East of Mobberly Road	SJ77577757	Lowland meadow and semi-improved grassland	20 June 2018	MA06	Within
L6307	Ecclesfield Wood	North-east of Lower House Farm	SJ78168361	Young plantation used for pheasant rearing	20 June 2018	MA06	Within
L5923	Northern bank of River Bollin	North-east of Thorns Green	SJ79528431	Dense herbs and scrub with boundary trees	10 July 2018, 17 September 2018 and 17 May 2019	MA06	Within

Ecology survey code	Survey site name	Location	Centroid OS grid reference	Habitat types included in survey	Survey date(s)	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
L5841	Flaxhigh Covert	North-east of Hale Barns	SJ80138569	Mixed woodland	21 August 2020 and 29 September 2020	MA06	Within
L4939	M56 junction 6 slip road	Within M56 junction 6 slip roads	SJ80298510	Deciduous woodland	20 June 2018	MA06	Adjacent
L8831	Didsbury Golf Course	North-east of the M60	SJ83969010	Mosaic habitat	9 July 2019 and 30 August 2019	MA07	Within
L8841	Car park at Withington Golf Course	West Didsbury, adjacent to Palatine Road	SJ83489077	Mosaic habitat	9 July 2019	MA07	Within
L8823	Land east of Palatine Road	West Didsbury north of Withington Golf course	SJ83729104	Suburban plantation surrounding a large pond	20 June 2018	MA07	16m north
L4904	Small edge area of Withington Golf Course	West Didsbury	SJ84039077	Mosaic habitat	9 July 2019	MA07	Within
L8860	Withington Golf Course	West Didsbury	SJ83829092	Mosaic habitat	17 September 2018, 17 May 2019 and 16 September 2019	MA07	Within
L8837	Ashfield Lodge	West Didsbury north of Withington Golf course	SJ83739096	Suburban plantation surrounding a residential development	20 June 2018	MA07	Within
L5033	Allotments adjacent to Withington Golf	West Didsbury	SJ84159074	Allotments, boundary trees	9 July 2019	MA07	Adjacent

Ecology survey code	Survey site name	Location	Centroid OS grid reference	Habitat types included in survey	Survey date(s)	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
	Course						
L8827	Northern edge of Withington Golf Course	West Didsbury	SJ84019101	Deciduous woodland	9 July 2019	MA07	Within
L5002	Land north of Ardwick Depot	Ardwick, Manchester	SJ86579734	Mosaic habitat	10 July 2018	MA07	Within
N/A	Land west of Ardwick Depot	Ardwick, Manchester	SJ86179744	Mosaic habitat	10 July 2018	MA07	Within

2.2 Deviations, constraints and limitations

2.2.1 As set out in the FSMS, standard survey methodology was followed, and as far as possible surveys were carried out on sunny, clear days with light wind. A few surveys were undertaken in sub-optimal conditions. Nevertheless, it is considered that these data still provide a good representation of the species present and allow for an objective measure of site value sufficient for the purposes of this assessment.

2.2.2 Access constraints were the main limitations to the field surveys. Additionally, delays in access for Phase 1 scoping surveys resulted in the late notification of potential invertebrate sites and therefore only late season visits were possible in some locations.

2.2.3 In addition to Habitats of Principal Importance, semi-natural broadleaved woodland, ancient woodland or standalone veteran trees and areas of unmanaged grassland with diverse flowering plant assemblages near water bodies, were also selected for further surveying.

2.2.4 Surveys undertaken were limited to locations where landowner permission had been obtained. Delays in granting access resulted in a restricted field season and it was not possible to undertake spring invertebrate surveys in all locations. For some sites this will have resulted in reduced species lists.

2.2.5 Details of sites where access was not available are listed in Table 2.

Table 2: Summary of locations where requirement for terrestrial invertebrate survey was identified but no access was available

Survey site name/ location	OS grid reference	Description of proposed survey location	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
Mossbridge Marsh Local Wildlife Site, Crewe	SJ74988477	Possible grassland-scrub mosaic. Local Wildlife Site with potential to support terrestrial invertebrates.	MA01	Within
Square Wood	SJ74988478	Part of scrub woodland area identified on the Priority Habitats Inventory as deciduous woodland.	MA02	Within
Land east of Square Wood	SJ74988479	Part of woodland area identified on the Priority Habitats Inventory as deciduous woodland. Evidence of previous development and possible open mosaic habitat.	MA02	Within
Belt Wood, Mere	SJ71798183	Large area of woodland fragmented by the A556 Davenham Roundabout. Two areas of ancient woodland to the north with the majority of the remainder identified on the Priority Habitats Inventory as deciduous woodland.	MA03	Within

Survey site name/ location	OS grid reference	Description of proposed survey location	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
Part of woodland off Bank Street, Glazebrook	SJ74988480	Woodland and scrub; former campsite identified on the Priority Habitats Inventory as deciduous woodland.	MA04	Within
Part of Coroner's Wood, Partington	SJ74988484	Deciduous woodland listed on the Ancient Woodland Inventory.	MA04	Within
Part of Coroner's Wood, Partington	SJ74988481	Deciduous woodland listed on the Ancient Woodland Inventory.	MA04	Adjacent and north
Part of Coroner's Wood, Partington	SJ74988482	Deciduous woodland listed on the Ancient Woodland Inventory.	MA04	Within
Land west of Partington Sewage Works	SJ70459098	Possible scrubby mosaic adjacent to sewage works and Coroner's Wood ancient woodland.	MA04	Within
Land south of Dam Head Lane, Glazebrook	SJ69139236	Area of deciduous woodland bounded to the south by the Liverpool to Manchester railway line. Identified on the Priority Habitats Inventory as deciduous woodland.	MA04	Within
Land west of Taylor Business Park	SJ65469455	Northern half of site is woodland and scrub, identified on the Priority Habitats Inventory as deciduous woodland. Southern portion comprises an agricultural field.	MA05	Within
Ponds near Lightshaw Lane Site of Biological Importance	SJ61619911	Middle part of Ponds near Lightshaw Lane Site of Biological Importance. Majority of site is identified on the Priority Habitats Inventory as lowland fen.	MA05	Within
Bamfurlong Hall	SD60160170	Site comprises deciduous woodland, scrub and an area identified on the Priority Habitats Inventory as lowland fen, the latter with an unknown watercourse running through it.	MA05	Within
Millington Clough Woodland	SJ72078419	Ancient woodland on south-eastern bank of Agden Brook.	MA06	Within
Part of woodland north of Millington Clough	SJ72378460	Area of woodland north of Millington Clough identified on the Priority Habitats Inventory as deciduous woodland. Large pond in south-west corner of the site.	MA06	Within
Land between M56 junction 7 and Birkin Brook	SJ75168504	Site comprises two agricultural fields with an area of ancient woodland at the eastern end of	MA06	Within

Survey site name/ location	OS grid reference	Description of proposed survey location	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
		the site. Bounded to the south and west by junction 7 of the M56 and by Birkin Brook to the north and east.		
Hancock's Banks	SJ74988475	Ancient oak woodland with a steep-sided gully and stream on the eastern side. Surrounded by agricultural land and horse paddocks and bounded by the M56 to the north.	MA06	Within
Land east of Ashley Road, Rostherne	SJ76468379	Area of woodland identified on the Priority Habitats Inventory as deciduous woodland. Bounded to the north by Birkin Brook.	MA06	Within
Land east of Mobberly Road, Ashley	SJ77428316	Site comprises a number of fields identified on the Priority Habitats Inventory as good quality semi-improved grassland, lowland meadows, deciduous woodland and traditional orchard. Remainder of site comprises agricultural fields.	MA06	Within
Banks of River Bollin east of Thorns Green	SJ79278420	Riparian deciduous woodland on banks of River Bollin. Identified in Priority Habitats Inventory as deciduous woodland.	MA06	Within
Davenport Green Wood	SJ80478608	Ancient woodland with a river (Timperley Brook) running through it. Located north-west of the M56 and surrounded by grazing land.	MA06	Within
Land northwest of M56 junction 5	SJ80668666	Large extent of grassland and scrub habitat with woodland and water features present.	MA06	Within
Land north-east of Rondin Road and south of Rondin Close, Ardwick	SJ86179744	Potential open mosaic habitat on previously developed land in Manchester city centre.	MA07	Within
Land east of Blind Lane and south-west of Rondin Road, Ardwick	SJ86039728	Potential open mosaic habitat on previously developed land in Manchester city centre.	MA07	Within

2.3 Baseline

2.3.1 Table 3 provides a summary of those sites that were subject to initial scoping surveys, and were found not to warrant further detailed survey.

Table 3: Sites scoped out of requirement for further terrestrial invertebrate survey

Ecology survey code	Survey site name/ location	OS grid reference	Description of proposed site and rationale for scoping out requirement for further survey	Survey date(s)	CA
L16111	Near Ironstile Farm	SJ70265757	Improved grassland field with partial scrub and hedge boundaries. Negligible potential for the site to support notable species.	28 June 2018	MA01
L5895	Near Spring Plantation	SJ69685862	Improved grassland field with partial scrub and hedge boundaries. Negligible potential for the site to support notable species.	28 June 2018	MA01
L5044	Field near Newfield Hall Farm	SJ68566206	Improved grassland field with partial woodland strip and hedge boundaries. Negligible potential for the site to support notable species.	20 June 2018	MA02
L5340	Small Rookery and Wimboldsey Woods	SJ67846388	Sown rye-grass fields and small deciduous woodland copses with bramble (*Rubus fruticosus* agg.) and common nettle (*Urtica dioica*) understorey. Negligible potential for the site to support notable species.	4 July 2018	MA02
L5394	Lea Hall	SJ68466408	Agricultural field with small, isolated woodland and pond features. Negligible potential for the site to support notable species.	20 June 2018	MA02
L5382	Yew-Tree Farm	SJ68386586	Improved grassland field with partial scrub and hedge boundaries. Negligible potential for the site to support notable species.	28 June 2018	MA02
L5405	River Dane crossing	SJ68406767	Agricultural field and boundary features. Negligible potential for the site to support notable species.	18 July 2018	MA02
L5061	Land between Trent and Mersey Canal and River Dane	SJ68236887	Agricultural field and boundary features. Negligible potential for the site to support notable species.	4 July 2018 and 13 August 2020	MA02
L5344	Marshall's Gorse	SJ68477172	Improved grazing pasture and semi-mature deciduous woodland. Negligible potential for the site to support notable species.	19 July 2018	MA02
L5489	Long Wood	SJ70197492	Improved agricultural fields with adjacent narrow, linear woodland feature. Negligible potential for the	20 June 2018	MA02

Ecology survey code	Survey site name/ location	OS grid reference	Description of proposed site and rationale for scoping out requirement for further survey	Survey date(s)	CA
			site to support notable species.		
L5855	Winnington Belt	SJ70297541	Deciduous woodland dominated by non-native tree species with negligible potential for the site to support notable species.	13 August 2020	MA02
L5250	Woodside Farm	SJ71738385	Improved grassland field with small a small number of scattered trees. Negligible potential for the site to support notable species.	26 June 2018	MA03
L4736	Broom Manor	SJ72078398	Well-maintained residential garden with negligible potential for the site to support notable species.	20 June 2018	MA03
L6113	Fox Covert	SJ70818861	Small, isolated, plantation woodland surrounded by agricultural grazed grassland. Lacks mature trees. Negligible potential for the site to support notable species.	19 July 2018	MA04
L5831	Saracen's Head Inn	SJ70638937	Small, isolated area of immature woodland and dense scrub. Negligible potential for the site to support notable species.	20 June 2018	MA04
L21077	Rixton Glazebrook Community Hall	SJ69859119	Grassland and boundary trees, none of which are of an old age. Negligible potential for the site to support notable species.	31 July 2018	MA04
L21219	Woodland north of Beechfield Farm	SJ68519256	Narrow strip of semi-mature trees with no older examples and no other features with more than negligible potential for the site to support notable species.	28 June 2018	MA04
L5934	Glazebrook Moss	SJ68699285	Improved grassland field with partial scrub and hedge boundaries. Negligible potential for the site to support notable species.	28 June 2018	MA04
L2044	Grassland south of Holcroft Moss	SJ68279315	Narrow strip of improved, tall herb grassland with occasional scattered sallow (*Salix* spp.) saplings. Negligible potential for the site to support notable species.	26 June 2018	MA05
L21396	Arable farmland	SJ67909309	Agricultural grass/crop fields with few trees and scrub boundaries. Negligible potential for the site to support notable species.	26 June 2018	MA05
L4513	Deciduous woodland west of Holcroft	SJ67799344	Narrow strip of semi-mature trees with no older examples and no other features with more than negligible potential for the site to support	26 June 2018	MA05

Ecology survey code	Survey site name/ location	OS grid reference	Description of proposed site and rationale for scoping out requirement for further survey	Survey date(s)	CA
	Moss		notable species.		
L5938	Culcheth Linear Park	SJ64229502	Intensively managed agricultural farmland. Negligible potential for the site to support notable species.	26 June 2018	MA05
L5876	Culcheth Linear Park	SJ63869568	Wooded disused railway line. Heavily shaded throughout with negligible potential for the site to support notable species.	14 August 2020	MA05
L21387	White's Farm	SJ63569624	Small linear strip of railway embankment with negligible potential for the site to support notable species.	26 June 2018	MA05
L21114	Birchalls Farm	SJ63199730	Small area of low scrub adjacent to industrial buildings. Negligible potential for the site to support notable species.	26 June 2018	MA05
L10041	Warren Croft Farm	SJ62909800	Mainly amenity grassland with some boundary scrub. Negligible potential for the site to support notable species.	26 June 2018	MA05
L6039	Warren Croft Farm	SJ62799807	Short mown amenity grassland playing fields with some boundary scrub along northern side. Negligible potential for the site to support notable species.	26 June 2018	MA05
L5141	Windy Bank Brook	SJ60879986	Intensively managed agricultural farmland. Negligible potential for the site to support notable species.	26 June 2018	MA05
L6100	Aye Bridge Farm	SD60430035	Managed short grassland, grazed farmland and some hedge/scrub lines. Negligible potential for the site to support notable species.	26 June 2018	MA05
L5290	Millington Clough Woodland	SJ72078419	Improved grazing pasture and sycamore (*Acer pseudoplatanus*) dominated deciduous woodland. Negligible potential for the site to support notable species.	20 August 2020	MA06
L5290	Moss House Farm	SJ72118419	Improved grassland field with hedge and tree boundaries. Negligible potential for the site to support notable species.	5 July 2018	MA06
L5425	Birkin Farm	SJ76298422	Isolated and narrow strip of woodland adjacent to M56 motorway and arable farmland. Negligible potential for the site to support notable species.	20 June 2018	MA06
L4921	Mobberly	SJ77577757	Immature plantation used for	20 June 2018	MA06

Ecology survey code	Survey site name/ location	OS grid reference	Description of proposed site and rationale for scoping out requirement for further survey	Survey date(s)	CA
	Road		pheasant rearing. Negligible potential for the site to support notable species.		
L6307	Ecclesfield Wood	SJ78168361	Young plantation with evidence of use for pheasant rearing. Negligible potential for the site to support notable species.	20 June 2018	MA06
L4939	M56 junction 6 slip road	SJ80298510	Immature woodland plantation in the centre of the M56 junction 6 slip road. Exposed external pressures such as dust and pollution. Negligible potential for the site to support notable species.	20 June 2018	MA06
L8841	Car park area at Withington Golf Course	SJ83489077	Golf clubhouse and tarmac car park area with scattered mostly non-native scrub and young tree edges. Negligible potential for the site to support notable species.	9 July 2019	MA07
L8823	Land east of Palatine Road	SJ83729104	Suburban area of planted trees surrounding a large pond. Heavily disturbed and appears subject to antisocial behaviour. Negligible potential for the site to support notable species.	20 June 2018	MA07
L4904	Small edge area of Withington Golf Course	SJ84039077	Predominantly mown golf fairways with a small area of planted semi-mature trees and poor ground flora. Negligible potential for the site to support notable species.	9 July 2019	MA07
L8837	Ashfield Lodge	SJ83739096	Suburban area of planted trees surrounding a residential development. Heavily disturbed with negligible potential for the site to support notable species.	20 June 2018	MA07
L5033	Allotments adjacent to Withington Golf Course	SJ84159074	Managed allotments with mostly non-native boundary trees. Negligible potential for the site to support notable species.	9 July 2019	MA07
L8827	Northern edge of Withington Golf Course	SJ84019101	Golf course boundary area of mostly non-native mature mixed woodland with predominantly bramble and nettle ground flora. Negligible potential for the site to support notable species.	9 July 2019	MA07
L5002	Land north of Ardwick Depot	SJ86579734	Mosaic habitat with dense young scrub and ruderal grassland. No older features. City centre location within a busy industrial area means negligible potential for the site to support	10 July 2018	MA07

Ecology survey code	Survey site name/ location	OS grid reference	Description of proposed site and rationale for scoping out requirement for further survey	Survey date(s)	CA
			notable species.		
N/A	Land west of Ardwick Depot	SJ86179744	Mosaic habitat with dense young scrub and ruderal grassland. No older features. City centre location within a busy industrial area means negligible potential for the site to support notable species.	10 July 2018	MA07

2.3.2 Table 4 provides a summary of invertebrate species of conservation significance identified from desk study data within MA01 to MA08.

Table 4: Protected and/or notable invertebrate species identified from desk study in MA01 to MA08

Species group/ family	Common name	Scientific name	Status	Survey site names/ locations	Habitat	Last recorded date	CA
Insect - beetle (Coleoptera)	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Crewe Business Park Nature Area	Arboreal (esp. alder *Alnus* sp.)	8 June 2014	MA01
Insect - beetle (Coleoptera)	Adonis ladybird	*Hippodamia variegata*	Nationally Notable (Nb)	Fishing ponds area of Shipbrook Avenue	Open habitats, tall sward and scrub	6 January 2014	MA01
Insect – butterfly (Lepidoptera)	Dingy skipper	*Erynnis tages*	Species of Principal Importance	Quaker's Coppice, Crewe; Chorlton, Crewe; Greenbank Farm, Basford, Crewe; Croatia Mill Farm, Weston, Crewe	Open habitats, tall sward and scrub	14 May 2014	MA01
Insect – butterfly (Lepidoptera)	Small heath	*Coenonympha pamphilus*	Species of Principal Importance	Heath Farm, Weston; Basford Hall, Weston; Shavington Lodge, Basford Greenbank Farm, Basford; Jubilee Farm, Chorlton; Weston Hall, Chorlton; Crotia Mill Farm, Weston	Open habitats, short sward and bare ground	6 December 2014	MA01
Insect – butterfly (Lepidoptera)	Wall	*Lasiommata megera*	Species of Principal Importance	Shavington Lodge, Basford; Sandbach Flashes, Sandbach	Open habitats, short sward and bare ground	6 January 2014	MA01
Insect – butterfly (Lepidoptera)	White-letter hairstreak	*Satyrium w-album*	Species of Principal Importance	Basford, Crewe; Weston, Crewe; Stowford, Crewe; Wistaston Green	Arboreal (esp elm, *Ulmus* sp.)	7 August 2014	MA01
Insect – moth (Lepidoptera)	Argent and Sable	*Rheumaptera hastata*	Species of Principal Importance/ Nationally Notable	Wybunbury Moss	Open woodland, moorland and bogs	9 June 2013	MA01
Insect - beetle (Coleoptera)	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Weaver Valley Parkway, Winsford; Lion saltworks wildlife area, Marston, Northwich; Old Danes Nursery, Northwich;	Arboreal (esp. alder)	12 August 2013	MA02

Species group/ family	Common name	Scientific name	Status	Survey site names/ locations	Habitat	Last recorded date	CA
				Uplands Wood, Northwich			
Insect - butterfly (Lepidoptera)	Dingy Skipper	*Erynnis tages*	Species of Principal Importance	Ashtons's Flash, Northwich; Weaver Parkway, Winsford	Open habitats, tall sward and scrub	21 May 2014	MA02
Insect - butterfly (Lepidoptera)	Small heath	*Coenonympha pamphilus*	Species of Principal Importance	Ashtons's Flash, Northwich	Open habitats, short sward and bare ground	4 June 2016	MA02
Insect - butterfly (Lepidoptera)	Wall	*Lasiommata megera*	Species of Principal Importance	Rudheath	Open habitats, short sward and bare ground	31 July 2013	MA02
Insect - butterfly (Lepidoptera)	White-letter hairstreak	*Satyrium w-album*	Species of Principal Importance	Leftwich, Northwich; Leftwich Meadows, Northwich	Arboreal (esp. elm)	7 July 2014	MA02
Insect - true fly (Diptera)	n/a	*Egle brevicornis*	Nationally Scarce	Newbridge, Vale Royal Cut	Fens and damp woodland	10 August 2005	MA02
Insect - true fly (Diptera)	n/a	*Fannia pauli*	Provisionally Nationally Scarce	Weaver Valley Parkway, Winsford	Tree-associated, shaded woodland floor	16 March 2014	MA02
Insect - true fly (Diptera)	Southern silver stiletto-fly	*Cliorismia rustica*	Species of Principal Importance/ Nationally Scarce	River Dane, Rudheath	Open habitats; wetland, running water; short sward and bare ground	22 July 2014	MA02
Insect - true fly (Diptera)	n/a	*Arctoconopa melampodia*	RDB2	River Dane, Bostock House	Wetland, running water	26 July 2013	MA02
Insect - true fly (Diptera)	n/a	*Dicranomyia ornata*	Nationally Notable	River Dane, Bostock House	Wetland, running water	19 September 2014	MA02
Insect - true fly (Diptera)	n/a	*Hilara albiventris*	Nationally Scarce	River Dane, Bostock House	Wetland, running water	28 June 2007	MA02
Insect - true fly	n/a	*Hilara*	Nationally Scarce	River Dane, Bostock House	Wetland, running water	28 June 2007	MA02

Species group/ family	Common name	Scientific name	Status	Survey site names/ locations	Habitat	Last recorded date	CA
(Diptera)		*pseudochorica*					
Insect - true fly (Diptera)	n/a	*Nephrotoma dorsalis*	Nationally Notable	River Dane, Bostock House	Wetland, running water	28 June 2007	MA02
Insect - true fly (Diptera)	n/a	*Platypalpus melancholicus*	Nationally Rare (NT)	River Dane, Bostock House	Wetland, running water	28 June 2007	MA02
Insect - true fly (Diptera)	n/a	*Tachydromia costalis*	Nationally Rare (NT)	River Dane, Bostock House	Wetland, running water	28 June 2007	MA02
Insect - beetle (Coleoptera)	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Pickmere, Knutsford; Tabley Hill, Knutsford	Arboreal (esp. alder)	26 July 2013	MA03
Insect - moth (Lepidoptera)	Festoon	*Apoda limacodes*	Nationally Notable (Nb)	Pheasant Walk, High Legh, Knutsford	Arboreal (esp. oak *Quercus* sp.)	30 July 2014	MA03
Insect - true fly (Diptera)	Southern silver stiletto-fly	*Cliorismia rustica*	Species of Principal Importance/ Nationally Scarce	Bollington Mill, Little Bollington	Open habitats; wetland, running water; short sward and bare ground	22 July 2014	MA03
Insect - beetle (Coleoptera)	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Rixton Clay Pits, Warrington	Arboreal (esp. alder)	21 August 2013	MA04
Insect - butterfly (Lepidoptera)	White-letter hairstreak	*Satyrium w-album*	Species of Principal Importance	Rixton Clay Pits, Warrington	Arboreal (esp. elm)	31 August 2014	MA04
Insect - true fly (Diptera)	Southern silver stiletto-fly	*Cliorismia rustica*	Species of Principal Importance/Nationally Scarce	Heatley Bridge, Warburton; Reddish, Stockport	Open habitats; wetland, running water; short sward and bare ground	22 July 2014	MA04
Arachnid - spider (Araeneae)	n/a	*Hahnia pusilla*	Nationally Scarce	Highfield Moss SSSI	Open habitats, tall sward and scrub	30 July 2007	MA05
Arachnid - spider (Araeneae)	n/a	*Hypselistes jacksoni*	Nationally Scarce	Highfield Moss SSSI	Wetland, peatland	16 April 2007	MA05

Species group/ family	Common name	Scientific name	Status	Survey site names/ locations	Habitat	Last recorded date	CA
Arachnid - spider (Araeneae)	n/a	*Taranucnus setosus*	Nationally Scarce	Highfield Moss SSSI	Wetland, peatland	19 May 2008	MA05
Arachnid - spider (Araeneae)	n/a	*Heliophanus dampfi*	Nationally Rare (VU)	Holcroft Moss	Wetland, peatland	15 September 2018	MA05
Arachnid - spider (Araeneae)	n/a	*Sibianor larae*	New to Britain	Holcroft Moss	Bog habitats	15 September 2018	MA05
Insect - beetle (Coleoptera)	Adonis ladybird	*Hippodamia variegata*	Nationally Notable (Nb)	St Helens	Open habitats, tall sward and scrub	21 July 2015	MA05
Insect - beetle (Coleoptera)	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Moss side farm, Warrington; Risley Moss Local Nature Reserve (LNR), Warrington; Wadeson Way, Croft, Warrington; Brock Road, Birchwood, Warrington	Arboreal (esp. alder)	14 August 2012	MA05
Insect - bush-cricket (Orthoptera)	Bog bushcricket	*Metrioptera brachyptera*	Nationally Scarce	Holcroft Moss	Wetland habitats, permanent wet mire	25 July 2016	MA05
Insect - butterfly (Lepidoptera)	Small heath	*Coenonympha pamphilus*	Species of Principal Importance	Highfield Moss SSSI; Low Hall Park LNR	Open habitats, short sward and bare ground	15 August 2011	MA05
Insect - butterfly (Lepidoptera)	Wall	*Lasiommata megera*	Species of Principal Importance	Low Hall Park LNR	Open habitats, short sward and bare ground	23 July 2011	MA05
Insect - moth (Lepidoptera)	Marsh oblique-barred	*Hypenodes humidalis*	Nationally Notable (Nb)	Risley Moss Nature Reserve, Warrington	Open habitats, tall sward and scrub; upland	9 May 2012	MA05
Insect - true fly (Diptera)	n/a	*Suillia dumicola*	Provisionally Nationally Scarce	Culcheth Linear Park; Holcroft Moss	Tree-associated, shaded woodland floor	1 October 2013	MA05
Insect - true fly (Diptera)	n/a	*Tanyptera nigricornis*	RDB3	Holcroft Moss	Tree-associated, decaying wood	6 June 2013	MA05

Species group/ family	Common name	Scientific name	Status	Survey site names/ locations	Habitat	Last recorded date	CA
Insect - true fly (Diptera)	n/a	*Tipula helvola*	Nationally Notable	Holcroft Moss	Tree-associated, shaded woodland floor	11 July 2012	MA05
Insect - true fly (Diptera)	n/a	*Keroplatus testaceus*	Nationally Scarce	Holcroft Moss	Damp, decaying wood	30 June 2017	MA05
Insect - beetle (Coleoptera)	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Rostherne Mere, Knutsford; Mobberley, Knutsford	Arboreal (esp. alder)	6 June 2011	MA06
Insect - butterfly (Lepidoptera)	Wall	*Lasiommata megera*	Species of Principal Importance	Hooksbank Wood, Bollin Valley	Open habitats, short sward and bare ground	5 May 2011	MA06
Insect - true fly (Diptera)	Drab wood-soldierfly	*Solva marginata*	Nationally Scarce	Tatton Park, Knutsford	Tree-associated, decaying wood	1 September 2005	MA06
Insect - true fly (Diptera)	Snail killing fly	*Psacadina verbekei*	Nationally Notable	Tatton Park, Knutsford	Wetland, peatland	1 September 2005	MA06
Insect - true fly (Diptera)	Southern silver stiletto-fly	*Cliorismia rustica*	Species of Principal Importance/ Nationally Scarce	Wilmslow District, River Bollin, Giant's Castle Bridge, Styal Country Park	Open habitats; wetland, running water; short sward and bare ground	7 June 2013	MA06
Insect - true fly (Diptera)	n/a	*Platypalpus melancholicus*	Nationally Rare (NT)	River Bollin, The Priory, Hale, Altrincham	Wetland, running water	19 July 2007	MA06
Insect - butterfly (Lepidoptera)	Small heath	*Coenonympha pamphilus*	Species of Principal Importance	Nutsford Vale Park, Manchester	Open habitats, short sward and bare ground	16 July 2014	MA07

2.3.3 Table 5 provides a summary of invertebrate species of conservation significance identified within MA01 to MA08.

Table 5: Protected and/or notable invertebrate species identified during terrestrial invertebrate survey in MA01 to MA08

Ecology survey code	Common name	Scientific name	Status	Survey site name/ location	Habitat	Survey date(s)	CA
L5168	A weevil	*Rhinocyllus conicus*	Nationally Notable (Na)	Banks of Trent and Mersey Canal (east bank)	Open habitats, short sward and bare ground (esp. *Cirsium* sp.)	4 September 2020	MA02
L4926	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Banks of Trent and Mersey Canal (north bank)	Arboreal (esp. alder)	18 September 2018	MA02
L5935	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Winnington Wood	Arboreal (esp. alder)	5 July 2018 and 18 September 2018	MA02
L5197	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Peas Wood	Arboreal (esp. alder)	5 July 2018	MA02
L5926	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Part of Coroner's Wood	Arboreal (esp. alder	1 May 2019	MA04
L21217	Bog bushcricket	*Metrioptera brachyptera*	Nationally Scarce	Holcroft Moss SSSI	Lowland bogs, marshes and wetlands	10 July 2018 and 10 June 2019	MA05
L21217	n/a	*Nephrotoma crocata*	RDB3	Holcroft Moss SSSI	Open habitats including sandy and peat substrates	10 June 2019	MA05
L21217	n/a	*Bembidion obliquum*	Nationally Scarce	Holcroft Moss SSSI	Marshland, mineral marsh and open water margin	10 June 2019	MA05
L6051	n/a	*Gimnomera tarsea*	Nationally Notable	Disused railway line near Burchall's Farm	Peatland, permanent wet mire	3 May 2019	MA05
L5332	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Abram Flashes	Arboreal (esp. alder)	14 August 2020 and 4 September 2020	MA05
L5212	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Land north of Millington Clough	Arboreal (esp. alder)	20 August 2020	MA06

Ecology survey code	Common name	Scientific name	Status	Survey site name/ location	Habitat	Survey date(s)	CA
L5923	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Northern bank of River Bollin	Arboreal (esp. alder)	17 May 2019	MA06
L5923	n/a	*Gimnomera tarsea*	Nationally Notable	Northern bank of River Bollin	Peatland, permanent wet mire	17 May 2019	MA06
L8831	Alder leaf beetle	*Agelastica alni*	[Nationally Rare] (DD)	Didsbury Golf Course	Arboreal (esp. alder)	30 August 2019	MA07
L8831	n/a	*Sciomyza dryomyzina*	RDB2	Didsbury Golf Course	Peatland, permanent wet mire	30 August 2019	MA07
L8831	n/a	*Opomyza punctata*	Provisionally Nationally Scarce	Didsbury Golf Course	Tall sward and scrub	30 August 2019	MA07

2.3.4 Using Pantheon, the quality of a Specific Assemblage Type (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.

2.3.5 Table 6 provides a summary of habitats identified for sites from Pantheon which contained qualifying assemblages of terrestrial invertebrates within MA01 to MA08.

Table 6: Pantheon qualifying Specific Assemblage Types represented based on terrestrial invertebrate survey results within MA01 to MA08

Ecology survey code	Survey site name/ location	Number of Pantheon SAT represented	Qualifying SAT recorded	CA
L4946	Western banks of Trent and Mersey Canal	2	None	MA02
L5168	Banks of Trent and Mersey Canal (east bank)	3	None	MA02
L4926	Banks of Trent and Mersey Canal (north bank)	5	None	MA02
L5935	Winnington Wood	5	None	MA02
L5197	Peas Wood	2	None	MA02
L43004	Leonard's Wood	3	None	MA03
L8877	Smoker Wood	1	None	MA03
L5926	Part of Coroner's Wood	4	None	MA04
L21024	Part of woodland off Bank Street, Glazebrook	2	None	MA04
L21217	Holcroft Moss SSSI	5	None	MA05
L6051	Disused railway line near Birchalls Farm	2	None	MA05
L5332	Abram Flashes	2	None	MA05
L5212	Land north of Millington Clough	3	None	MA06
L5923	Northern bank of River Bollin	5	None	MA06
L5841	Flaxhigh Covert	2	None	MA06
L8831	Didsbury Golf Course	3	None	MA07
L8860	Withington Golf Course	5	None	MA07

Hough to Walley's Green (MA01)

Notable/protected species recorded

2.3.6 No notable or protected species of greater than local value were recorded within MA01.

Discussion and summary

2.3.7 Both sites visited in the Hough to Walley's Green area were scoped out from detailed terrestrial invertebrate surveys, as shown in Table 3. No detailed surveys were required.

2.3.8 The closest desk records within MA01 are four butterfly Species of Principal Importance, white-letter hairstreak, dingy skipper, small heath and wall, all recorded within the land required for the construction of the Proposed Scheme. Within 2km of the Proposed Scheme, there are four Species of Principal Importance, one Species of Principal Importance/Nationally Scarce, one [Nationally Rare] (DD) and one Nationally Notable (Nb) species recorded.

Wimboldsley to Lostock Gralam (MA02)

Notable/protected species recorded

2.3.9 Field surveys within MA02 recorded two notable species, one of which, the [Nationally Rare] (DD) alder leaf beetle, is an arboreal species. It was recorded from deciduous woodland on the banks of the Trent and Mersey Canal, north of Whatcroft, and from Winnington Wood ancient woodland and Peas Wood, an area of deciduous woodland, both of which are located to the north-east of Lostock Gralam. The other species is the weevil *Rhinocyllus conicus* (Nationally Notable (Na)), which was also recorded from deciduous woodland on the banks of the Trent and Mersey Canal (east bank), northeast of Bostock Hall, where it was associated with creeping thistle at the wood margin.

Discussion and summary

2.3.10 Nine of the 16 sites visited in the Wimboldsley to Lostock Gralam area were scoped out from detailed terrestrial invertebrate surveys, as shown in Table 3. Two sites were not accessible, as shown in Table 2.

2.3.11 Oak Wood is an area of deciduous woodland, adjacent and to the west of the land required for the construction of the Proposed Scheme. Surveys in this location recorded 40 terrestrial invertebrate species, all of which were common and widespread, and typical of the habitat types present within the surveyed areas. No SATs were present.

2.3.12 The western bank of the Trent and Mersey Canal, to the north-east of Bostock Hall, is an area of deciduous woodland within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 67 terrestrial invertebrate species, all of which were common and widespread, and typical of the habitat types present within the surveyed areas. Two SATs (F002 – rich flower resource and W211 – open water on disturbed mineral sediments) are present, but neither qualifies as being in favourable condition.

2.3.13 The banks of the Trent and Mersey Canal (east bank), to the north-east of Bostock Hall, are an area of deciduous woodland within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 53 terrestrial invertebrate species,

including the weevil *Rhinocyllus conicus* (Nationally Notable (Na)). The remaining species recorded were common and widespread, and typical of the habitat types present within the surveyed areas. Three SATs (F001 – scrub edge, F111 – bare sand and chalk and A212 – bark and sapwood decay) are present, but none qualify as being in favourable condition.

2.3.14 The banks of the Trent and Mersey Canal (north bank), to the north of Whatcroft, are an area of deciduous woodland within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 108 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. Five SATs (F001 – scrub edge, F002 – rich flower resource, F111 – bare sand and chalk, A211 – heartwood decay and A212 – bark and sapwood decay) are present, but none qualify as being in favourable condition.

2.3.15 Winnington Wood is an area of ancient woodland within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 180 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. Five SATs (F001 – scrub edge, F002 – rich flower resource, A212 – bark and sapwood decay, A215 – epiphyte fauna and W314 – reed-fen and pools) are present, but none qualify as being in favourable condition.

2.3.16 Peas Wood is an area of deciduous woodland to the north-east of Lostock Gralam and within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 40 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. Two SATs (F002 – rich flower resource and A211 – heartwood decay) are present, but neither qualifies as being in favourable condition.

2.3.17 The closest desk record within MA02 is a [Nationally Rare] (DD) species, the alder leaf beetle, recorded within the land required for the construction of the Proposed Scheme. Within 2km of the Proposed Scheme, four Species of Principal Importance, one Species of Principal Importance/Nationally Scarce, two Nationally Rare (NT), one [Nationally Rare] (DD), three Nationally Scarce, one provisionally Nationally Scarce, one RBD2 and two Nationally Notable species, were recorded.

Pickmere to Agden and Hulseheath (MA03)

Notable/protected species recorded

2.3.18 No notable or protected species of greater than local value were recorded within MA03.

Discussion and summary

2.3.19 Two of the four sites visited in the Pickmere to Agden and Hulseheath area were scoped out from detailed terrestrial invertebrate surveys, as shown in Table 3.

2.3.20 Leonard's Wood is a linear area of ancient woodland that follows the route of a tributary of Smoker Brook and lies within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 73 terrestrial invertebrate species, all of which were common and widespread and typical of the habitat types present within the surveyed areas. Three SATs (F001 – scrub edge, F002 – rich flower resource and A212 – bark and sapwood decay) are present but none qualify as being in favourable condition.

2.3.21 Smoker Wood is a linear area of ancient woodland that follows the route of Smoker Brook and lies within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 32 terrestrial invertebrate species, all of which were common and widespread and typical of the habitat types present within the surveyed areas. One SAT (A212 – bark and sapwood decay) is present but does not qualify as being in favourable condition.

2.3.22 The closest desk record within MA03 is a [Nationally Rare] (DD) species, the alder leaf beetle, recorded within the land required for the construction of the Proposed Scheme. Within 2km of the Proposed Scheme, there are one Species of Principal Importance/Nationally Scarce, one [Nationally Rare] (DD) and one Nationally Notable (Nb) species recorded.

Broomedge to Glazebrook (MA04)

Notable/protected species recorded

2.3.23 Field surveys within MA04 recorded one notable species; the [Nationally Rare] (DD) alder leaf beetle, which is an arboreal species. It was recorded from Coroner's Wood ancient woodland located south of the Manchester Ship Canal to the west of Partington.

Discussion and summary

2.3.24 Five of the seven sites visited in the Broomedge to Glazebrook area were scoped out from detailed terrestrial invertebrate surveys, as shown in Table 3.

2.3.25 Coroner's Wood is an area of ancient woodland immediately to the south of the Manchester Ship Canal and within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 107 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 (F001 – scrub edge, F002 – rich flower resource, A211 – heartwood decay and A212 – bark and sapwood decay) are present but none qualify as being in favourable condition.

2.3.26 Part of woodland at Glazebrook, south-west of Bank Street, is a small area of scrub woodland that forms part of a much larger area of woodland which was not accessible. It lies within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 69 terrestrial invertebrate species, all of which were common and widespread and typical of the habitat types present within the surveyed areas. Two SATs

(F001 – scrub edge and F002 – rich flower resource) are present but neither qualifies as being in favourable condition.

2.3.27 The closest desk record within MA04 is a Species of Principal Importance/Nationally Scarce, the southern silver stiletto-fly, recorded 24m west of the land required for the construction of the Proposed Scheme. Within 2km of the Proposed Scheme, there are one Species of Principal Importance, one Species of Principal Importance/Nationally Scarce and one [Nationally Rare] (DD) species recorded.

Risley to Bamfurlong (MA05)

Notable/protected species recorded

2.3.28 Field surveys within MA05 recorded five notable species. The Nationally Scarce bog bushcricket, which is a wetland species, the Nationally Scarce *Bembidion obliquum*, which is a marshland beetle species and the RDB3 *Nephrotoma crocata*, which is a woodland cranefly species, were all recorded from Holcroft Moss. The Nationally Notable Scathophagid fly, *Gimnomera tarsea*, which is a peatland species, was recorded from a disused railway line near Burchall's Farm, north-west of Culcheth, and the alder leaf beetle ([Nationally Rare] (DD)) was recorded from marshland margin habitats at Abram Flashes.

Discussion and summary

2.3.29 Eleven out of 14 sites visited in the Risley to Bamfurlong area were scoped out from terrestrial invertebrate surveys, as shown in Table 3.

2.3.30 Holcroft Moss is an area of lowland raised bog that forms part of the Manchester Mosses Special Area of Conservation (SAC) and is also designated as a SSSI. It is adjacent and to the east of the land required for the construction of the Proposed Scheme. Surveys in this location recorded 137 terrestrial invertebrate species, including the bog bushcricket (Nationally Scarce), *Bembidion obliquum* (Nationally Scarce) and *Nephrotoma crocata* (RDB3). The remaining species recorded were common and widespread and typical of the habitat types present within the surveyed areas. Five SATs (F001 – scrub edge, F002 – rich flower resource, F003 – scrub-heath and moorland, A212 – bark and sapwood decay and W312 – *Sphagnum* bog) are present but none qualify as being in favourable condition.

2.3.31 The disused railway line near Birchalls Farm is an area of deciduous woodland and dense scrub to the north-west of Culcheth and within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 117 terrestrial invertebrate species, including *Gimnomera tarsea* (Nationally Notable). The remaining species recorded were common and widespread and typical of the habitat types present within the surveyed areas. Two SATs (F001 – scrub edge and F002 – rich flower resource) are present but neither qualifies as being in favourable condition.

2.3.32 Abram Flashes is an area of reedbed, tall herb swamp, and marshy grassland which lies partly within Abram Flashes SSSI. It lies within land required for the construction of the

Proposed Scheme. Surveys in this location recorded 63 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. Two SATs (F001 – scrub edge and F002 – rich flower resource) are present but neither qualifies as being in favourable condition.

2.3.33 The closest desk record within MA05 is a [Nationally Rare] (DD) species, the alder leaf beetle recorded within the land required for the construction of the Proposed Scheme. Within 2km of the Proposed Scheme, there are two Species of Principal Importance, one Nationally Rare (VU), one [Nationally Rare] (DD), five Nationally Scarce, one provisionally Nationally Scarce, one RDB3, one Nationally Notable and two Nationally Notable (Nb) species recorded as well as one species new to Britain.

Hulseheath to Manchester Airport (MA06)

Notable/protected species recorded

2.3.34 Field surveys within MA06 recorded two notable species, the [Nationally Rare] (DD) alder leaf beetle, which is an arboreal species and the Nationally Notable Scathophagid fly, *Gimnomera tarsea*, which is a peatland species. Both were recorded from the northern banks of the River Bollin, an area of mixed riparian habitats to the north-east of Higher Thorns Green, whilst the alder leaf beetle [Nationally Rare] (DD) was also recorded from the woodland to the north of Millington Clough.

Discussion and summary

2.3.35 Six out of nine sites visited in the Hulseheath to Manchester Airport area were scoped out from terrestrial invertebrate surveys, as shown in Table 3.

2.3.36 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 Proposed Scheme. Surveys in this location recorded 53 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. Three SATs (F001 – scrub edge, F002 – rich flower resource and A211 – heartwood decay) are present but none qualify as being in favourable condition.

2.3.37 The northern bank of the River Bollin is an area of mixed riparian habitats (dense herbs, scrub and trees) to the north-east of Thorns Green and within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 83 terrestrial invertebrate species, including the alder leaf beetle ([Nationally Rare] (DD)) and *Gimnomera tarsea* (Nationally Notable). The remaining species recorded were common and widespread and typical of the habitat types present within the surveyed areas. Five SATs (F002 – rich flower resource, F003 – scrub-heath and moorland, A211 – heartwood decay, A212 – bark

and sapwood decay and W314 – reed-fen and pools) are present but none qualify as being in favourable condition.

2.3.38 Flaxhigh Covert is a small mixed woodland to the north-east of Hale Barns and within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 27 terrestrial invertebrate species. All species recorded were common and widespread and typical of the habitat types present within the surveyed areas. Two SATs (F002 – rich flower resource and A213 – fungal fruiting bodies) are present but neither qualifies as being in favourable condition.

2.3.39 The closest desk record within MA06 is a [Nationally Rare] (DD) species, the alder leaf beetle, recorded from within the land required for the construction of the Proposed Scheme. Within 2km of the Proposed Scheme, there are one Species of Principal Importance, one Species of Principal Importance/Nationally Scarce, one Nationally Rare (NT), one [Nationally Rare] (DD), one Nationally Scarce and one Nationally Notable species recorded.

Davenport Green to Ardwick (MA07)

Notable/protected species recorded

2.3.40 Field surveys within MA07 recorded three notable species, the [Nationally Rare] (DD) alder leaf beetle, which is an arboreal species, the provisionally Nationally Scarce Opomyzid fly, *Opomyza punctata*, which is a tall sward and scrub species and the RDB2 Sciomyzid fly (*Sciomyza dryomyzina*), a peatland specialist. All were recorded from Didsbury Golf Course.

Discussion and summary

2.3.41 Nine out of 10 sites visited in the Davenport Green to Ardwick area were scoped out from terrestrial invertebrate surveys, as shown in Table 3.

2.3.42 Didsbury Golf Course is an area of mosaic habitat including deciduous woodland, grassland, scrub and, most importantly, transitional or edge habitats between these. It is located north-east of the M60 in West Didsbury and within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 97 terrestrial invertebrate species, including the alder leaf beetle ([Nationally Rare] (DD)), *Opomyza punctata* (provisionally Nationally Scarce) and the chestnut snailkiller (RDB2). The remaining species recorded were common and widespread and typical of the habitat types present within the surveyed areas. Three SATs (F001 – scrub edge, F002 – rich flower resource and F003 – scrub-heath and moorland) are present but none qualify as being in favourable condition.

2.3.43 Withington Golf Course is an area of mosaic habitat including deciduous woodland, grassland, scrub and, most importantly, transitional or edge habitats between these. It is located north-east of the M60 in West Didsbury and within the land required for the construction of the Proposed Scheme. Surveys in this location recorded 114 terrestrial invertebrate species, all of which were common and widespread and typical of the habitat types present within the surveyed areas. Five SATs (F001 – scrub edge, F002 – rich flower

resource, F003 – scrub-heath and moorland, A211 – heartwood decay and A212 – bark and sapwood decay) are present but none qualify as being in favourable condition.

2.3.44 The closest desk record within MA07 is a Species of Principal Importance, the small heath butterfly, recorded 1km from the land required for the construction of the Proposed Scheme. Within 2km of the Proposed Scheme, there is one Species of Principal Importance recorded.

Manchester Piccadilly Station (MA08)

Notable/protected species recorded

2.3.45 No notable or protected species of greater than local value were recorded within MA08.

Discussion and summary

2.3.46 No sites within the Manchester Piccadilly Station area were identified as requiring surveys. Desk study records show no notable species have been previously recorded in MA08.

3 Aquatic invertebrates

3.1 Methodology

3.1.1 Details of the standard methodologies utilised for aquatic invertebrate survey are provided in Technical Note – Ecology and biodiversity – Ecological Field Survey Methods and Standards (FSMS) included in the Environmental Impact Assessment Scope and Methodology Report (SMR)[2], (see Environmental Statement, Volume 5, Appendix CT-001-00001). This section does not include white-clawed crayfish, which is covered in Section 4. Aquatic invertebrates in ponds and canals are covered in Background Information and Data: BID EC-007-00001.

3.1.2 Desk study records relating to aquatic invertebrates for the land required for the construction of the Proposed Scheme were obtained from Environment Agency records, Staffordshire Ecological Record[14], Staffordshire Wildlife Trust[15], Cheshire Wildlife Trust[16] and rECOrd (the Local Biological Records Centre)[17]. The field surveys included aquatic invertebrate river sampling and invertebrates sampled as part of ditch assessments. Surveys were undertaken in spring and autumn 2018, 2019 and/or 2020.

3.1.3 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.

[14] Staffordshire Ecological Record, *The Ecological Database for Staffordshire*. Available online at: http://www.staffs-ecology.org.uk/html2015/index.php?title=Main_Page.

[15] Staffordshire Biodiversity Action Plan Steering Group (2001), *Staffordshire Biodiversity Action Plan,* Staffordshire Wildlife Trust.

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

[17] rECOrd, *Local Biological Records Centre serving Cheshire.* Available online at: http://www.record-lrc.co.uk.

3.1.4 A summary of locations at which aquatic invertebrate surveys were undertaken within MA01 to MA08 is provided in Table 7, and shown in accompanying Ecology Map Series EC-12.

Table 7: Summary of aquatic invertebrate field surveys undertaken

Ecology survey code	Survey site name	Feature type	Survey date(s)	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
CH366652-CH446766-CH639040_L5294_IA1	River Dane	Main river	14 May 2018 10 October 2019	MA02	Within
CH446766-CH515800-CH534892-CH639040_L5061_IA1	River Dane	Main river	14 May 2018 6 September 2018	MA02	Within
CH446766-CH515800-CH534892_L5021_IA1	Puddinglake Brook	Main river	15 May 2018 6 September 2018	MA02	Within
CH402012-CH505004_L6340_IA1_150518	Gad Brook	Ordinary watercourse	15 May 2018	MA02	Within
CH505004_L5424_IA1_150518	Tributary of Gad Brook 3	Ordinary watercourse	15 May 2018	MA02	250m south-east
CH345680_L17877_IA1	Broken Cross Drains	Ordinary watercourse	18 May 2018 11 September 2018	MA02	Within
CH134605_L5935_IA1_160518	Tributary of Peover Eye	Ordinary watercourse	16 May 2018	MA02	Within
CH561720_L5935_IA1	Peover Eye	Main river	16 May 2018 6 September 2018	MA02	Within
CH561720-CH634300_L5278_IA1	Smoker Brook	Main river	16 May 2018 5 September 2018	MA02	Within
CH171520_L5891_IA1_160518	Waterless Brook/Arley Brook	Main river	16 May 2018	MA03	Within
CH278025_L4745_IA1	Tributary of Tabley Brook 3	Ordinary watercourse	16 May 2018 5 September 2018	MA03	112m north-east
CH517829_L6291_IA1_210519	Tributary of Tabley Brook 8	Ordinary watercourse	21 May 2019	MA03	Within
CH241489_L5932_IA1_170518	Glaze Brook	Main river	17 May 2018	MA04	11.5m west
MAN198524_L21127_IA1_191020	Carr Brook	Main river	19 October 2020	MA05	Within
MAN227328_L21214_IA1	Small Brook	Main river	22 May 2019	MA05	359m south

Ecology survey code	Survey site name	Feature type	Survey date(s)	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
			4 September 2018		
GM909356_L6100_IA1_191020	Hey Brook	Main river	19 October 2020	MA05	Within
GM425997-GM917074_L6100_IA1	Nan Holes Brook	Main river	22 May 2019 8 October 2019	MA05	Within
GM909356-GM917074_L6071_IA1	Coffin Lane Brook	Main river	23 May 2019 8 October 2019	MA05	Within
CH448367_L5290_IA1_170518	Millington Clough	Main river	17 May 2018	MA06	Within
CH424125_L21155_IA1	Agden Brook	Main river	21 May 2019 9 October 2019	MA06	38.7m east
GM478972-MAN157768_L5040_IA1	River Bollin	Main river	23 May 2019 9 October 2019	MA06	Within
CH448367-CH573339_L5841_IA1_091019	Tributary of Timperley Brook 1	Main river	9 October 2019	MA06	45m north-west
GM79805_L4481_IA1_091019	Timperley Brook	Main river	9 October 2019	MA06	32m east

3.1.5 Table 8 summarises the biotic indices calculated for the aquatic invertebrate survey locations for MA01 to MA08. It includes notable taxa with a conservation score of 7 and greater and invasive non-native species. Species with of a lower conservation score (5 and 6) are mentioned in the text only.

Table 8: Summary of biotic indices calculated for aquatic invertebrate survey locations for MA01 to MA08

Ecology survey code	Watercourse/ waterbody	CA	Total number of taxa in sample	Total abundance in sample	WHPT score	WHPT ASPT	WHPT N-Taxa	LIFE score (family)	CCI score	PSI	PSI interpretation	EQR	Notable taxa
CH366652-CH446766-CH639040_L5294_IA1_140518	River Dane	MA02	17	58	65.1	5.01	13	7.6	5.4	75	Slightly sedimented	0.797	Invasive shrimp *Dikerogammarus haemobaphes* Freshwater polychaete *Hypania invalida*
CH366652-CH446766-CH639040_L5294_IA1_101019	River Dane	MA02	24	222	89.2	5.25	17	7.31	13.3	60	Moderately sedimented	0.797	Invasive shrimp *Dikerogammarus haemobaphes* Caspian mud shrimp *Chelicorophium curvispinum* Asiatic clam *Corbicula fluminea* Freshwater polychaete *Polychaeta*
CH446766-CH515800-CH534892-CH639040_L5061_IA1_140518	River Dane	MA02	23	337	112.9	5.7	20	7.6	10.4	69.2	Slightly sedimented	0.842	Invasive shrimp *Dikerogammarus haemobaphes*

Ecology survey code	Watercourse/ waterbody	CA	Total number of taxa in sample	Total abundance in sample	WHPT score	WHPT ASPT	WHPT N-Taxa	LIFE score (family)	CCI score	PSI	PSI interpretation	EQR	Notable taxa
CH446766-CH515800-CH534892-CH639040_L5061_IA1_060918	River Dane	MA02	31	2181	111.4	5.3	21	7.3	11.7	64.3	Slightly sedimented	0.842	Invasive shrimp *Dikerogammarus haemobaphes*
CH446766-CH515800-CH534892_L5021_IA1_150518	Puddinglake Brook	MA02	16	294	50.9	3.9	13	6.7	1.0	53.0	Moderately sedimented	0.608	No notable taxa present
CH446766-CH515800-CH534892_L5021_IA1_060918	Puddinglake Brook	MA02	29	442	73.3	3.7	20	5.7	3.9	3.3	Heavily sedimented	0.608	No notable taxa present
CH402012-CH505004_L6340_IA1_150518	Gad Brook	MA02	19	252	58.2	4.2	14	5.8	1.1	21.4	Sedimented	0.719	No notable taxa present
CH505004_L5424_IA1_150518	Tributary of Gad Brook 3	MA02	12	220	31.6	3.5	9	5.8	1.0	37.5	Sedimented	0.567	No notable taxa present
CH345680_L17877_IA1_180518	Broken Cross Drains	MA02	13	377	52.2	4.4	12	6.4	4.7	46.1	Moderately sedimented	0.661	No notable taxa present
CH345680_L17877_IA1_1	Broken Cross	MA02	12	62	44	4.0	11	6.3	4.5	26.7	Sedimented	0.661	No notable taxa

Ecology survey code	Watercourse/ waterbody	CA	Total number of taxa in sample	Total abundance in sample	WHPT score	WHPT ASPT	WHPT N-Taxa	LIFE score (family)	CCI score	PSI	PSI interpretation	EQR	Notable taxa
10918	Drains												present
CH134605_L5935_IA1_160518	Tributary of Peover Eye	MA02	25	322	93.4	4.7	20	6.3	8.1	46.4	Moderately sedimented	0.728	No notable taxa present
CH561720_L5935_IA1_160518	Peover Eye	MA02	36	540	171.8	6.1	28	7.1	12.3	64.0	Slightly sedimented	0.990	No notable taxa present
CH561720_L5935_IA1_060918	Peover Eye	MA02	32	850	155	6.7	23	7.4	10.8	70.6	Slightly sedimented	0.990	No notable taxa present
CH561720-CH634300_L5278_IA1_160518	Smoker Brook	MA02	34	396	156.3	6.3	25	7.7	7.5	74.2	Slightly sedimented	0.964	No notable taxa present
CH561720-CH634300_L5278_IA1_050918	Smoker Brook	MA02	45	1684	180.2	6.4	28	7.4	11.8	70.5	Slightly sedimented	0.964	No notable taxa present
CH171520_L5891_IA1_160518	Waterless Brook/Arley Brook	MA03	36	347	148.3	5.9	25	7.5	8.3	60.6	Heavily sedimented	0.913	No notable taxa present
CH278025_L4745_IA1_160518	Tributary of Tabley Brook 3	MA03	21	521	76.4	4.5	17	6.7	3.9	52.0	Moderately sedimented	0.715	No notable taxa present
CH517829_L6291_IA1_21	Tributary of Tabley Brook 8	MA03	14	548	38.1	4.2	9	6.2	1.5	38.5	Sedimented	0.646	No notable taxa present

Ecology survey code	Watercourse/ waterbody	CA	Total number of taxa in sample	Total abundance in sample	WHPT score	WHPT ASPT	WHPT N-Taxa	LIFE score (family)	CCI score	PSI	PSI interpretation	EQR	Notable taxa
0519													
CH242489_L5932_IA1_170518	Glaze Brook	MA04	20	139	80.7	4.0	20	6	7.4	8.3	Heavily sedimented	0.616	No notable taxa present
MAN198524_L21127_IA1_191020	Carr Brook	MA05	17	900	36.9	3.4	11	5.5	5.5	3.5	Heavily sedimented	0.596	No notable taxa present
MAN227328_L21214_IA1_220519	Small Brook	MA05	22	3297	43.1	3.3	13	6.1	7	33.3	Sedimented	0.561	No notable taxa present
MAN227328_L21214_IA1_040918	Small Brook	MA05	18	1180	65	3.6	18	5.9	7.3	29.0	Sedimented	0.561	No notable taxa present
GM909356_L6100_IA1_191020	Hey Brook	MA05	35	504	103.6	4.1	25	6.3	4.1	13.5	Heavily sedimented	0.867	No notable taxa present
GM425997-GM917074_L6100_IA1_220519	Nan Holes Brook	MA05	28	1083	81.6	4.5	18	6.5	3.3	42.3	Moderately sedimented	0.714	No notable taxa present
GM425997-GM917074_L6100_IA1_081019	Nan Holes Brook	MA05	15	110	60.2	4.6	13	6.6	10.6	61.1	Slightly sedimented	0.714	No notable taxa present
GM909356-GM917074_	Coffin Lane	MA05	17	763	62.6	4.8	13	6.9	1.2	55.6	Moderately	0.648	No notable taxa

Ecology survey code	Watercourse/ waterbody	CA	Total number of taxa in sample	Total abundance in sample	WHPT score	WHPT ASPT	WHPT N-Taxa	LIFE score (family)	CCI score	PSI	PSI interpretation	EQR	Notable taxa
L6071_IA1_230519	Brook										sedimented		present
GM909356-GM917074_L6071_IA1_081019	Coffin Lane Brook	MA05	20	393	72.4	4.5	16	6.3	8.1	50	Moderately sedimented	0.648	No notable taxa present
CH448367_L5290_IA1_170518	Millington Clough	MA06	18	1224	59.8	4.6	13	6.6	1.0	60.7	Moderately sedimented	0.672	No notable taxa present
CH448367-CH573339_L5290_IA1_091019	Millington Clough	MA06	13	1952	50.7	3.9	13	6.5	1.1	52	Moderately sedimented	0.672	No notable taxa present
CH424125_L21155_IA1_210519	Agden Brook	MA06	7	280	14.8	3.7	4	10	1	100	Minimally sedimented	0.636	No notable taxa present
CH424125_L21155_IA1_091019	Agden Brook	MA06	22	900	77.8	4.3	18	6.4	3.7	41.9	Moderately sedimented	0.636	No notable taxa present
GM478972-MAN157768_L5040_IA1_230519	River Bollin	MA06	35	961	81.6	4.5	18	6.5	3.3	42.3	Moderately sedimented	0.799	No notable taxa present
GM478972-MAN157768_L5040_IA1_091019	River Bollin	MA06	32	319	140.9	5.9	24	7.3	8.5	68.8	Slightly sedimented	0.799	No notable taxa present

Ecology survey code	Watercourse/ waterbody	CA	Total number of taxa in sample	Total abundance in sample	WHPT score	WHPT ASPT	WHPT N-Taxa	LIFE score (family)	CCI score	PSI	PSI interpretation	EQR	Notable taxa
CH448367-CH573339_L5841_IA1_091019	Tributary of Timperley Brook 1	MA06	14	919	52.8	4.1	13	5.7	1.4	27.3	Sedimented	0.655	No notable taxa present
GM79805_L4481_IA1_091019	Timperley Brook	MA06	17	143	57.9	4.5	13	6	10	50	Moderately sedimented	0.732	No notable taxa present

3.2 Deviations, constraints and limitations

3.2.1 Aquatic invertebrate surveys were primarily scheduled based on the results of an initial desk scoping exercise and scoping surveys undertaken as part of Phase 1 habitat survey and WFD walkover surveys.

3.2.2 Due to health and safety concerns, surveys could not be completed on the River Bollin in MA04. A high abundance of giant hogweed (*Heracleum mantegazzianum*) and steep river banks on this watercourse restricted access to the river channel.

3.2.3 Detailed aquatic invertebrate surveys could not be completed on Fairywell Brook in MA06. The watercourse was visited in 2018 and 2019. On both occasions it was found to be dry. As such, the watercourse was not scoped in for 2020.

3.2.4 Due to changing access permissions, some riverine invertebrate sites were only surveyed once as opposed to the preferred spring and autumn survey at each site. The metrics calculated for sites with single samples are informative but less robust than those calculated for two samples.

3.2.5 Details of sites where access was not available are listed in Table 9.

Table 9: Summary of locations where requirements for aquatic invertebrate survey was identified where no access was available.

Survey site name/location	OS grid reference	Description of proposed survey location	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
Basford Brook	SJ7147253619	South of Crewe	MA01	Within
Valley Brook	SJ7105455148	Within Crewe	MA01	230m north
River Wheelock	SJ6941966694	West of Middlewich	MA02	Within
Wade Brook	SJ6954774284	North of Lostock Green and south of Lostock Gralam	MA02	Within
Red Brook	SJ7010290808	South-west of Partington and east of Hollins Green	MA04	Within
Holcroft Lane Brook	SJ6648494168	South-west of Culcheth	MA05	Within
Windy Bank Brook	SJ6082299739	South of Abram and north of Golborne	MA05	Within
Blackburn's Brook	SJ7552784565	East of Rostherne Mere and south of the M56	MA06	Within
Birkin Brook	SJ7577984450	East of Rostherne Mere and west of Ashley	MA06	Within
Tributary of Birkin Brook 1	SJ8015985707	East of Rostherne Mere and south of Altrincham	MA06	Within
Tributary of Birkin Brook 4	SJ7672784067	East of Rostherne Mere and south of Altrincham	MA06	Within
Tributary of Birkin Brook 7	SJ7672784067	East of Rostherne Mere and south of Altrincham	MA06	Within

Survey site name/location	OS grid reference	Description of proposed survey location	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
Mobberley Brook	SJ7678983133	East of Rostherne Mere and south of Altrincham	MA06	Within
Sugar Brook	SJ7706083110	East of Rostherne Mere and south of Altrincham	MA06	Within

3.3 Baseline

3.3.1 Baseline data for watercourses and water bodies containing habitat capable of supporting a range of aquatic invertebrates are presented in the sections below.

Hough to Walley's Green (MA01)

Basford Brook

3.3.2 Basford Brook is not crossed by the route of the Proposed Scheme and is not within the land required for the construction of the Proposed Scheme. The route is tunnelled in this location. Access constraints limited detailed aquatic invertebrate surveys on Basford Brook in 2018, 2019 and 2020, as set out in Section 3.1.5.

3.3.3 The Environment Agency monitoring conducted in 2013 indicates good biological water quality. ASPT scores indicate probable moderate pollution, LIFE scores suggest slow flows, and the PSI scores indicate that the watercourse has moderate levels of sedimentation. The number of sensitive taxa ranges from 10 in 2005 to 17 in 2013. No CCI scores were recorded by the Environment Agency for Basford Brook.

3.3.4 Basford Brook flows through predominantly farmland and is likely heavily modified in sections to receive agricultural field drainage. Sedimentation pressures from agricultural land-use have likely reduced habitat diversity in Basford Brook. This is a typical condition when sedimentation pressures are high and river flow is poor.

3.3.5 The current WFD quality class of invertebrates for this waterbody (classified under Wistaston Brook on the Environment Agency Catchment Data Explorer[18]) is Good. This is consistent with previous years' classifications.

[18] The Environment Agency, Catchment Data Explorer. Available online at: https://environment.data.gov.uk/catchment-planning/.

Valley Brook

3.3.6 Although Valley Brook is crossed by the route of the Proposed Scheme, it is not within the land required for the construction of the Proposed Scheme as the route is tunnelled in this location. Access constraints limited detailed aquatic invertebrate surveys on Valley Brook in 2018, 2019 and 2020 as set out in Section 3.1.5.

3.3.7 Environment Agency monitoring conducted between 1995 and 2016 suggest predominately poor water quality and substantial organic pollution. ASPT scores indicate probable moderate pollution and cases of probable severe pollution in most years. LIFE scores suggest slow or sluggish flow conditions and PSI scores indicate the watercourse had moderate levels of sedimentation.

3.3.8 It is likely that this small watercourse has been historically modified for flood risk management due to its urban location. It has also been realigned and culverted under an existing railway. Urban pollution pressures and agricultural sedimentation in the upper reaches are further anticipated pressures. No notable species were identified by the Environment Agency, though caddisflies and mayflies, identified at this site, are often associated with moderate or higher biological water quality.

3.3.9 The current WFD quality class of invertebrates in this waterbody is Bad. This is consistent with previous years' classifications.

Wimboldsley to Lostock Gralam (MA02)

River Wheelock

3.3.10 The River Wheelock is within the land required for the construction of the Proposed Scheme west of Middlewich. However, no aquatic invertebrate survey was possible due to access constraints.

3.3.11 Environment Agency monitoring was conducted at two locations on the River Wheelock. The first site, approximately 34m upstream of the land required for the construction of the Proposed Scheme, was sampled on 16 occasions between 1995 and 2013. The data collected indicate moderate biological water quality and ASPT scores suggest probable severe pollution. Mean LIFE scores suggest slow or sluggish flows. No CCI or PSI scores are available for this watercourse.

3.3.12 The second Environment Agency monitoring site, approximately 200m upstream of the land required for the construction of the Proposed Scheme, was sampled on two occasions in 2016. The data collected indicate moderate biological water quality and ASPT scores suggest probable moderate pollution. Mean LIFE scores suggest slow or sluggish flows. No CCI or PSI scores are available for this watercourse. No Environment Agency species data are available for this watercourse.

3.3.13 The current WFD quality class of invertebrates in this waterbody (classified under Wheelock (Fowle Brook to Dane) in the Environment Agency Catchment Data Explorer) is Bad. This is a deterioration on previous years' classifications of Moderate.

River Dane

3.3.14 The River Dane is a large lowland river. It will be intersected by the route of the Proposed Scheme at two points, both near Bostock Green. Detailed aquatic surveys were conducted at both locations during the 2018 and 2019 survey seasons.

3.3.15 At the stretch surveyed (SJ6839268102), the River Dane is an 8m wide, 0.5m – 1m deep, meandering river, with varied habitat of glides and riffles, and a mosaic substrate of cobbles, pebbles, gravel, sand and silt.

3.3.16 The spring 2018 field survey of the River Dane recorded 58 individual specimens from 17 taxa. Overall, the CCI score indicates moderate conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by slight levels of sedimentation.

3.3.17 The WHPT score indicates moderate biological water quality, while the WHPT-ASPT score indicates good water quality. A broad variety of taxa were present, including the invasive non-native species of shrimp *Dikerogammarus haemobaphe*, a freshwater gammarid crustacean. The sample also contained the invasive freshwater polychaete *Hypania invalida*, snails, mussels, worms, crustacea, mayflies, beetles, caddisflies and true flies. The LIFE score of 7.6 for the River Dane sample indicates sluggish flow.

3.3.18 The autumn 2019 field survey of the River Dane recorded 222 individual specimens from 24 taxa. Overall, the CCI score indicates moderate conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.19 The WHPT score indicates good biological water quality, while the WHPT-ASPT score indicates good water quality. A broad variety of taxa were present, including many of the above mentioned, as well as four invasive non-native species, these were: *Dikerogammarus haemobaphes*, Caspian mud shrimp *Chelicorophium curvispinum*, Asiatic clam *Corbicula fluminea* and freshwater polychaete *Polychaeta*. The sample also contained *Bithynia leachii* and *Brachycentrus subnubilus*, which both have a conservation score of 6 and indicated that there may be regionally notable or locally important species present. The LIFE score of 7.31 for the River Dane sample suggests sluggish flow.

3.3.20 The combined spring and autumn EQR score is equivalent to Moderate WFD quality class (95.9% confidence that the site is Moderate for ASPT; 45.3% and 45.2% confidence that the site is Moderate and Poor for N-Taxa respectively).

3.3.21 At the second reach surveyed (SJ6836668762), the River Dane is an 8m wide, 0.6m – 1m deep, meandering river with varied habitat of glides and riffles and a mosaic substrate of cobbles, pebbles, gravel, sand and silt.

3.3.22 The spring 2018 field survey of the River Dane recorded 337 individual specimens from 23 taxa. Overall, the CCI score indicates fairly high conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by slight levels of sedimentation.

3.3.23 The WHPT score indicates good biological water quality, while the WHPT-ASPT score indicates good water quality. A broad variety of taxa were present, including *Baetis buceratus* and *Notonecta viridis*, which both have a conservation score of 6 and 5 respectively and may be of local importance. The invasive species *Dikerogammarus haemobaphe* was also recorded, as well as snails, mussels, worms, crustacea, mayflies, damselflies, beetles, caddisflies and true flies. The LIFE score of 7.6 for the River Dane sample suggests slow flow.

3.3.24 The autumn 2018, field survey of the River Dane recorded 2,181 individual specimens from 31 taxa. Overall, the CCI score indicates high conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by slight levels of sedimentation.

3.3.25 The WHPT score indicates good biological water quality, while the WHPT-ASPT score indicates good water quality. A broad variety of taxa are present, including *Baetis buceratus* and *Brachycentrus subnubilus*, which both have a conservation score of 6, and indicated that there may be regionally notable or locally important species present. The invasive species *Dikerogammarus haemobaphe* was recorded, as well as snails, mussels, worms, crustacea, mayflies, damselflies, true bugs, beetles, caddisflies and true flies. The LIFE score of 7.3 for the River Dane sample suggests slow flow.

3.3.26 The combined spring and autumn EQR score is equivalent to Moderate WFD quality class (78.2% confidence that the site is Moderate for ASPT; 78.0% confidence that the site is Moderate for N-Taxa).

3.3.27 No Environment Agency aquatic invertebrate data are available for this area of the River Dane.

Puddinglake Brook

3.3.28 Puddinglake Brook is a small tributary of the River Dane that flows flowing predominantly through agricultural land. It will be intersected by the route of the Proposed Scheme north of Whatcroft. Aquatic invertebrate surveys were conducted in spring and autumn 2018.

3.3.29 At the stretch surveyed, Puddinglake Brook is a 1m wide, 0.4m – 0.6m deep, brook with a varied habitat and a mosaic substrate of boulders, gravel and sand.

3.3.30 The spring 2018 field survey of Puddinglake Brook recorded 294 individual specimens from 16 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.31 The WHPT score indicates moderate biological water quality, while the ASPT score indicates poor water quality. A variety of taxa are present, including snails, mussels, worms, leeches,

crustacea, mayflies, beetles and true flies. The LIFE score of 6.7 for the Puddinglake Brook sample indicates slow flow.

3.3.32 The autumn 2018 field survey of Puddinglake brook recorded 442 individual specimens from 29 taxa. The overall CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by heavy levels of sedimentation.

3.3.33 The WHPT score indicates good biological water quality, while the WHPT-ASPT score indicates poor water quality. A variety of taxa are present, including flatworms, snails, mussels, leeches, crustacea, alderflies, true bugs, beetles and true flies. The LIFE score of 5.7 for the Puddinglake Brook sample indicates sluggish flow. The combined spring and autumn EQR score is equivalent to Poor WFD quality class (61.7% confidence that the site is Poor for ASPT; 64.6% confidence that the site is Moderate for N-Taxa).

3.3.34 Environment Agency monitoring was conducted on Puddinglake Brook in 2013 and 2016 at a site approximately 1km downstream from the Proposed Scheme. ASPT scores indicated probable moderate organic pollution and LIFE scores suggested slow flows.

Gad Brook

3.3.35 Gad Brook is a heavily overgrown channel flowing through dense scrub. It will be intersected by the route of the Proposed Scheme south-east of Rudheath. Only a short section was accessible for survey in spring 2018. Gad Brook is a 1m wide, 0.2m – 0.3m, field brook with varied habitat and a bed substrate of predominately silt with some cobbles, pebbles, gravel and sand. A significant quantity of woody debris is present in the channel and macrophyte cover is low.

3.3.36 The spring 2018 field survey of Gad Brook recorded 252 individual specimens from 19 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by sedimentation.

3.3.37 The WHPT score indicates moderate biological water quality, while the WHPT-ASPT score indicates moderate water quality. A variety of taxa are present, including snails, mussels, worms, leeches, crustacea, true bugs, beetles, caddisflies and true flies. The LIFE score of 5.8 for the Gad Brook sample indicates slow or sluggish flow.

3.3.38 The spring EQR score is equivalent to Poor WFD quality class (44.2% and 40.1% confidence that the site is Poor and Moderate for ASPT respectively; 39.9% and 30.8% confidence that the site is Moderate and Poor for N-Taxa respectively). No Environment Agency aquatic invertebrate data are available for Gad Brook.

Tributary of Gad Brook 3

3.3.39 A Tributary of Gad Brook 3 was also surveyed in spring 2018. It will be intersected by the route of the Proposed Scheme south-east of Rudheath. Access constrained autumn surveys

in 2018, 2019 and 2020. Tributary of Gad Brook 3 flows into Gad Brook approximately 0.8km upstream of the Gad Brook survey location.

3.3.40 At the stretch surveyed, Tributary of Gad Brook 3 is a 0.5m wide, 0.05m – 0.1m deep, overgrown field ditch with a substrate of largely silt and a small quantity of gravel.

3.3.41 The spring 2018 field survey of Tributary of Gad Brook 3 recorded 220 individual specimens from 21 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by sedimentation.

3.3.42 The WHPT score indicates poor biological water quality, while the WHPT-ASPT score indicates poor water quality. A variety of taxa are present, including snails, worms, leeches, crustacea, true bugs, caddisflies and true flies. The LIFE score of 5.8 for the Tributary of Gad Brook 3 sample indicates slow or sluggish flow.

3.3.43 The spring EQR score is equivalent to Bad WFD quality class (67.8% confidence that the site is Bad for ASPT; 59.9% confidence that the site is Bad for N-Taxa).

3.3.44 No Environment Agency aquatic invertebrate data are available for Tributary of Gad Brook 3.

Broken Cross Drains

3.3.45 Broken Cross Drains lies within the land required for construction of the Proposed Scheme north-east of Rudheath.

3.3.46 At the stretch surveyed, Broken Cross Drains is a 0.4m wide, 0.1m deep, drain system with little habitat variation and a substrate of predominantly silt.

3.3.47 The spring 2018 field survey of Broken Cross Drains recorded 377 individual specimens from 13 taxa. The overall CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.48 The WHPT score indicates moderate biological water quality, while the WHPT-ASPT score indicates moderate water quality. A variety of taxa are present, including snails, worms, crustacea, true bugs, beetles, caddisflies and true bugs. The LIFE score of 6.4 for the Broken Cross Drains sample indicates slow flow.

3.3.49 The autumn 2018 field survey of Broken Cross Drains recorded 62 individual specimens from 12 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by sedimentation.

3.3.50 The WHPT score indicates moderate biological water quality, while the WHPT-ASPT score indicates moderate water quality. A variety of taxa are present, including snails, crustacea, beetles and true bugs. The LIFE score of 6.3 for the Broken Cross Drains sample indicates slow flow.

3.3.51 The EQR score for the combined spring and autumn samples is equivalent to Bad to Poor WFD quality class (93.4% confidence that the site is Poor for ASPT; 69.5% confidence that the site is Bad for N-Taxa).

3.3.52 No Environment Agency aquatic invertebrate data are available for Broken Cross Drains.

Wade Brook

3.3.53 Wade Brook will be intersected by the route of the Proposed Scheme north of Lostock Gralam. Access constraints prevented detailed aquatic invertebrate surveys on Wade Brook in 2018, 2019 and 2020 as set out in Section 3.1.5.

3.3.54 Environment Agency monitoring was carried out for two locations on Wade Brook. The first site, approximately 170m downstream of the land required for the construction of the Proposed Scheme, was sampled on five occasions between 1995 and 2004. Mean PSI scores indicate that the watercourse has moderate levels of sedimentation, mean LIFE scores suggest moderate flows, and the mean CCI score indicates a low conservation value.

3.3.55 The second Environment Agency monitoring site, approximately 1.1km downstream of the land required for the construction of the Proposed Scheme, was sampled on four occasions between 2013 and 2015. Mean PSI scores indicate that the channel was affected by sedimentation, mean LIFE scores suggest moderate flows and the mean CCI score indicate that the aquatic invertebrate community had low conservation value. Environment Agency surveys undertaken on Wade Brook suggest abundant amphipods, as well as non-biting midge and worm species are present. Other species, including mayflies, soldier flies and sandflies, were present in low abundance.

3.3.56 The current WFD quality class of invertebrates in this waterbody (classified under Wade Brook in the Environment Agency Catchment Data Explorer) is Poor. This is consistent with previous years' classifications.

Tributary of Peover Eye

3.3.57 Tributary of Peover Eye will be intersected by the route of the Proposed Scheme north-east of Lostock Gralam. Aquatic invertebrate surveys were conducted in spring 2018 at this location. Access constraints prevented autumn surveys in 2018, 2019 and 2020, as set out in Section 3.1.5.

3.3.58 At the stretch surveyed, Tributary of Peover Eye is a 0.5m wide, 0.05m deep, small woodland stream with lots of woody debris in the channel and little flow.

3.3.59 The spring 2018 field survey of Tributary of Peover Eye recorded 322 individual specimens from 25 taxa. The overall CCI score indicates moderate conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.60 The WHPT score suggests good biological water quality, while the WHPT-ASPT score indicates good water quality. A variety of taxa are present, including *Agabus guttatus*, which

has a conservation score of 5, indicating that there may be regionally notable or locally important species present. Flatworms, snails, mussels, crustacea, mayflies, stoneflies, true bugs, beetles, caddisflies and true bugs were also present. The LIFE score of 6.3 for the Tributary of Peover Eye sample indicates slow flow.

3.3.61 The spring EQR score is equivalent of Moderate WFD quality class (49.9% and 47.4% confidence that the site is Moderate and Poor for ASPT respectively; 96.8% confidence that the site is High for N-Taxa).

3.3.62 No Environment Agency aquatic invertebrate data were available for Tributary of Peover Eye.

3.3.63 Plumley Lime Beds SSSI, approximately 270m west of the land required for the construction of the Proposed Scheme, encompasses a reach of the Tributary of Peover Eye and therefore has hydrological connectivity with the land required for the construction of the Proposed Scheme. Tributary of Peover Eye also flows through and adjacent to Winnington and Peas Wood LWS and Long Wood LWS. These sites are designated for their habitat and no notable aquatic invertebrate species records exist for these sites.

Peover Eye

3.3.64 Peover Eye will be intersected by the route of the Proposed Scheme north-east of Lostock Gralam. Both spring and autumn aquatic invertebrate surveys were undertaken on Peover Eye in 2018.

3.3.65 At the stretch surveyed, Peover Eye is a 6m wide, 0.3m deep, moderate lowland river flowing through an area of woodland. It has a relatively uniform substrate of predominately sand with small areas of pebble and gravel.

3.3.66 The spring 2018 field survey of Peover Eye recorded 540 individual specimens from 36 taxa. The overall CCI score indicates fairly high conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by slight levels of sedimentation.

3.3.67 The WHPT score indicates very good biological water quality, while the WHPT-ASPT score indicates good water quality. A broad variety of taxa are present, including non-biting midge, New Zealand mud snail, caddisflies and beetles in moderate abundance. Waterlouse, sandflies, crustacea, arthropods, stoneflies, worms, leeches and mayflies were also present, though all in relatively low abundance. The LIFE score of 6.1 for the Peover Eye sample indicates slow flow.

3.3.68 The autumn 2018 field survey of Peover Eye recorded 850 individual specimens from 32 taxa. The overall CCI score indicates fairly high conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by slight levels of sedimentation.

3.3.69 The WHPT score indicates very good biological water quality, while the WHPT-ASPT score indicates good water quality. A broad variety of taxa are present, including *Brachycentrus subnubilus* and *Planaria torva*, which have a conservation score of 6 and 5 respectively and

indicated that there may be regionally notable or locally important species present. Other species including mayflies and beetles were also present. The LIFE score of 6.7 for the Peover Eye sample indicates slow flow.

3.3.70 The combined spring and autumn EQR score is equivalent to High WFD quality class (63.6% confidence that the site is High for ASPT; 94.7% confidence that the site is High for N-Taxa).

3.3.71 Environment Agency monitoring has been undertaken for Peover Eye approximately 360m upstream of the land required for the construction of the Proposed Scheme. Environment Agency sampling was conducted at this site on 10 occasions between 1995 and 2014. Mean PSI scores indicate the watercourse is slightly sedimented and mean LIFE scores suggest slow flows. CCI score indicate a moderate conservation value. Environment Agency surveys on Peover Eye have recorded abundant mayflies, blackflies (*Simulium sp*.), non-biting midge, caddisflies, amphipods, worms, and beetles. Crane fly species and dagger flies (*Empididae sp.*) are also present in lower abundance.

3.3.72 Peover Eye flows through and adjacent to Winnington and Peas Wood LWS and Mill Wood and Mill Bottoms LWS. These sites are designated for their habitat and no notable aquatic invertebrate species records exist for these sites.

Smoker Brook

3.3.73 Smoker Brook, a small lowland stream, will be intersected by the route of the Proposed Scheme east of Higher Wincham. Smoker Brook was accessed for aquatic invertebrate surveys in spring and autumn 2018.

3.3.74 At the stretch surveyed, Smoker Brook is a 3m wide, 0.15m – 0.25m deep, meandering brook flowing through a woody copse, where substrate was diverse and comprised boulders, cobbles, pebbles, gravel, sand and silt.

3.3.75 The spring 2018 field survey of Smoker Brook recorded 396 individual specimens from 34 taxa. Overall, the CCI score indicates moderate conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by slight levels of sedimentation.

3.3.76 The WHPT score indicates very good biological water quality, while the WHPT-ASPT score indicates good water quality. A broad variety of taxa are present, including caddisflies, mayflies, beetles and non-biting midge. The LIFE score of 7.7 for the Smoker Brook sample indicates sluggish flow.

3.3.77 The autumn 2018 field survey of Smoker Brook recorded 1684 individual specimens from 45 taxa. Overall, the CCI score indicates moderate conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by slight levels of sedimentation.

3.3.78 The WHPT score indicates very good biological water quality, while the WHPT-ASPT score indicates good water quality. A broad variety of taxa are present, including the spongillafly (*Sisyra fuscata*), which has a conservation score of five and indicated that there may be

regionally notable or locally important species present. Other species including beetles and snails were also present. The LIFE score of 7.4 for the Smoker Brook sample indicates sluggish flow.

3.3.79 The combined spring and autumn EQR score is equivalent to Good WFD quality class (61.7% confidence that the site is Good for ASPT; 98.2% confidence that the site is High for N-Taxa).

3.3.80 Environment Agency monitoring between 1995 and 2015 suggest very good biological water quality. ASPT scores indicate moderate to good water quality, whilst LIFE scores suggest slow flows. The number of sensitive taxa recorded ranges from 13 in 1995 to 27 in 2013.

3.3.81 Smoker Brook flows through Leonards and Smoker Wood LWS. This site is designated for its habitat and no notable aquatic invertebrate species records exist for this site.

Pickmere to Agden and Hulseheath (MA03)

Waterless Brook/Arley Brook

3.3.82 Waterless Brook/Arley Brook will be intersected by the route of the Proposed Scheme west of Knutsford. Aquatic invertebrate surveys were conducted in spring 2018 at this location. Access constraints prevented detailed aquatic invertebrate surveys on Waterless Brook/Arley Brook in autumn 2018, 2019 and 2020 as set out in Section 3.1.5.

3.3.83 At the stretch surveyed, Waterless Brook/Arley Brook is a 4m wide, 0.2m – 0.3m deep, stream flowing through an area of rough pasture with a substrate largely comprised cobbles with some pebbles, gravel and silt present. A small quantity of woody debris was also recorded. Banks on both sides of the river were steep with sheet pile reinforcement in some reaches.

3.3.84 The spring 2018 field survey of Waterless Brook/Arley Brook recorded 347 individual specimens from 36 taxa. Overall, the CCI score indicates moderate conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by heavy levels of sedimentation.

3.3.85 The WHPT score indicates very good biological water quality, while the WHPT-ASPT score indicates good water quality. A variety of taxa are present, including abundant beetles, as well as flatworms, snails, mussels, worms, leeches, crustacea, mayflies, caddisflies and true bugs. The LIFE score of 7.5 for the Waterless Brook/Arley Brook sample indicates sluggish flow.

3.3.86 The spring EQR score is equivalent to Moderate to Good WFD quality class (61.7% confidence that the site is Good for ASPT; 42.3% and 29.4% confidence that the site is Moderate and Poor for N-Taxa respectively).

3.3.87 No Environment Agency aquatic invertebrate data are available for Waterless Brook/Arley Brook.

3.3.88 Waterless Brook/Arley Brook flows through Arley and Waterless Brook Corridor LWS within the land required for the construction of the Proposed Scheme and is therefore in hydrological continuity with Rinks Wood and Round Wood LWS, Bongs Woodland Rough LWS and Gore Wood LWS. These sites are designated for their habitat and no notable aquatic invertebrate species records exist for these sites.

Tributary of Tabley Brook 3

3.3.89 Tributary of Tabley Brook 3 will be intersected by the route of the Proposed Scheme west of Tatton Park. Aquatic invertebrate surveys were conducted in spring 2018 at this location. Detailed aquatic invertebrate surveys on Tributary of Tabley Brook 3 could not be carried out in autumn 2018, 2019 or 2020 as the watercourse was dry (see Section 3.1.5).

3.3.90 At the stretch surveyed, Tributary of Tabley Brook 3 is a 0.5m wide, 0.05m – 0.1m deep, small ditch flowing through agricultural land with homogenous habitat, with a largely silt substrate and a lack of flow diversity throughout the stretch.

3.3.91 The spring 2018 field survey of Tributary if Tabley Brook 3 recorded 521 individual specimens from 21 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.92 The WHPT score indicates good biological water quality and the WHPT-ASPT score indicates moderate water quality. A variety of taxa are present, including flatworms, snails, mussels, worms, leeches, crustacea, alderflies, mayflies, beetles, caddisflies and true flies. The LIFE score of 6.7 for the Tributary of Tabley Brook 3 sample indicates sluggish flow.

3.3.93 The spring EQR score is equivalent to Poor for WFD quality class (53.8% and 43.1% confidence that the site is Poor and Moderate for ASPT respectively; 81.5% confidence that the site is High for N-Taxa).

3.3.94 No Environment Agency aquatic invertebrate data are available for Tributary of Tabley Brook 3.

Tributary of Tabley Brook 8

3.3.95 Tributary of Tabley Brook 8 will be intersected by the route of the Proposed Scheme west of Tatton Park. Aquatic invertebrate surveys were conducted in spring 2019 at this location. Access constraints prevented autumn aquatic invertebrate surveys on Tributary of Tabley Brook 8 in spring and autumn 2018 and autumn 2019 and 2020 as set out in Section 3.1.5.

3.3.96 At the stretch surveyed, Tributary of Tabley Brook 8 is a 0.5m wide, 0.1m – 0.15m deep, small ditch flowing through agricultural land, with poor habitat and flow diversity and a bed substrate of clay.

3.3.97 The spring 2019 field survey of Tributary of Tabley Brook 8 recorded 548 individual specimens from 14 taxa. The overall CCI score indicates low conservation value of the

aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by sedimentation.

3.3.98 The WHPT score indicates poor biological water quality, while the WHPT-ASPT score indicates moderate water quality. A variety of taxa are present, including worms, leeches and true bugs. The LIFE score of 6.2 for the Tributary of Tabley Brook 8 sample indicates sluggish flow.

3.3.99 The spring EQR score is equivalent to Poor WFD quality class (70.7% confidence that the site is Poor for ASPT; 59.9% confidence that the site is Bad for N-Taxa).

3.3.100 No Environment Agency aquatic invertebrate data are available for Tributary of Tabley Brook 8.

Broomedge to Glazebrook (MA04)

River Bollin

3.3.101 Health and safety concerns prevented detailed aquatic invertebrate surveys on the River Bollin in 2018, 2019 and 2020 as set out in Section 3.1.5. It will be intersected by the route of the Proposed Scheme west of Altrincham.

3.3.102 The Environment Agency conducted aquatic invertebrate sampling approximately 500m downstream of the land required for the construction of the Proposed Scheme at the confluence of the River Bollin and the Old Bollin. Data collected in spring 2010 and 2013 indicate good biological water quality. Environment Agency monitoring in autumn 2013 and spring and autumn in 2015 indicate high biological water quality. ASPT scores indicate pollution in 2010 and early 2013 but an improvement to cleaner water in late 2013 and 2015. The number of scoring taxa increase substantially from 16 in 2013 to 27 in 2015. LIFE scores suggest slow or sluggish flows, whilst PSI indices indicate that the watercourse has moderate levels of sedimentation. Mean CCI scores indicate moderate conservation value, though the most recent surveys (in 2015) suggest high to very high conservation value. True flies, mayflies, caddisflies, leeches, worms, crustacea and snails are present in the River Bollin.

3.3.103 The current WFD quality class of invertebrates in the River Bollin (Ashley Mill to Manchester Ship Canal) is Good. This is an improvement on the previous classification in 2015, which was Moderate.

Red Brook

3.3.104 Access constraints prevented detailed aquatic invertebrate surveys on Red Brook in 2018, 2019 and 2020 as set out in Section 3.1.5. It will be intersected by the route of the Proposed Scheme south-west of Partington.

3.3.105 Red Brook, which flows into the Manchester Ship Canal, is crossed by the route of the Proposed Scheme. Environment Agency monitoring, approximately 1.3km upstream of the land required for the construction of Proposed Scheme, was conducted on 14 occasions

between 1995 and 2015. Mean PSI scores indicate that the watercourse is heavily sedimented, mean LIFE scores suggest slow flows and no CCI scores were recorded. Abundant mayflies and caddisflies are present, along with worms, crustacea, true flies and snails.

3.3.106 The current WFD quality class for aquatic invertebrates in this waterbody (classified under Sinderland Brook on the Environment Agency Catchment Data Explorer) is Moderate. This is consistent with previous years' classifications.

Glaze Brook

3.3.107 Glaze Brook is a lowland river that flows into the Manchester Ship Canal. It is within the land required for the construction of the Proposed Scheme west of Cadishead. Aquatic invertebrate surveys were conducted in spring 2018 at this location. Detailed aquatic invertebrate surveys on Glaze Brook could not be carried out in autumn 2018, 2019 or in 2020 due to access constraints as set out in Section 3.1.5.

3.3.108 At the stretch surveyed, Glaze Brook is a 10m wide, 0.4m deep, lowland river flowing through a copse, with a main habitat of glide and a substrate of boulder, cobble, gravel and silt. Woody and urban debris are present, as is a sewage odour.

3.3.109 The spring 2018 field survey of Glaze Brook recorded 139 individual specimens from 20 taxa. The overall CCI score indicates moderate conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by heavy levels of sedimentation.

3.3.110 The WHPT score indicates good biological water quality, while the WHPT-ASPT score indicates moderate water quality. A variety of taxa were present, including the damselfly *Calopteryx virgo*, which has a conservation score of five and indicated that there may be regionally notable or locally important species present. Flat worms, snails, mussels, worms, leeches, crustacea, damselflies, true bugs, beetles, caddisflies and true bugs are also present. The LIFE score of 6 for the Glaze Brook sample indicates slow flow.

3.3.111 The spring EQR score is equivalent to Poor WFD quality class (63% confidence that the site is Poor for ASPT; 42.2% confidence that the site is Good for N-Taxa).

3.3.112 The Environment Agency conducted aquatic invertebrate monitoring on this watercourse approximately 40m upstream of the land required for the construction of the Proposed Scheme, upstream of Cadishead Way, on 13 occasions between 1995 and 2013. Environment Agency data were consistent with the detailed aquatic invertebrate survey conducted in spring 2018. Further Environment Agency surveys on Glaze Brook were not included in this baseline study because they were located further upstream of the land required for the Proposed Scheme. No Environment Agency species list exists for this watercourse.

Risley to Bamfurlong (MA05)

Holcroft Lane Brook

3.3.113 Holcroft Lane Brook will be intersected by the route of the Proposed Scheme near Culcheth. No Environment Agency aquatic invertebrate data are available for Holcroft Lane Brook. Access constraints prevented detailed aquatic invertebrate surveys on Holcroft Lane Brook in 2018, 2019 and 2020 as set out in Section 3.1.5.

3.3.114 Holcroft Lane Brook and its tributaries are crossed by the route of the Proposed Scheme at Silver Lane Ponds LWS, south of Culcheth. This site is designated for its habitat and no notable aquatic invertebrate species records exist for this site.

Carr Brook

3.3.115 Carr Brook will be intersected by the route of the Proposed Scheme south of Golborne. Aquatic invertebrate surveys were undertaken in autumn 2020 in this location.

3.3.116 At the stretch surveyed, Carr Brook is a 1m wide, 0.1m deep, steep sided ditch characterised by run features and a predominately silty substrate.

3.3.117 The autumn 2020 field survey of Carr Brook recorded 900 individual specimens from 17 taxa. Overall, the CCI score indicates moderate conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by heavy sedimentation.

3.3.118 The WHPT score indicates poor biological water quality, while the WHPT-ASPT score indicates poor water quality. A variety of taxa are present, including snails, worms, crustacea, beetles and true bugs. The LIFE score of 5.5 for the Carr Brook sample indicates slow flow.

3.3.119 The autumn EQR score is equivalent to Bad WFD quality class (46.9% confidence that the site is Bad for ASPT; 33.5% confidence that the site is High for N-Taxa).

3.3.120 No Environment Agency aquatic invertebrate data are available for Carr Brook.

Small Brook

3.3.121 Small Brook will be intersected by the route of the Proposed Scheme at Lowton Common. Aquatic invertebrate surveys were undertaken in autumn 2018 and spring 2019 at this location.

3.3.122 At the stretch surveyed, Small Brook is a 3m wide, 0.1m deep, small agricultural stream characterised by pool and riffle features with a homogenous substrate.

3.3.123 The spring 2019 field survey of Small Brook recorded 396 individual specimens from 34 taxa. Overall, the CCI score indicates moderate conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by sedimentation.

3.3.124 The WHPT score indicates moderate biological water quality, while the WHPT-ASPT score indicates poor water quality. A variety of taxa are present, including snails, worms, crustacea, beetles and true bugs. The LIFE score of 6.1 for the Small Brook sample indicates slow flow.

3.3.125 The autumn 2018 field survey of Small Brook recorded 1180 individual specimens from 18 taxa. Overall, the CCI score indicates moderate conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by sedimentation.

3.3.126 The WHPT score indicates moderate biological water quality, while the WHPT-ASPT score indicates poor water quality. A variety of taxa are present, including snails, mussels, worms, leeches, crustacea, mayflies and true bugs. The LIFE score of 5.9 for the Small Brook sample indicates slow flow.

3.3.127 The combined spring and autumn EQR score is equivalent to Bad WFD quality class (78.7% confidence that the site is Bad for ASPT; 53.8% confidence that the site is Moderate for N-Taxa).

3.3.128 No Environment Agency aquatic invertebrate data are available for Small Brook.

Hey Brook

3.3.129 Hey Brook is within the land required for the construction of the Proposed Scheme south of Abram and north of Golborne. Aquatic invertebrate surveys were undertaken in autumn 2020 in this location.

3.3.130 At the stretch surveyed, Hey Brook is a 4m wide, 0.8m deep, stream characterised by run features and a predominately silty substrate.

3.3.131 The autumn 2020 field survey of Hey Brook recorded 504 individual specimens from 35 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by heavy sedimentation.

3.3.132 The WHPT score indicates very good biological water quality, while the WHPT-ASPT score indicates poor water quality. A variety of taxa are present, including snails, worms, crustacea, beetles and true bugs. The LIFE score of 6.3 for the Hey Brook sample indicates slow flow.

3.3.133 The autumn EQR score is equivalent to Moderate WFD quality class (43.6% confidence that the site is Moderate for ASPT; 96.1% confidence that the site is High for N-Taxa).

3.3.134 No Environment Agency aquatic invertebrate data were available for Hey Brook.

3.3.135 This waterbody is named Hey/Borsdane Brook on the Environment Agency Catchment Data Explorer. The current WFD quality class for aquatic invertebrates in this waterbody is Moderate. This is consistent with previous years' classifications.

Windy Bank Brook

3.3.136 Windy Bank Brook will be intersected by the route of the Proposed Scheme north of Golborne. Access constraints prevented detailed aquatic invertebrate surveys on Windy Bank Brook in 2018, 2019 and 2020 as set out in Section 3.1.5. No Environment Agency aquatic invertebrate data are available for Windy Bank Brook.

Nan Holes Brook

3.3.137 Nan Holes Brook will be intersected by the route of the Proposed Scheme north of Golborne. Aquatic invertebrate surveys were conducted in spring and autumn 2019 at this location.

3.3.138 At the stretch surveyed, Nan Holes Brook is a 2m wide, 0.1m – 0.2m deep, stream with varied habitat of riffles and pools and a mosaic of substrate of bedrock, boulders, cobbles, pebbles, gravel and clay.

3.3.139 The spring 2019 field survey of Nan Holes Brook recorded 1083 individual specimens from 28 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.140 The WHPT score indicates good biological water quality, while the WHPT-ASPT score indicates moderate water quality. A variety of taxa are present, including water beetles, mussels, worms, crustacea, leeches and true flies. The LIFE score of 6.5 for the Nan Holes Brook sample indicates slow flow.

3.3.141 The autumn 2019 field survey of Nan Holes Brook recorded 110 individual specimens from 25 taxa. Overall, the CCI score indicates fairly high conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.142 The WHPT score indicates moderate biological water quality, while the WHPT-ASPT score indicates moderate water quality. A variety of taxa are present, including *Simulium aureum*, which has a conservation score of 5, and indicates that there may be regionally notable or locally important species present. Water beetles, mussels, worms, crustacea, mayflies, caddisflies, leeches and true flies are also present. The LIFE score of 6.6 for the Nan Holes Brook sample indicates slow flow.

3.3.143 The combined spring and autumn EQR score is equivalent to Poor WFD quality class (62.9% confidence that the site is Poor for ASPT; 53.8% and 37.2% confidence that the site is Moderate and Poor for N-Taxa respectively).

3.3.144 No Environment Agency aquatic invertebrate data are available for Nan Holes Brook.

Coffin Lane Brook

3.3.145 Coffin Lane Brook will be intersected by the route of the Proposed Scheme north of Golborne. Aquatic invertebrate surveys were conducted in spring and autumn 2019 at this location.

3.3.146 At the stretch surveyed, Coffin Lane Brook is a 1m wide, 0.1m – 0.3m deep, small tributary of Hey Brook flowing predominately through agricultural land. The main habitat features are riffle and pool, and the bed substrate is a mosaic of boulders, cobbles, pebbles, gravel, silt and clay. A weir is present upstream of the surveyed reach.

3.3.147 The spring 2019 field survey of Coffin Lane Brook recorded 763 individual specimens from 17 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.148 The WHPT score indicates moderate biological water quality, while the WHPT-ASPT score indicates moderate water quality. A variety of taxa are present, including water beetles, mussels, worms, crustacea, leeches and true flies. The LIFE score of 6.9 for the Coffin Lane Brook sample indicates slow or sluggish flow.

3.3.149 The autumn 2019 field survey of Coffin Lane Brook recorded 393 individual specimens from 20 taxa. Overall, the CCI score indicates moderate conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.150 The WHPT score indicates good biological water quality, while the WHPT-ASPT score indicates moderate water quality. A variety of taxa are present, including the black fly *Simulium aureum*, which has a conservation score of 5, and indicated that there may be regionally notable or locally important species present. Water beetles, mussels, worms, crustacea, mayflies, caddisflies, leeches and true flies are also present. The LIFE score of 6.3 for the Coffin Lane Brook sample indicates slow or sluggish flow.

3.3.151 The combined spring and autumn EQR score is equivalent to Poor WFD quality class (90.2% confidence that the site is Poor for ASPT; 57.7% confidence that the site is Moderate for N-Taxa).

3.3.152 No Environment Agency aquatic invertebrate data are available for Coffin Lane Brook.

Hulseheath to Manchester Airport (MA06)

Millington Clough

3.3.153 Millington Clough will be intersected by the route of the Proposed Scheme south of Booth Bank. Aquatic invertebrate surveys were conducted in spring 2018 and autumn 2019 at this location.

3.3.154 At the stretch surveyed, Millington Clough is a 1m wide, 0.1m – 0.2m deep, small stream flowing through agricultural land with a substrate of cobbles, pebbles, gravel, sand and silt. Some woody debris is present in the channel, as well as non-filamentous algae.

3.3.155 The spring 2018 field survey of Millington Clough recorded 1,224 individual specimens from 18 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.156 The WHPT score indicates moderate biological water quality, while the WHPT-ASPT score indicates moderate water quality. A variety of taxa are present, including water beetles, mussels, worms, crustacea, leeches and true flies. The LIFE score of 6.6 for the Millington Clough sample indicates slow or sluggish flow.

3.3.157 The autumn 2019 field survey of Millington Clough recorded 1,952 individual specimens from 13 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.158 The WHPT score indicates moderate biological water quality, while the WHPT-ASPT score indicates poor water quality. A variety of taxa are present, including water beetles, worms, crustacea, leeches and true flies. The LIFE score of 6.5 for the Millington Clough sample indicates slow or sluggish flow.

3.3.159 The combined spring and autumn EQR score is equivalent to Poor WFD quality class (92.8% confidence that the site is Poor for ASPT; 50.4% and 36% confidence that the site is Poor and Bad for N-Taxa respectively).

3.3.160 No Environment Agency aquatic invertebrate data are available for Millington Clough.

Agden Brook

3.3.161 Agden Brook will be intersected by the route of the Proposed Scheme south-west of Little Bollington. Aquatic invertebrate surveys were conducted in spring and autumn 2019 at this location.

3.3.162 At the stretch surveyed, Agden Brook is a 1m wide, 0.1m – 0.2m deep, small stream flowing through agricultural land with riffle-pool sequences and a substrate of boulder, cobble, pebble, gravel, sand and silt. Woody debris and macrophytes are present in the channel.

3.3.163 The spring 2019 field survey of Agden Brook recorded 280 individual specimens from 7 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by minimal levels of sedimentation.

3.3.164 The WHPT score indicates poor biological water quality, while the WHPT-ASPT score indicates poor water quality. A low variety of taxa are present, including water beetles, worms, crustacea and true flies. The LIFE score of 10 for the Agden Brook sample indicates fast flow.

3.3.165 The autumn 2019 field survey of Agden Brook recorded 900 individual specimens from 22 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.166 The WHPT score indicates good biological water quality, while the WHPT-ASPT score indicates moderate water quality. A variety of taxa are present, including water beetles, worms, crustacea, leeches and true flies. The LIFE score of 6.4 for the Agden Brook sample indicates slow flow.

3.3.167 The combined spring and autumn EQR score is equivalent to Poor WFD quality class (85.4% confidence that the site is Poor for ASPT; 78.7% confidence that the site is Bad for N-Taxa).

3.3.168 Environment Agency monitoring exists for Agden Brook approximately 2.2km downstream of the land required for the construction of the Proposed Scheme. Environment Agency surveys were conducted on eight occasions between 1995 and 2006. Mean ASPT scores indicate that the watercourse was impacted by organic pollution, mean LIFE scores suggest slow flows and mean PSI scores indicate that the watercourse has moderate levels of sedimentation. No CCI scores were available for this watercourse. Environment Agency surveys on Agden Brook identified abundant mayflies, true flies, worms, non-biting midge and crustacea.

Blackburn's Brook

3.3.169 Blackburn's Brook will be intersected by the route of the Proposed Scheme south of Altrincham. Access constraints prevented detailed aquatic invertebrate surveys on Blackburn's Brook in 2018, 2019 and 2020, as set out in Section 3.1.5.

3.3.170 Environment Agency monitoring exists for Blackburn's Brook approximately 510m upstream of the land required for the construction of the Proposed Scheme. Environment Agency surveys were conducted on eight occasions between 1995 and 2006. Mean ASPT scores indicate probable moderate pollution, mean LIFE scores suggest slow flows and mean PSI scores indicate that the watercourse is 'sedimented'. No CCI scores were available for this watercourse.

3.3.171 Environment Agency surveys on Blackburn's Brook identified abundant crustacea, snails, true flies and mussels. Worms, caddisflies and leeches are also present.

3.3.172 The current WFD quality class for aquatic invertebrates on this watercourse (classified under Birkin Brook on the Environment Agency Catchment Data Explorer) is High. This is consistent with the previous year's classification, although prior to this the quality class was Good.

3.3.173 Blackburn's Brook is in hydrological continuity with Rostherne Mere Ramsar site, SSSI and National Nature Reserve. Rostherne Mere is an area of wetlands consisting of open water and peatland sites, as well as reedbed habitat, fen, carr and damp pasture. rECOrd has identified a number of notable species, including damselflies, true bug, crustaceans, beetles, molluscs, annelids and caddisflies. Blackburn's Brook also flows through Hancock's Bank

South LWS. This site is designated for its habitat and no records of notable aquatic invertebrate species exist for this site.

Birkin Brook

3.3.174 Birkin Brook will be intersected by the route of the Proposed Scheme south of Altrincham. Access constraints prevented detailed aquatic invertebrate surveys on Birkin Brook in 2018, 2019 and 2020, as set out in Section 3.1.5.

3.3.175 Environment Agency monitoring was conducted at three locations on Birkin Brook between 1995 and 2016. One site was approximately 555m upstream of the proposed scheme (SJ7655683555) and indicates a watercourse of predominately good biological water quality. ASPT scores indicate probable moderate pollution. Another monitoring site, approximately 955m downstream of the proposed route (SJ7504085285) indicates moderate to very good biological water quality, whilst ASPT scores indicate probable moderate pollution. The third site was approximately 1.2km downstream of the proposed route (SJ7490085500) and analysis indicates a watercourse of poor to moderate biological water quality, with ASPT scores that indicate probable severe pollution. The LIFE indices across the watercourse suggest moderate flows further upstream and slow flows downstream. The PSI scores indicate that the watercourse is slightly sedimented in the upstream reaches and has moderate levels of sedimentation in the downstream reaches. The number of sensitive taxa ranges from 28 in the furthest upstream site, to 9 in the furthest downstream site. No notable species are present. The CCI scores indicates that the aquatic invertebrate community has moderate conservation value. Environment Agency surveys identify a large number of species, the most abundant being crustacea, worms, mayflies, true bugs and beetles.

3.3.176 The current WFD quality class for aquatic invertebrates on this waterbody is High. This is consistent with the previous year's classification, although prior to this the quality class was Good.

3.3.177 Birkin Brook flows through Ryecroft Covert LWS and Hancock's Bank North LWS. These sites are designated for their habitats and no records of notable aquatic invertebrate species exist for these sites.

Tributary of Birkin Brook 1

3.3.178 Tributary of Birkin Brook 1 will be intersected by the route of the Proposed Scheme south of Altrincham. Access constraints prevented detailed aquatic invertebrate surveys on Tributary of Birkin Brook 1 in 2018, 2019 and 2020 as set out in Section 3.1.5. No Environment Agency aquatic invertebrate data are available for Tributary of Birkin Brook 1.

3.3.179 Tributary of Birkin Brook 1 flows through Wood Near Arden House LWS and Ashley Brickworks LWS. Tributary of Birkin Brook 1 is also in hydrological continuity with Ecclesfield Wood LWS and Wood End – Lady Lane LWS. These sites are designated for their habitats and no records of notable species exist for these sites. However, it is noted that Ashley

Brickworks LWS contains species-rich ponds which may support a good dragonfly assemblage.

Tributary of Birkin Brook 4

3.3.180 Tributary of Birkin Brook 4 is within the land required for the construction of the Proposed Scheme south of Altrincham. However, no aquatic invertebrate survey was possible due to access constraints. No Environment Agency aquatic invertebrate data are available for Tributary of Birkin Brook 4.

Tributary of Birkin Brook 7

3.3.181 Tributary of Birkin Brook 7 is within the land required for the construction of the Proposed Scheme south of Altrincham. Access constraints prevented detailed aquatic invertebrate surveys on Tributary of Birkin Brook 7 in 2020 as set out in Section 3.1.5. No Environment Agency aquatic invertebrate data are available for Tributary of Birkin Brook 7.

Mobberley Brook

3.3.182 Mobberley Brook is within the land required for the construction of the Proposed Scheme south of Altrincham. Access constraints prevented detailed aquatic invertebrate surveys on Mobberley Brook in 2020 as set out in Section 3.1.5.

3.3.183 Environment Agency monitoring exists for Sugar Brook approximately 20m upstream of the land required for the construction of the Proposed Scheme. Environment Agency surveys were conducted on eight occasions between 1995 and 2015. Mean ASPT scores indicate probable moderate pollution and mean LIFE scores suggest slow flows. No CCI or PSI scores are available for this watercourse. No Environment Agency species data are available for this watercourse.

3.3.184 The current WFD quality class for aquatic invertebrates on this watercourse (classified under Mobberley Brook on the Environment Agency Catchment Data Explorer) is Good. This is consistent with the previous year's classification.

Sugar Brook

3.3.185 Sugar Brook is within the land required for the construction of the Proposed Scheme south of Altrincham. Access constraints prevented detailed aquatic invertebrate surveys on Sugar Brook in 2020 as set out in Section 3.1.5.

3.3.186 Environment Agency monitoring exists for Sugar Brook, but this is the same monitoring station as Mobberley Brook above.

3.3.187 The current WFD quality class for aquatic invertebrates on this watercourse (classified under Sugar Brook on the Environment Agency Catchment Data Explorer) is High. This is consistent with the previous year's classification, though earlier classifications were Good.

River Bollin

3.3.188 The River Bollin will be intersected by the route of the Proposed Scheme at Thorns Green, west of Manchester Airport. Aquatic invertebrate surveys were conducted in spring and autumn 2019 at this location.

3.3.189 At the stretch surveyed, the River Bollin is a 12m wide, 0.15m – 0.4m deep, main watercourse flowing through agricultural land with predominately riffle-pool sequences and some glide, and a bed substrate of bedrock, boulder, cobble, pebble, gravel and sand. Tree roots are present in the channel, as are unvegetated side bars.

3.3.190 The spring 2019 field survey of the River Bollin recorded 961 individual specimens from 35 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.191 The WHPT score indicates good biological water quality, while the WHPT-ASPT score indicates moderate water quality. A variety of taxa are present, including the caddisfly *Brachycentrus subnubilus*, which has a conservation score of 6 and indicated that there may be regionally notable or locally important species present. Flat worms, snails, mussels, worms, leeches, crustacea, damselflies, beetles, caddisflies and true bugs are also present. The LIFE score of 6.5 for the River Bollin sample indicates slow flow.

3.3.192 The 2019 autumn field survey of the River Bollin recorded 319 individual specimens from 32 taxa. Overall, the CCI score indicates moderate conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by slight levels of sedimentation.

3.3.193 The WHPT score indicates very good biological water quality, while the WHPT-ASPT score indicates good water quality. A variety of taxa are present, including the caddisfly *Brachycentrus subnubilus*, which has a conservation score of 6 and indicated that there may be regionally notable or locally important species present. Flat worms, snails, mussels, worms, leeches, crustacea, damselflies, true bugs, beetles, caddisflies and true bugs are also present. The LIFE score of 7.3 for the River Bollin sample indicates moderate flow.

3.3.194 The combined spring and autumn EQR score is equivalent to Moderate WFD quality class (91.1% confidence that the site is Moderate for ASPT; 60.8% confidence that the site is Good for N-Taxa).

3.3.195 Environment Agency monitoring exists for the River Bollin approximately 4km downstream of the land required for the construction of the Proposed Scheme. The Environment Agency conducted aquatic invertebrate monitoring at this site on four occasions in 2011 and 2014. The ASPT scores indicate good biological water quality, LIFE scores indicate slow flows and PSI scores suggest that the watercourse is slightly sedimented. CCI scores suggest that the aquatic invertebrate assemblage is of moderate conservation value. Environment Agency surveys identify a large number of species, the most abundant being true bugs and worms, followed by mayflies.

3.3.196 The River Bollin in MA06 is adjacent to a number of designated and non-designated sites, including Cotteril Clough SSSI, Bollin Oxbow at Castle Hill LWS, Mill Wood at Castle Hill LWS, Jackson's Bank East LWS, Jackson's Bank West LWS and Sunbank Wood and Ponds Site of Biological Importance. These sites are designated for their habitats and no records of notable aquatic invertebrate species exist for these sites.

Tributary of Timperley Brook 1

3.3.197 Tributary of Timperley Brook 1 is within the land required for the construction of the Proposed Scheme west of Manchester Airport. Aquatic invertebrate surveys were conducted in autumn 2019 at this location.

3.3.198 At the stretch surveyed, Tributary of Timperley Brook 1 is a 1m wide, 0.1m – 0.25m deep, small, channelised stream with little in-channel diversity and culverted in sections. Bed substrate comprises pebble, gravel, sand and silt and flow is dominated by runs, however riffles are also present. Some woody debris is also present.

3.3.199 The autumn 2019 field survey of Tributary of Timperley Brook 1 recorded 919 individual specimens from 14 taxa. Overall, the CCI score indicates low conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by sedimentation.

3.3.200 The WHPT score indicates moderate biological water quality, while the WHPT-ASPT score indicates moderate water quality. A variety of taxa were recorded including the black fly *Simulium aureum*, which has a conservation score of 5, and indicated that there may be regionally notable or locally important species present. Snails, worms, crustacea and true bugs are also present. The LIFE score of 5.7 for the Tributary of Timperley Brook 1 sample indicates very slow flows.

3.3.201 The autumn EQR score is equivalent to Poor WFD quality class (70% confidence that the site is Poor for ASPT; 41.2%, 22.4% and 21.7% confidence that the site is Moderate, Good and Poor for N-Taxa respectively).

3.3.202 No Environment Agency aquatic invertebrate data are available for Tributary of Timperley Brook 1.

Timperley Brook

3.3.203 Timperley Brook will be intersected by the route of the Proposed Scheme west of Manchester Airport. Aquatic invertebrate surveys were conducted in autumn 2019 at this location. Access constraints prevented detailed aquatic invertebrate surveys on Timperley Brook in spring 2018 and 2020 as set out in Section 3.1.5.

3.3.204 At the stretch surveyed, Timperley Brook is a 1.5m wide, 0.1m – 0.15m deep, stream flowing through agricultural land and woodland. The habitat is characterised by riffle-pool sequences and the bed substrate comprises boulder, cobble, pebble, gravel, sand and silt.

Filamentous algae and macrophytes are present in the channel and Himalayan balsam is present on both banks.

3.3.205 The autumn 2019 field survey of Timperley Brook recorded 143 individual specimens from 17 taxa. Overall, the CCI score indicates moderate conservation value of the aquatic invertebrate assemblage. The PSI score indicates that the riverbed ecology is affected by moderate levels of sedimentation.

3.3.206 The WHPT score indicates moderate biological water quality, while the WHPT-ASPT scores indicates moderate water quality. A variety of taxa are present, including snails, worms, crustacea, mayflies and true bugs. The LIFE score of 6 for the Timperley Brook sample indicates slow flow.

3.3.207 The autumn EQR score is equivalent to Moderate WFD quality class (53.2% and 43.9% confidence that the site is Moderate and Poor for ASPT respectively; 41.2%, 22.4% and 21.7% confidence that the site is Moderate, Good and Poor for N-Taxa respectively).

3.3.208 Timperley Brook flows through Davenport Green Wood Site of Biological Importance. This site is designated for its habitats and no records of notable aquatic invertebrate species exist for this site. No Environment Agency aquatic invertebrate data are available for Timperley Brook.

Fairywell Brook

3.3.209 Detailed aquatic invertebrate surveys were scheduled on Fairywell Brook but the watercourse was dry in 2018 and 2019 as set out in Section 3.1.5, as such, the watercourse was not scoped in for 2020. No Environment Agency aquatic invertebrate data are available for Fairywell Brook.

Davenport Green to Ardwick (MA07)

3.3.210 No detailed aquatic invertebrate surveys were scoped in for the Davenport Green to Ardwick community area. There are no records of notable aquatic invertebrate species in MA07.

Manchester Piccadilly Station (MA08)

3.3.211 No detailed aquatic invertebrate surveys were scoped in for the Manchester Piccadilly Station community area. There are no records of notable aquatic invertebrate species in MA08.

Discussion and summary

3.3.212 EQR classify Peover Eye as High and Smoker Brook as Good WFD quality class, whilst the River Dane, Tributary of Peover Eye, Hey Brook, the River Bollin and Timperley Brook are classified as Moderate WFD quality class. Respective WHPT and WHPT-ASPT scores indicate relatively good water quality and a diverse taxa assemblage for these watercourses.

Waterless Brook/Arley Brook had an EQR score that classifies the site as Good WFD quality class. However, this site was only sampled in spring and the analysis suggests the classification is unreliable (suitability code four). WHPT indices for this watercourse suggest good water quality, supporting a diverse assemblage. EQR scores classify Puddinglake Brook, Gad Brook, Broken Cross Drains, Tributary of Tabley Brook 3, Tributary of Tabley Brook 8, Glaze Brook, Nan Holes Brook, Coffin Lane Brook, Agden Brook, Millington Clough and Tributary of Timperley Brook 1 as Poor WFD quality class, whilst Tributary of Gad Brook 3, Carr Brook and Small Brook are classified as Bad WFD quality class. WHPT and WHPT-ASPT indices and species data collected on Glaze Brook and Nan Holes Brook suggest relatively good water quality that support diverse aquatic invertebrate assemblages. WHPT and WHPT-ASPT indices and species data collected on the remaining watercourses suggest relatively poor to moderate aquatic invertebrate assemblages which are impacted by organic or urban pollution and are typical of most agricultural or urban watercourses.

3.3.213 All watercourses are slow flowing and most range from slightly sedimented to sedimented, although Puddinglake Brook, Waterless Brook/Arley Brook, Glaze Brook, Carr Brook and Hey Brook had PSI scores suggestive of heavy sedimentation. This is typical of most lowland UK rivers.

3.3.214 No notable aquatic invertebrate species were recorded through detailed aquatic invertebrate surveys in MA01 to MA08, though the invasive species *Dikerogammarus haemobaphe* was recorded at a number of sites.

3.3.215 Aquatic invertebrate species with a conservation score of between 5 and 6 may indicated that there may be regionally notable or locally important species present. Eight species with a conservation score of 5 or 6 were recorded in detailed aquatic invertebrate surveys in MA01 to MA08. These species are present in the River Dane, Tributary of Peover Eye, Peover Eye, Smoker Brook, Glaze Brook, Coffin Lane Brook, Nan Holes Brook, the River Bollin and Timperley Brook.

3.3.216 The River Dane, Peover Eye and Nan Holes Brook have CCI scores indicative of high or fairly high conservation value.

4 White-clawed crayfish

4.1 Methodology

4.1.1 Details of the standard methodology utilised for white-clawed crayfish surveys are provided in Technical Note – Ecology and biodiversity – Ecological Field Survey Methods and Standards (FSMS) included in the Environmental Impact Assessment Scope and Methodology Report (SMR)[2] (see Environmental Statement, Volume 5, Appendix CT-001-00001).

4.1.2 Following this approach, the requirement for detailed white-clawed crayfish surveys has been based on consideration of:

- desk study records relating to white-clawed crayfish obtained from the relevant Environment Agency offices (West Midlands Area, Greater Manchester, Merseyside and Cheshire Area);
- Staffordshire Ecological Record;
- rECOrd (the local biological records centre for the Cheshire Region);
- stakeholder consultation responses relating to white-clawed crayfish (National Trust, Cheshire East Council);
- Environment Agency records of signal crayfish which would preclude the presence of white-clawed crayfish;
- scoping surveys undertaken as part of Phase 1 habitat and WFD walkover surveys; and
- the potential for significant effects to white-clawed crayfish to occur.

4.1.3 Survey work was undertaken between July and September 2018, 2019 and 2020.

4.1.4 Table 10 summarises those locations where surveys for white-clawed crayfish were undertaken. This information is cross referenced to the accompanying Ecology Map Series EC-11.

Table 10: Summary of white-clawed crayfish field surveys undertaken

Ecology survey code	Watercourse	OS grid reference	Survey methods and survey dates			CA	Approximate distance from land required for construction of the Proposed Scheme (m) and orientation
			Habitat assessment	Manual search	Trapping		
AT12_WC1_F001_180820	Hoggins Brook	SJ6949260835	18 August 2020	N/A	N/A	MA01	Within
AT11_WC1_F001_180820	River Wheelock	SJ6953966030	18 August 2020	N/A	N/A	MA02	660m south
AT04_WC1_F001_090718	Trent and Mersey Canal – 1st Crossing	SJ6830268911	9 July 2018	N/A	N/A	MA02	10m north
AT05_WC1_F001_070818 AT05_WC3_F001_070818	River Dane	SJ6933766989	7 August 2018	N/A	7 August 2018	MA02	290m north-east
AT02_WC1_F001_090718	Shropshire Union Canal	SJ6865565644	9 July 2018	N/A	N/A	MA02	Within
AT03_WC1_F001_090718	Puddinglake Brook	SJ6834570141	9 July 2018	N/A	N/A	MA02	Within
CH231088_L5855_WC1_F001_180919	Tributary of Peover Eye	SJ7017375545	18 September 2019	N/A	N/A	MA02	Within
BT01_WC1_F001_070818 BT01_WC3_F001_070818 BT01_WC3_190919	Peover Eye	SJ7072275595	7 August 2018	N/A	6 September 2018 19 September 2019	MA02	Within
BT09_WC1_F001_100718 BT09_WC2_F001_100718 BT09_WC2_F001_1	Smoker Brook	SJ7031276001	10 July 2018	10 July 2018 18 September 2019	N/A	MA02	Within

Ecology survey code	Watercourse	OS grid reference	Survey methods and survey dates			CA	Approximate distance from land required for construction of the Proposed Scheme (m) and orientation
			Habitat assessment	Manual search	Trapping		
80919							
BT06_WC1_F001_100718 BT06_WC2_F001_100718	Waterless Brook/Arley Brook	SJ7043978861	10 July 2018	10 July 2018	N/A	MA03	1m west
DT05_WC1_F001_110718	River Bollin	SJ7100288175	8 August 2018	N/A	N/A	MA04	Within
DT01_WC1_F001_080818	Old Bollin	SJ7088688439	8 August 2018	N/A	N/A	MA04	160m east
DT02_WC1_F001_080818	Tributary of Old Bollin	SJ7088788541	8 August 2018	N/A	N/A	MA04	Within
DT04_WC1_F001_090818	Red Brook	SJ7037090920	8 August 2018	N/A	N/A	MA04	Within
DT03_WC1_F002_090818	Manchester Ship Canal	SJ6989890685	8 August 2018	N/A	N/A	MA04	60m north-east
DT06_WC1_F001_120718	Holcroft Lane Brook (dry at time of survey)	SJ6648494169	12 July 2018	N/A	N/A	MA05	Within
DT13_WC1_F001_170820	Carr Brook	SJ6362197388	17 August 2020	N/A	N/A	MA05	120m east
DT07_WC1_F001_120718	Small Brook	SJ6328498273	12 July 2018	N/A	N/A	MA05	300m east
DT09_WC1_F001_090818	Windy Bank Brook	SJ6083499739	9 August 2018	N/A	N/A	MA05	Within
DT10_WC1_F001_090818	Tributary of Nan Holes Brook 2 (dry at time of survey)	SJ6067499924	9 August 2018	N/A	N/A	MA05	Within
DT08_WC1_	Nan Holes Brook	SD6056700070	9 August 2018	N/A	N/A	MA05	Within

Ecology survey code	Watercourse	OS grid reference	Survey methods and survey dates			CA	Approximate distance from land required for construction of the Proposed Scheme (m) and orientation
			Habitat assessment	Manual search	Trapping		
F001_090818							
DT11_WC1_F001_170919	Coffin Lane Brook	SD6015700997	17 September 2019	N/A	N/A	MA05	Within
GM519317_L4851_WC1_F001_170919	Leeds and Liverpool Canal	SD5987902143	17 September 2019	N/A	N/A	MA05	Within
BT05_WC1_F001_100718	Millington Clough	SJ7202684296	10 July 2018	N/A	N/A	MA06	22m north
BT11_WC1_F001_100718	Blackburn's Brook	SJ7532284020	10 July 2018	N/A	N/A	MA06	Within
BT03_WC1_F001_110718	Tributary of Birkin Brook 3	SJ7751883790	11 July 2018	N/A	N/A	MA06	Within
BT07_WC1_F001_110718	River Bollin	SJ7955484175	11 July 2018	NA	N/A	MA06	Within
BT15_WC1_F001_170919	Tributary of Timperley Brook 1	SJ8030485451	17 September 2019	NA	N/A	MA06	Within
BT08_WC1_F001_110718	Timperley Brook	SJ8025186157	11 July 2018	N/A	N/A	MA06	Within
CT02_WC1_F001_110718	River Mersey	SJ8327190257	11 July 2018	N/A	N/A	MA07	39m west
CT04_WC1_F001_110718	Tributary of River Mersey 2	SJ8357890884	11 July 2018	N/A	N/A	MA07	Within
CT01_WC1_F001_110718	Baguley Brook	SJ8217188912	11 July 2018	N/A	N/A	MA07	540m south-west
CT03_WC1_F001_110718	River Medlock	SJ8592298102	11 July 2018	N/A	N/A	MA08	360m north-east

4.2 Deviations, constraints and limitations

4.2.1 Surveys undertaken were limited to locations where landowner permission had been obtained within the period surveyed (July to September 2018, 2019 and 2020, respectively). Further manual search and/or trapping surveys were not possible on the River Bollin in MA04, due to health and safety reasons with the presence of a large stand of giant hogweed. A trapping survey was not possible on the River Bollin in MA06 as this public area presented a high risk of disturbance and vandalism to traps deployed, which could cause survey results to be invalid. Lack of access to the River Wheelock, Red Brook and Blackburn's Brook restricted surveys such that manual search and/or trapping surveys could not be conducted after the habitat was assessed, (see Table 10).

4.2.2 Scoping surveys would have been conducted at the locations shown in Table 11 but access was not granted within the survey window. Further description of these locations is provided in the sections below.

Table 11: Locations where no access was available for survey within MA01 to MA08

Watercourse	Location	OS grid reference	CA	Approximate distance from the land required for the construction of the Proposed Scheme (m) and orientation
Valley Brook	Crewe city centre, north of Crewe Station	SJ7105455148	MA01	Within
Wade Brook	North of Lostock Green and south of Lostock Gralam	SJ6957174285	MA02	Within
Bridgewater Canal	East of Lymm and north-west of Little Bollington	SJ7140086827	MA04	Within
Agden Brook	South of Booth Bank and east of Stonedelph Farm	SJ7241285071	MA06	Within
Birkin Brook	East of Rostherne Mere and west of Ashley	SJ7636083866	MA06	Within

4.3 Baseline

4.3.1 Baseline data for watercourses and water bodies containing habitat capable of supporting white-clawed crayfish are presented in the sections below.

Hough to Walley's Green (MA01)

4.3.2 Desk study records for Basford Brook exist from Cheshire East Council, approximately 250m west of the land required for the construction of the Proposed Scheme. The presence of white-clawed crayfish in Basford Brook has been recorded from 2001. The most recent of these surveys (2019) recorded six male and one female white-clawed crayfish. No scoping surveys have been undertaken on Basford Brook, as presence has been confirmed in 2019.

4.3.3 There are no desk study records for white-clawed crayfish or signal crayfish (*Pacifastacus leniusculus*) in Hoggins Brook or its tributaries. A scoping survey was undertaken, which identified an overgrown, shaded and shallow watercourse, with sheet piled banks adjacent to the bridge. The watercourse was deemed unsuitable to support white-clawed crayfish.

Wimboldsley to Lostock Gralam (MA02)

4.3.4 There are no desk study records for white-clawed crayfish or signal crayfish in the River Wheelock or its tributaries. A scoping survey was undertaken, which identified a 1m wide channel with riffles, though weirs were also present. Cobbles and tree roots were thought to provide adequate shelter and the watercourse was deemed suitable to support white-clawed crayfish. However, no further surveys, including manual search or trapping survey, could be undertaken as access to the watercourse could not be obtained.

4.3.5 There are no desk study records for white-clawed crayfish or signal crayfish in the Shropshire Union Canal. A scoping survey was undertaken, which identified a large, very deep canal, heavily polluted with a petrol-like sheen on the surface. The watercourse was deemed unsuitable to support white-clawed crayfish.

4.3.6 There are no desk study records for white-clawed crayfish or signal crayfish in the River Dane or its tributaries. A scoping survey was undertaken, which identified a fairly fast flowing, moderately clear watercourse, which was approximately 1m deep and had a substrate of silt with occasional boulders. Vegetative banks were thought to provide adequate shelter and the watercourse was deemed suitable to support white-clawed crayfish. A trapping survey was conducted but no white-clawed crayfish were recorded.

4.3.7 There are no desk study records for white-clawed crayfish or signal crayfish in the Trent and Mersey Canal. A scoping survey was undertaken, which identified a wide, slow flowing canal, with high siltation and polluted water. Thus, the watercourse was deemed unsuitable to support white-clawed crayfish.

4.3.8 There are no desk study records for white-clawed crayfish or signal crayfish in Puddinglake Brook or its tributaries. A scoping survey was undertaken, which identified a shallow, slow flowing stream with poor water clarity, which appeared to be polluted by sewage. Some sections of the stream were dry, and the embankments were shallow and covered in tall, ruderal vegetation, thick bramble and scattered trees. Due to the shallow nature of the brook and polluted water, the watercourse was deemed unsuitable to support white-clawed crayfish.

4.3.9 There are no desk study records for white-clawed crayfish or signal crayfish in Wade Brook or its tributaries. No access within the survey window prevented scoping surveys as set out in Section 4.2.

4.3.10 There are no desk study records for white-clawed crayfish or signal crayfish in Tributary of Peover Eye or its tributaries. A scoping survey was undertaken, which identified a very

shallow, silted and polluted field ditch that was most likely used for field drainage. The watercourse was deemed unsuitable to support white-clawed crayfish.

4.3.11 There are no desk study records for white-clawed crayfish or signal crayfish in Peover Eye or its tributaries. A scoping survey was undertaken, identifying suitable river depth and refuges to support white-clawed crayfish. The subsequent trapping survey recorded a single, male, white-clawed crayfish. Conditions during trapping were identified as sub-optimal, due to heavy rainfall, and a repeat survey was scheduled. This trapping survey was conducted in 2019 and recorded two male and one female white-clawed crayfish.

4.3.12 There are no desk study records for white-clawed crayfish or signal crayfish in Smoker Brook or its tributaries. A scoping survey was undertaken, and the river was deemed suitable for white-clawed crayfish, with clear water and boulders which provided suitable refuges. The subsequent manual search survey did not record any white-clawed crayfish present. An additional manual search conducted in 2019 did not record any white-clawed crayfish present. Surveys were repeated as, although no white-clawed crayfish were identified in 2018, the habitat was deemed suitable and Smoker Brook is in hydrological connectivity with Peover Eye, where the presence of white-clawed crayfish had previously been confirmed.

Pickmere to Agden and Hulseheath (MA03)

4.3.13 There are no desk study records for white-clawed crayfish or signal crayfish in Waterless Brook/Arley Brook. A scoping survey was undertaken, and the river was deemed suitable for white-clawed crayfish, as it had low turbidity and boulders which provided suitable refuges. The subsequent manual search did not record any white-clawed crayfish.

Broomedge to Glazebrook (MA04)

4.3.14 There are no desk study records for white-clawed crayfish or signal crayfish in Bridgewater Canal or its tributaries. Scoping surveys could not be conducted as suitable land access was not available within the survey window as set out in Section 4.2.

4.3.15 There are no desk study records for white-clawed crayfish or signal crayfish in the River Bollin or its tributaries. A scoping survey was undertaken, and the river was deemed suitable for white-clawed crayfish. A dense stand of giant hogweed along the river banks prevented access to the river channel and thus constrained both manual search and trapping surveys.

4.3.16 There are no desk study records for white-clawed crayfish or signal crayfish in the Old Bollin or its tributaries. A scoping survey was undertaken, which identified a thick blanket of duckweed (*Lemna* sp.) covering the surface of the watercourse. The watercourse was therefore deemed unsuitable to support white-clawed crayfish.

4.3.17 There are no desk study records for white-clawed crayfish or signal crayfish in the Tributary of Old Bollin or its tributaries. A scoping survey was undertaken, and the watercourse was dry and therefore deemed unsuitable to support white-clawed crayfish.

4.3.18 There are no desk study records for white-clawed crayfish or signal crayfish in Red Brook or its tributaries. A scoping survey was undertaken, which identified a clear, shallow stream with moderate flows and steep embankments, which were undercut in places. The substrate was predominately cobbles and sand. Trees were present on both embankments. The watercourse was deemed suitable to support white-clawed crayfish. However, no further surveys, including manual search or trapping survey, could be undertaken as access to the watercourse could not be obtained.

4.3.19 There are no desk study records for white-clawed crayfish or signal crayfish in the Manchester Ship Canal or its tributaries. A scoping survey was undertaken, which identified a deep, fast flowing canal with steep embankments covered with scattered scrub, trees and tall ruderal vegetation. Thus, the watercourse was deemed unsuitable to support white-clawed crayfish.

Risley to Bamfurlong (MA05)

4.3.20 There are no desk study records for white-clawed crayfish or signal crayfish in Holcroft Lane Brook or its tributaries. A scoping survey was undertaken, which identified a dry field ditch fed by a pipe culvert. The watercourse was approximately 0.5m wide, with moderately steep embankments which were covered in tall ruderal vegetation. As the watercourse was found to be dry, it was therefore deemed unsuitable to support white-clawed crayfish.

4.3.21 There are no desk study records for white-clawed crayfish or signal crayfish in Carr Brook or its tributaries. A scoping survey was undertaken, which identified a very shallow watercourse with deep banks and a pebble and silt substrate. Due to the shallow nature of the brook, the watercourse was deemed unsuitable to support white-clawed crayfish.

4.3.22 There are no desk study records for white-clawed crayfish or signal crayfish in Small Brook or its tributaries. A scoping survey was undertaken, which identified a small, shallow watercourse that was approximately 1.5m wide and 15cm deep. The banks were stone covered in ivy and the substrate was covered in leaf litter. Due to the shallow nature of the brook, the watercourse was not deemed suitable to support white-clawed crayfish.

4.3.23 There are no desk study records for white-clawed crayfish or signal crayfish in Windy Bank Brook or its tributaries. A scoping survey was undertaken, which identified a shallow stream, approximately 1m wide and 10cm deep. The substrate comprised cobbles and boulders and the watercourse was surrounded by tall ruderal vegetation. Due to the shallow nature of the brook, the watercourse was deemed unsuitable to support white-clawed crayfish.

4.3.24 There are no desk study records for white-clawed crayfish or signal crayfish in Nan Holes Brook or its tributaries. A scoping survey was therefore undertaken, which identified a dry, narrow watercourse that was overgrown with bramble and Indian balsam. As the watercourse was found to be dry it was deemed unsuitable to support white-clawed crayfish.

4.3.25 There are no desk study records for white-clawed crayfish or signal crayfish in the Tributary of Nan Holes Brook 1 or its tributaries. A scoping survey was undertaken, which identified a dry, narrow field ditch along a hedgerow. The base of the ditch was full of leaf litter and no refugia were present. As the watercourse was found to be dry it was deemed unsuitable to support white-clawed crayfish.

4.3.26 There are no desk study records for white-clawed crayfish or signal crayfish in Coffin Lane Brook or its tributaries. A scoping survey was undertaken, which identified a very shallow and shaded watercourse. Due to the shallow nature of the brook, the watercourse was deemed unsuitable to support white-clawed crayfish.

4.3.27 There are no desk study records for white-clawed crayfish or signal crayfish in the Leeds and Liverpool Canal or its tributaries. A scoping survey was undertaken, which identified a very deep and silty canal. The watercourse was deemed unsuitable to support white-clawed crayfish.

Hulseheath to Manchester Airport (MA06)

4.3.28 There are no desk study records for white-clawed crayfish or signal crayfish in Millington Clough or its tributaries. A scoping survey was undertaken, and the watercourse was dry and therefore deemed unsuitable to support white-clawed crayfish.

4.3.29 There are no desk study records for white-clawed crayfish or signal crayfish for Agden Brook or its tributaries. Scoping surveys were prevented as land access was not available within the survey window as set out in Section 4.2. However, the watercourse was viewed from a public road and was observed to be dry and was therefore deemed unsuitable to support white-clawed crayfish.

4.3.30 There are no desk study records for white-clawed crayfish or signal crayfish in Blackburn's Brook or its tributaries. A scoping survey was undertaken, which identified a shallow, slow flowing watercourse with few refuges and minor pollution. The watercourse was deemed unsuitable to support white-clawed crayfish.

4.3.31 There are no desk study records for white-clawed crayfish or signal crayfish in Birkin Brook or its tributaries. Scoping surveys were prevented as land access was not available within the survey window as set out in Section 4.2.

4.3.32 There are no desk study records for white-clawed crayfish or signal crayfish in Tributary of Birkin Brook 3 or its tributaries. A scoping survey was undertaken, which identified a field ditch flowing between arable fields and broadleaved woodland with no suitable refugia. Thus, the watercourse was deemed unsuitable to support white-clawed crayfish.

4.3.33 There are no desk study records for white-clawed crayfish or signal crayfish in the River Bollin or its tributaries. A scoping survey determined that the River Bollin was suitable to support white-clawed crayfish. A manual search could not be conducted due to the depth of the watercourse as set out in Section 4.2.

4.3.34 There are no desk study records for white-clawed crayfish or signal crayfish in Tributary of Timperley Brook 1 or its tributaries. A scoping survey was undertaken, which identified a very shallow, polluted watercourse with few refugia. Thus, the watercourse was deemed unsuitable to support white-clawed crayfish.

4.3.35 There are no desk study records for white-clawed crayfish or signal crayfish in Timperley Brook or its tributaries. A scoping survey was undertaken, which identified a very shallow, almost dry watercourse with vertical embankments and a gravel and cobble substrate. As the watercourse was almost dry, it was deemed unsuitable to support white-clawed crayfish.

Davenport Green to Ardwick (MA07)

4.3.36 There are no desk study records for white-clawed crayfish or signal crayfish in the River Mersey. A scoping survey was undertaken, which identified a wide, fast flowing watercourse with steep banks and a substrate comprising boulders and cobbles. Due to the fast flows in the river, the watercourse was deemed unsuitable to support white-clawed crayfish.

4.3.37 There are no desk study records for white-clawed crayfish or signal crayfish in the Tributary of River Mersey 2. A scoping survey was undertaken, which identified a very shallow watercourse with little refuges, which was therefore deemed unsuitable to support white-clawed crayfish.

4.3.38 There are no desk study records for white-clawed crayfish or signal crayfish in Baguley Brook or its tributaries. A scoping survey was undertaken, which identified a very shallow watercourse fed by a concrete pipe culvert and surrounded by broadleaved semi-natural woodland. The substrate comprised mud and boulders, whilst the embankments were bare earth with limited vegetation. As the brook was very shallow, polluted and had no suitable refuges, the watercourse was deemed unsuitable to support white-clawed crayfish.

Manchester Piccadilly Station (MA08)

4.3.39 There are no desk study records for white-clawed crayfish or signal crayfish in the River Medlock. A scoping survey was undertaken, and the watercourse was found to be heavily modified, with limited habitat potential for white-clawed crayfish. It was therefore deemed unsuitable to support white-clawed crayfish.

Discussion and summary

4.3.40 The presence of white-clawed crayfish was only confirmed in one of the surveyed watercourses. A single, male, white-clawed crayfish was trapped in Peover Eye (MA02) in 2018 and two males and one female white-clawed crayfish were trapped in 2019. There are also existing records held by Cheshire East Council of a white-clawed crayfish population on Basford Brook. Their presence in Basford Brook has been recorded from 2001, with surveys in 2010 recording 152 individuals, suggesting a population containing healthy numbers. Some individuals in 2012, 2017 and 2018 exhibited porcelain disease *Thelohaniasis*. These

records were approximately 250m west of the land required for the construction of the Proposed Scheme.

4.3.41 Habitat assessment surveys determined that several other watercourses were suitable to support white-clawed crayfish. They include the River Dane, Smoker Brook and Waterless Brook/Arley Brook. White-clawed crayfish were not identified by either manual search or trapping survey on these watercourses.

4.3.42 Scoping surveys also determined that the River Wheelock, the River Bollin in MA04, Red Brook and the River Bollin in MA06 have habitat that is potentially suitable to support white-clawed crayfish. Neither manual searches nor trapping surveys could be conducted within the 2018 to 2020 survey windows. Access to the River Bollin was constrained by dense giant hogweed, land access to the River Wheelock and Red Brook could not be obtained and the River Bollin in MA06 was considered too deep to search and too public to trap. The presence of white-clawed crayfish on these watercourses cannot be discounted.

4.3.43 Scoping surveys could not be conducted on Wade Brook and Birkin Brook due to land access constraints as set out in Section 4.2. The presence of white-clawed crayfish on these watercourses cannot be discounted, although Tributary of Birkin Brook 3, which flows into Birkin Brook, was not deemed suitable.

4.3.44 Several watercourses scoped out for further survey at the habitat assessment stage were considered either too shallow or were completely dry and as such could not support white-clawed crayfish. These include Hoggins Brook, Puddinglake Brook, Tributary of Peover Eye, Old Bollin, Tributary of Old Bollin, Holcroft Lane Brook, Carr Brook, Small Brook, Windy Bank Brook, Nan Holes Brook, Tributary of Nan Holes Brook 2, Coffin Lane Brook, Millington Clough, Blackburn's Brook, Timperley Brook, Tributary of Timperley Brook 3, Tributary of Timperley Brook 1, Timperley Brook, Baguley Brook, Tributary of River Mersey 2 and the River Medlock. A notable exception is the River Mersey. Although it is of suitable depth (0.5m) it was excluded from further survey because it was too fast-flowing and the banks were considered too steep for white-clawed crayfish.

4.3.45 Scoping surveys undertaken on the Shropshire Union Canal, Trent and Mersey Canal, Manchester Ship Canal and Leeds and Liverpool Canal determined that these watercourses are not suitable for supporting white-clawed crayfish. Canals are often too deep, of poor water quality and have too few refuges. Although the Bridgewater Canal could not be surveyed (see Section 4.2) it can be discounted as suitable for white-clawed crayfish on similar grounds.

5 References

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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