

High Speed Rail (Crewe – Manchester)

Background information and data

Ecology and biodiversity

BID EC-006-00001

Ecological baseline data - river habitat, river macrophyte and ditch surveys

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Department for Transport

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

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1 Introduction

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

- river habitat surveys;
- river macrophyte surveys; and
- ditch surveys.

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 Background Information and Data, Ecology Map Book, Map Series EC-10.

1.1.4 The Environmental Statement¹ 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>.

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2 River habitat survey

2.1 Methodology

- 2.1.1 Details of the standard methodology utilised for river habitat surveys (RHS) 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.
- 2.1.2 Desk study records for RHS in the area of the Proposed Scheme were obtained through an information request submitted to the Environment Agency.
- 2.1.3 A summary of locations where the RHS scoping requirements outlined in the FSMS were met and a RHS was undertaken is provided in Table 1. This information is cross referenced to the accompanying Ecology Map Series EC-10.

Table 1: Summary of accessible locations where RHS survey was undertaken

Ecology survey code	Watercourse name	Feature type	Survey date	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
AT01_RH1_140818	River Dane	Main river	14 August 2018	MA02	Within
AT02_RH1_150518	River Dane	Main river	15 May 2018	MA02	Within
AT03_RH1_150518	Puddinglake Brook	Main river	15 May 2018	MA02	Within
BT02_RH1_160518	Peover Eye	Main river	16 May 2018	MA02	Within
BT04_RH1_170518	Smoker Brook	Main river	17 May 2018	MA02, MA03	Within
BT05_RH1_060619	Tributary of Smoker Brook 1	Ordinary watercourse	6 June 2019	MA02, MA03	Within
BT12_RH1_180518	Waterless Brook/Arley Brook	Main river	18 May 2018	MA03	Within
BT03_RH1_180518	Waterless Brook/Arley Brook	Main river	18 May 2018	MA03	Within
BT06_RH1_050619	Millington Clough	Main river	5 June 2019	MA03, MA06	Within
DT01_RH1_160818	River Bollin	Main river	16 August 2018	MA04	Within
DT05_RH1_040619	Nan Holes Brook	Main river	4 June 2019	MA05	Within
BT13_RHS_250920	Agden Brook	Main river	25 September 2020	MA06	Within

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>.

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Ecology survey code	Watercourse name	Feature type	Survey date	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
BT10_RH1_020818	River Bollin	Main river	2 August 2018	MA06	Within

2.2 Deviations, constraints and limitations

- 2.2.1 A summary of locations where requirement for RHS was identified but where surveys were not conducted due to inadequate access is provided in Table 2.
- 2.2.2 The survey conducted on Agden Brook in MA06 (BT13_RHS_250920) deviated from the FSMS. The FSMS specifies that RHS should cover a 500m section of river, centred on the route of the Proposed Scheme. Due to land access constraints, the surveyed reach of Agden Brook did not cross the route of the Proposed Scheme. The survey was conducted as close to the route as land access would allow.

Table 2: Summary of locations in MA01 to MA08 that were scoped in for RHS but access was not available for survey

Watercourse name	Location	Ordnance Survey (OS) grid reference –crossing point of the route of the Proposed Scheme	Feature type	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
River Wheelock	West of Middlewich	SJ6941766696	Main river	MA02	Within
Wade Brook	East of Northwich and south of Lostock Gralam, Cheshire	SJ6957274283	Main river	MA02	Within
Red Brook	West of Partington and east of the Manchester Ship Canal, Greater Manchester	SJ7013790846	Main river	MA04	Within
Coffin Lane Brook	North of Golborne and west of Leigh, Greater Manchester	SD6016700994	Main river	MA05	Within
Windy Bank Brook	North of Golborne and west of Leigh, Greater Manchester	SJ6083399724	Ordinary watercourse	MA05	Within
Blackburn's Brook	South of Ashley and east of Rostherne Mere, Cheshire	SJ7553084556	Main river	MA06	Within
Birkin Brook	South of Ashley and east of Rostherne Mere, Cheshire	SJ7578084452	Main river	MA06	Within
Tributary of Birkin Brook 1	South of Ashley and east of Rostherne Mere, Cheshire	SJ7734183533	Main river	MA06	Within
Mobberley Brook	South of Ashley	SJ7678083213	Main river	MA06	Within

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Watercourse name	Location	Ordnance Survey (OS) grid reference –crossing point of the route of the Proposed Scheme	Feature type	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
Sugar Brook	South of Ashley	SJ7684583289	Main river	MA06	Within
Timperley Brook	South-east of Altrincham and north-west of Manchester Airport, Greater Manchester	SJ8056686023	Main river	MA06	Within
Fairywell Brook	South-east of Altrincham and north-west of Manchester Airport, Greater Manchester	SJ8085886760	Main river	MA06, MA07	Within

2.3 Baseline

Desk study

Hough to Walley's Green (MA01)

2.3.1 No Environment Agency RHS data exist on watercourses within the land required for the construction of the Proposed Scheme.

Wimboldsley to Lostock Gralam (MA02)

2.3.2 Environment Agency RHS data exist for Puddinglake Brook, downstream of the land required for the construction of the Proposed Scheme. These data are outlined in Table 3. On examination of aerial imagery, the areas of habitat surveyed appear similar to habitat on this watercourse within the land required for the construction of the Proposed Scheme.

Table 3: Desk study RHS data for Puddinglake Brook downstream of the land required for the construction of the Proposed Scheme in MA02

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
Puddinglake Brook	Approximately 700m north-west and downstream	Grid reference	SJ6773070539
		Date	14 August 2010
		Predominant valley form	Shallow vee
		Number of riffles, pools and point bars	1 pool, 2 riffles, 0 point bars
		Realigned channel	No
		Over-deepened	No

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Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
		channel	
		Impoundments	No
		Bank top land use and vegetation structure	Occasional clumps of trees on left bank and occasional clumps of trees on right banks.
		Channel dimensions	Left bank top height 0.6m Right bank top height 2m Channel bank full width 4.5m Channel water depth 0.05m Channel water width 1.3m
		Location of channel measurements	Riffle
		Embankments	Not recorded
		Trash line	Not recorded
		Bed material	Unconsolidated
		Invasive species	Giant hogweed (<i>Heracleum mantegazzianum</i>)
		Habitat Modification Score	320
		Habitat Quality Assessment Score	47
		Habitat Modification Class	3: Obviously modified

Pickmere to Agden and Hulseheath (MA03)

2.3.3 Environment Agency RHS data exist for Tributary of Smoker Brook 1, upstream of the land required for the construction of the Proposed Scheme. These data are outlined in Table 4. On examination of aerial imagery, the areas of habitats surveyed appear similar to habitat on this watercourse within the land required for the construction of the Proposed Scheme.

Table 4: Desk study RHS data for Tributary of Smoker Brook 1 upstream of the land required for the construction of the Proposed Scheme in MA03

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
Tributary of Smoker Brook 1	Approximately 230m west and upstream	Grid reference	SJ7023676979
		Date	21 May 2008
		Predominant valley form	No obvious valley sides

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Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
		Number of riffles, pools and point bars	7 pools, 3 riffles, 3 unvegetated point bars, 2 vegetated point bars
		Realigned channel	No
		Over-deepened channel	No
		Impoundments	No
		Bank top land use and vegetation structure	Semi-continuous trees on left bank and semi-continuous trees on right bank.
		Channel dimensions	Left bank top height 1m Right bank top height 1.5m Channel bank full width 2m Channel water depth 0.2m Channel water width 1.5m
		Location of channel measurements	Riffle
		Embankments	Not recorded
		Trash line	Not recorded
		Bed material	Unconsolidated
		Invasive species	Himalayan balsam (<i>Impatiens glandulifera</i>)
		Habitat Modification Score	260
		Habitat Quality Assessment Score	60
		Habitat Modification Class	3: Obviously modified

Broomedge to Glazebrook (MA04)

2.3.4 Environment Agency RHS data exist for the River Bollin in two locations within the land required for the construction of the Proposed Scheme. These data are outlined in Table 5 and Table 6.

Table 5: Desk study RHS data for the River Bollin within the land required for the construction of the Proposed Scheme in MA04

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
River Bollin	Within and to the west	Grid reference	SJ7090088300
		Date	21 June 1996

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Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
		Predominant valley form	Symmetrical floodplain
		Number of riffles, pools and point bars	0 pools, 0 riffles, 0 point bars
		Realigned channel	No
		Over-deepened channel	No
		Impoundments	No
		Bank top land use and vegetation structure	Occasional clumps of trees on left bank and isolated or scattered trees on right banks.
		Channel dimensions	Left bank top height 0.75m Right bank top height 1.5m Channel bank full width 11m Channel water depth 0.75m Channel water width 7m
		Location of channel measurements	Run or glide
		Embankments	Left bank embanked height 2.5m Right bank embanked height 7m
		Trash line	Trash line height 0.5m Trash line width 0m
		Bed material	Unknown
		Invasive species	Giant hogweed
		Habitat Modification Score	2,970
		Habitat Quality Assessment Score	18
		Habitat Modification Class	5: Severely modified

Table 6: Desk study RHS data for the River Bollin within the land required for the construction of the Proposed Scheme in MA04

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
River Bollin	Within and to the east and north-west	Grid reference	SJ7079388336
		Date	13 August 2007
		Predominant valley form	No obvious valley sides

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Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
		Number of riffles, pools and point bars	0 pools, 0 riffles, 0 point bars
		Realigned channel	No
		Over-deepened channel	No
		Impoundments	No
		Bank top land use and vegetation structure	Isolated or scattered trees on left bank and isolated or scattered trees on right bank.
		Channel dimensions	Left bank top height 2.5m Right bank top height 2.5m Channel bank full width 15m Channel water depth not recorded Channel water width 10m
		Location of channel measurements	Other
		Embankments	Left bank embanked height 1m Right bank embanked height 1.5m
		Trash line	Not recorded
		Bed material	Unknown
		Invasive species	Himalayan balsam
		Habitat Modification Score	780
		Habitat Quality Assessment Score	32
		Habitat Modification Class	4: Significantly modified

Risley to Bamfurlong (MA05)

2.3.5 Environment Agency RHS data exist for Hey Brook within the land required for the construction of the Proposed Scheme. These data are outlined in Table 7.

Table 7: Desk study RHS data for Hey Brook within the land required for the construction of the Proposed Scheme in MA05

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
Hey Brook	Within and to the east	Grid reference	SD6080000400
		Date	6 September 2000

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Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
		Predominant valley form	Shallow vee
		Number of riffles, pools and point bars	0 pools, 1 riffle, 0 point bars
		Realigned channel	No
		Over-deepened channel	No
		Impoundments	No
		Bank top land use and vegetation structure	Isolated or scattered trees on left bank and isolated or scattered trees on right bank.
		Channel dimensions	Left bank top height 3.1m Right bank top height 3.4m Channel bank full width 2.3m Channel water depth 0.18m Channel water width 1.8m
		Location of channel measurements	Riffle
		Embankments	Not recorded
		Trash line	Not recorded
		Bed material	Unconsolidated
		Invasive species	None recorded
		Habitat Modification Score	3,076
		Habitat Quality Assessment Score	25
		Habitat Modification Class	5: Severely modified

Hulseheath to Manchester Airport (MA06)

2.3.6 Environment Agency RHS data exist for Birkin Brook downstream of the land required for the construction of the Proposed Scheme. These data are outlined in Table 8. On examination of aerial imagery, the areas of habitats surveyed appear similar to habitat on this watercourse within the land required for the construction of the Proposed Scheme.

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Table 8: Desk study RHS data for Birkin Brook downstream of the land required for the construction of the Proposed Scheme in MA06

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
Birkin Brook	Approximately 800m north and downstream	Grid reference	SJ7510085200
		Date	16 May 1994
		Predominant valley form	Symmetrical floodplain
		Number of riffles, pools and point bars	5 pools, 5 riffles, 10 unvegetated point bars, 10 vegetated point bars
		Realigned channel	No
		Over-deepened channel	No
		Impoundments	No
		Bank top land use and vegetation structure	Semi-continuous trees on left bank and semi-continuous trees on right bank.
		Channel dimensions	Left bank top height: 1.5m Right bank top height 1.5m Channel bank full width 6.5m Channel water depth 0.25m Channel water width 6m
		Location of channel measurements	Riffle
		Embankments	Right bank embanked height: 0m Left bank embanked height: 0m
		Trash line	Not recorded
		Bed material	Consolidated
		Invasive species	Giant hogweed Himalayan balsam
		Habitat Modification Score	60
Habitat Quality Assessment Score	36		
Habitat Modification Class	2: Predominately unmodified		

2.3.7 Environment Agency RHS data exist for the River Bollin downstream of the land required for the construction of the Proposed Scheme. These data are outlined in Table 9. On examination of aerial imagery, the areas of habitats surveyed appear similar to habitat on this watercourse within the land required for the construction of the Proposed Scheme.

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Table 9: Desk study RHS data for the River Bollin downstream of the land required for the construction of the Proposed Scheme in MA06

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
River Bollin	Approximately 1km north and downstream	Grid reference	SJ7880084700
		Date	17 July 1997
		Predominant valley form	Shallow vee
		Number of riffles, pools and point bars	0 pools, 1 riffle, 0 point bars
		Realigned channel	No
		Over-deepened channel	No
		Impoundments	No
		Bank top land use and vegetation structure	Continuous trees on left bank and continuous trees on right bank.
		Channel dimensions	Left bank top height 0.4m Right bank top height 0.7m Channel bank full width 13m Channel water depth 0.2m Channel water width 13m
		Location of channel measurements	Run or glide
		Embankments	Right bank embanked height 0m Left bank embanked height 0m
		Trash line	None visible
		Bed material	Unconsolidated
		Invasive species	Himalayan balsam
		Habitat Modification Score	0
Habitat Quality Assessment Score	54		
Habitat Modification Class	1: Pristine/semi-natural		

Davenport Green to Ardwick (MA07)

2.3.8 Environment Agency RHS data exist for the River Mersey downstream of the land required for the construction of the Proposed Scheme. These data are outlined in Table 10. On examination of aerial imagery, the areas of habitats surveyed appear similar to habitat on this watercourse within the land required for the construction of the Proposed Scheme.

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Table 10: Desk study RHS data for the River Mersey downstream of the land required for the construction of the Proposed Scheme in MA07

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
River Mersey	Approximately 500m north-west and downstream	Grid reference	SJ8340091500
		Date	12 June 1998
		Predominant valley form	Symmetrical floodplain
		Number of riffles, pools and point bars	1 pool, 0 riffles, 0 point bars
		Realigned channel	No
		Over-deepened channel	No
		Impoundments	No
		Bank top land use and vegetation structure	No trees on left bank and no trees on right bank.
		Channel dimensions	Left bank top height: 2.9m Right bank top height 2.6m Channel bank full width 26m Channel water depth 2.6m Channel water width 15m
		Location of channel measurements	Run or glide
		Embankments	Right bank embanked height 3m Left bank embanked height 3.1m
		Trash line	Not recorded
		Bed material	Unknown
		Invasive species	Giant hogweed
		Habitat Modification Score	2,880
		Habitat Quality Assessment Score	31
Habitat Modification Class	5: Severely modified		

Manchester Piccadilly Station (MA08)

2.3.9 No Environment Agency RHS data exist on watercourses within the land required for the construction of the Proposed Scheme.

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Survey data

Hough to Walley's Green (MA01)

2.3.10 No RHS surveys were completed within the land required for the construction of the Proposed Scheme. No watercourses were scoped in under FSMS guidance.

Wimboldsley to Lostock Gralam (MA02)

2.3.11 Surveys were carried out on five watercourses crossed by the Proposed Scheme in MA02: the River Dane; Puddinglake Brook; Peover Eye; Smoker Brook; and Tributary of Smoker Brook 1.

2.3.12 The River Dane is crossed twice by the route of the Proposed Scheme. Therefore, two surveys were scoped in for this watercourse: AT01_RH1_140818 and AT02_RH1_150818.

2.3.13 The RHS results for the River Dane (AT01_RH1_140818) are detailed in Table 11.

2.3.14 In the reach surveyed, the River Dane is a heavily modified watercourse with a Habitat Modification Score (HMS) of 3,140, categorised as Habitat Modification Class (HMC) five, indicating severe modification. The watercourse is characterised by a realigned, embanked and over-deepened channel, through semi-natural broadleaf/mixed woodland and rough unimproved grassland/pasture. Channel vegetation includes submerged linear-leaved species. Himalayan balsam is present at this site, on both the bank face and bank top.

Table 11: RHS data for the River Dane in MA02

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
River Dane (AT01_RH1_140818)	Within and to the east	Grid reference	SJ6770769585
		Date	14 August 2018
		Predominant valley form	Asymmetrical valley
		Number of riffles, pools and point bars	3 riffles, 1 pool, 0 points bars
		Realigned channel	Yes, >= 33%
		Over-deepened channel	Yes, >= 33%
		Impoundments	No
		Bank top land use and vegetation structure	Occasional clumps of trees on left bank and occasional clump of trees on right bank.
		Channel dimensions	Left bank top height 3m Right bank top height 6m Channel bank full width 18m

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Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
			Channel water depth 3m Channel water width 9m
		Location of channel measurements	Smooth flow
		Embankments	Left bank embanked height 3m Right bank embanked height 6m
		Trash line	Trash line width 9m
		Bed material	Unconsolidated (loose)
		Invasive species	Himalayan balsam
		Habitat Modification Score	3,140
		Habitat Quality Assessment Score	52
		Habitat Modification Class	5: Severely modified

2.3.15 The RHS results for the River Dane (AT02_RH1_150818) are detailed in Table 12.

2.3.16 In the reach surveyed, the River Dane is a heavily modified watercourse with a HMS of 2,958, categorised as HMC five, indicating severe modification. The watercourse is characterised by a realigned, embanked and over-deepened channel through scrub/shrubs, tall herb or rank vegetation and semi-natural broadleaf/mixed woodland. Channel vegetation includes emergent broad-leaved herbs, floating-leaved (rooted), submerged species and filamentous algae. Himalayan balsam is present at this site, on both the bank face and bank top.

Table 12: RHS data for the River Dane in MA02

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
River Dane (AT02_RH1_150518)	Within and to the south-east and north-west	Grid reference	SJ6820568789
		Date	15 May 2018
		Predominant valley form	Shallow vee
		Number of riffles, pools and point bars	3 riffles, 10 pools, 3 vegetated point bars
		Realigned channel	Yes, >= 33%
		Over-deepened channel	Yes, >=33%
		Impoundments	No
		Bank top land use and	Isolated or scattered trees on left bank

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Ecological baseline data – river habitat, river macrophyte and ditch surveys

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
		vegetation structure	and isolated or scattered trees on right bank.
		Channel dimensions	Left bank top height 5m Right bank top height 5m Channel bank full width 20m Channel water depth 1m Channel water width 15m
		Location of channel measurements	Smooth flow
		Embankments	Left bank embanked height 5m Right bank embanked height 5m
		Trash line	Trash line height 2m Trash line width 2m
		Bed material	Consolidated
		Invasive species	Himalayan balsam
		Habitat Modification Score	2,958
		Habitat Quality Assessment Score	53
		Habitat Modification Class	5: Severely modified

2.3.17 The RHS results for Puddinglake Brook (AT02_RH1_150518) are detailed in Table 13.

2.3.18 In the reach surveyed, Puddinglake Brook at the crossing point is a heavily modified watercourse with a HMS of 4,980, categorised as HMC five, indicating severe modification. The watercourse is characterised by a resectioned, reinforced and over-deepened channel through semi-natural broadleaf/mixed woodland, tall herb vegetation and improved or semi-improved grassland. Himalayan balsam is present at this site, on both the bank face and bank top.

Table 13: RHS data for Puddinglake Brook in MA02

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
Puddinglake Brook (AT03_RH1_150518)	Within	Grid reference	SJ68843370071
		Date	15 May 2018
		Predominant valley form	Shallow vee
		Number of riffles,	5 riffles, 10 pools, 5 unvegetated point

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Ecology and biodiversity

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Ecological baseline data – river habitat, river macrophyte and ditch surveys

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
		pools and point bars	bars
		Realigned channel	Yes, >= 33%
		Over-deepened channel	Yes, >= 33%
		Impoundments	No
		Bank top land use and vegetation structure	Semi-continuous trees on left bank and semi-continuous trees on right bank.
		Channel dimensions	Left bank top height 2m Right bank top height 2m Channel bank full width 3m Channel water depth 0.1m Channel water width 1.5m
		Location of channel measurements	Riffle
		Embankments	Left bank embanked height 10m Right bank embanked height 15m
		Trash line	Trash line height 2m Trash line width 3m
		Bed material	Unconsolidated (loose)
		Invasive species	Himalayan balsam
		Habitat Modification Score	4,980
		Habitat Quality Assessment Score	52
		Habitat Modification Class	5: Severely modified

2.3.19 The RHS results for Peover Eye (BT02_RH1_160518) are detailed in Table 14.

2.3.20 In the reach surveyed, Peover Eye is a heavily modified watercourse with a HMS of 4,492, categorised as HMC five, indicating severe modification. The watercourse is characterised by a resectioned, realigned and over-deepened channel with debris dams and weirs/sluices present through semi-natural broadleaf/mixed woodland. Himalayan balsam is present at this site on both the bank face and bank top.

Table 14: RHS data for Peover Eye in MA02

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
Peover Eye	Within and to the east	Grid reference	SJ7021975684

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Ecological baseline data – river habitat, river macrophyte and ditch surveys

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
(BT02_RH1_160518)	and west	Date	16 May 2018
		Predominant valley form	Concave/bowl
		Number of riffles, pools and point bars	5 riffles, 15 pools, 7 unvegetated point bars, 2 vegetated point bars
		Realigned channel	Yes, >= 33%
		Over-deepened channel	Yes, >= 33%
		Impoundments	Yes, < 33%
		Bank top land use and vegetation structure	Continuous trees on left bank and continuous trees on right bank.
		Channel dimensions	Left bank top height 2m Right bank top height 2m Channel bank full width 30m Channel water depth 0.2m Channel water width 15m
		Location of channel measurements	Smooth flow
		Embankments	Left bank embanked height 2m Right bank embanked height 10m
		Trash line	None visible
		Bed material	Unconsolidated (loose)
		Invasive species	Himalayan balsam
		Habitat Modification Score	4,492
		Habitat Quality Assessment Score	84
Habitat Modification Class	5: Severely modified		

2.3.21 The RHS results for Smoker Brook (BT04_RH1_170518) are detailed in Table 15. Smoker Brook is on the border of MA02 and MA03.

2.3.22 In the reach surveyed, Smoker Brook is a heavily modified watercourse with a HMS of 4,428, categorised as HMC five, indicating severe modification. The watercourse is characterised by a resectioned, realigned, over-deepened, reinforced and embanked channel through semi-natural broadleaf/mixed woodland and tall herb or rank vegetation. Channel vegetation includes filamentous algae, observed in one location. Himalayan balsam is present at this site on both the bank face and bank top.

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Table 15: RHS data for Smoker Brook in MA02

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
Smoker Brook (BT04_RH1_170518)	Within and to the north-east	Grid reference	SJ7041760260
		Date	17 May 2018
		Predominant valley form	Shallow vee
		Number of riffles, pools and point bars	15 riffles, 20 pools, 14 unvegetated point bars, 1 vegetated point bar
		Realigned channel	Yes, >= 33%
		Over-deepened channel	Yes, >= 33%
		Impoundments	No
		Bank top land use and vegetation structure	Continuous trees on left bank and continuous trees on right bank.
		Channel dimensions	Left bank top height 2.5m Right bank top height 2m Channel bank full width 6m Channel water depth 0.1m Channel water width 6m
		Location of channel measurements	Riffle
		Embankments	Left bank embanked height 5m Right bank embanked height 4m
		Trash line	Trash line height 2m Trash line width 4m
		Bed material	Unconsolidated (loose)
		Invasive species	Himalayan balsam
		Habitat Modification Score	4,428
		Habitat Quality Assessment Score	77
Habitat Modification Class	5: Severely modified		

2.3.23 The RHS results for Tributary of Smoker Brook 1 (BT05_RH1_060619) are detailed in Table 16. Tributary of Smoker Brook 1 is on the border of MA02 and MA03.

2.3.24 In the reach surveyed, Tributary of Smoker Brook 1 is a heavily modified watercourse with a HMS of 480, categorised as HMC three, indicating obvious modification. Apart from a reinforced culvert, the watercourse is characterised by a relatively unmodified channel through semi-natural broadleaf/mixed woodland, on both banks. Channel vegetation

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includes emergent broad-leaved herbs and reeds or sedges. Himalayan balsam is present at this site, on both the bank face and bank top.

Table 16: RHS data for Tributary of Smoker Brook 1 in MA02

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
Tributary of Smoker Brook 1 (BT05_RH1_060619)	Within and to the north-west	Grid reference	SJ7022576146
		Date	6 June 2019
		Predominant valley form	Deep vee
		Number of riffles, pools and point bars	1 riffle, 11 pools, 8 unvegetated point bars
		Realigned channel	No
		Over-deepened channel	No
		Impoundments	No
		Bank top land use and vegetation structure	Continuous trees on left bank and continuous trees on right bank.
		Channel dimensions	Left bank top height 0.5m Right bank top height 0.9m Channel bank full width 2m Channel water depth 0.1m Channel water width 1.75m
		Location of channel measurements	Riffle
		Embankments	Left bank embanked height 0m Right bank embanked height 0m
		Trash line	None visible
		Bed material	Unconsolidated (loose)
		Invasive species	Himalayan balsam
		Habitat Modification Score	480
		Habitat Quality Assessment Score	55
Habitat Modification Class	3: Obviously modified		

Pickmere to Agden and Hulseheath (MA03)

2.3.25 Surveys were carried out on two watercourses crossed by the Proposed Scheme in MA03: Waterless Brook/Arley Brook and Millington Clough.

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- 2.3.26 Waterless Brook/Arley Brook is crossed twice by the route of the Proposed Scheme. Therefore, two surveys were scoped in for this watercourse: BT03_RH1_180518 and BT12_RH1_180518.
- 2.3.27 The RHS results for Waterless Brook/Arley Brook (BT12_RH1_180518) are detailed in Table 17.
- 2.3.28 In the reach surveyed, Waterless Brook/Arley Brook is a heavily modified watercourse with a HMS of 3,795, categorised as HMC five, indicating severe modification. The watercourse is characterised by a realigned and over-deepened channel through semi-natural broadleaf/mixed woodland and tall herb vegetation. Channel vegetation includes liverworts, mosses or lichens, submerged species and filamentous algae. Himalayan balsam is present at this site on both the bank face and bank top.

Table 17: RHS data for Waterless Brook/Arley Brook in MA03

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
Waterless Brook/Arley Brook (BT12_RH1_180518)	Within and to the south-east	Grid reference	SJ7100278420
		Date	18 May 2018
		Predominant valley form	Shallow vee
		Number of riffles, pools and point bars	3 riffles, 11 pools, 4 unvegetated point bars
		Realigned channel	Yes, >= 33%
		Over-deepened channel	Yes, >= 33%
		Impoundments	Yes, < 33%
		Bank top land use and vegetation structure	Semi-continuous trees on left bank and semi-continuous trees on right bank.
		Channel dimensions	Left bank top height 0.5m Right bank top height 0.5m Channel bank full width 15m Channel water depth 0.1m Channel water width 3m
		Location of channel measurements	Riffle
		Embankments	Left bank embanked height 6m Right bank embanked height 6m
		Trash line	None visible
		Bed material	Unconsolidated (loose)
		Invasive species	Himalayan balsam
Habitat Modification Score	3,795		

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Ecological baseline data – river habitat, river macrophyte and ditch surveys

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
		Habitat Quality Assessment Score	68
		Habitat Modification Class	5: Severely modified

2.3.29 The RHS results for Waterless Brook/Arley Brook (BT03_RH1_180518) are detailed in Table 18.

2.3.30 In the reach surveyed, Waterless Brook/Arley Brook is a heavily modified watercourse with a habitat modification score (HMS) of 4,328, categorised as HMC five, indicating severe modification. The watercourse is characterised by a resectioned, over-deepened and reinforced channel through semi-natural broadleaf/mixed woodland and tall herb vegetation. Channel vegetation includes liverworts, mosses or lichens, submerged species and filamentous algae. Himalayan balsam is present at this site on both the bank face and bank top.

Table 18: RHS data for Waterless Brook/Arley Brook in MA03

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
Waterless Brook/Arley Brook (BT03_RH1_180518)	Within and to the north-west	Grid reference	SJ7068778681
		Date	18 May 2018
		Predominant valley form	Shallow vee
		Number of riffles, pools and point bars	6 riffles, 25 pools, 9 unvegetated point bars
		Realigned channel	Yes, >= 33%
		Over-deepened channel	Yes, >= 33%
		Impoundments	No
		Bank top land use and vegetation structure	Semi-continuous trees on left bank and semi-continuous trees on right bank.
		Channel dimensions	Left bank top height 2.5m Right bank top height 2m Channel bank full width 6m Channel water depth 0.1m Channel water width 6m
		Location of channel measurements	Riffle
Embankments	Left bank embanked height 3m Right bank embanked height 5m		

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Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
		Trash line	Not visible
		Bed material	Unconsolidated (loose)
		Invasive species	Himalayan balsam
		Habitat Modification Score	4,328
		Habitat Quality Assessment Score	61
		Habitat Modification Class	5: Severely modified

2.3.31 The RHS results for Millington Clough (BT06_RH1_050619) are detailed in Table 19.

2.3.32 In the reach surveyed, Millington Clough is a heavily modified watercourse with a HMS of 1,010, categorised as HMC four, indicating significant modification. The watercourse is characterised by a relatively unmodified channel with some reinforced banks and resectioning through broadleaf/mixed woodland (semi-natural) and rough unimproved grassland/pasture. Channel vegetation includes liverworts, mosses and lichens, emergent broad-leaved herbs and reeds or sedges. Himalayan balsam is present at this site on the bank face.

Table 19: RHS data for Millington Clough in MA03/MA06

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
Millington Clough (BT06_RH1_050619)	Within	Grid reference	SJ7221584169
		Date	05 June 2019
		Predominant valley form	Concave/bowl
		Number of riffles, pools and point bars	2 riffles, 2 pools, 2 unvegetated point bars
		Realigned channel	Yes, < 33% of site
		Over-deepened channel	Yes, < 33% of site
		Impoundments	No
		Bank top land use and vegetation structure	Semi-continuous trees on left bank and occasional clumps of trees on right bank.
		Channel dimensions	Left bank top height 0.5m Right bank top height 0.6m Channel bank full width 2.5m

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Ecological baseline data – river habitat, river macrophyte and ditch surveys

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
			Channel water depth 0.05m Channel water width 2m
		Location of channel measurements	Riffle
		Embankments	Left bank embanked height 0m Right bank embanked height 0m
		Trash line	None visible
		Bed material	Unconsolidated (loose)
		Invasive species	Himalayan balsam
		Habitat Modification Score	1,010
		Habitat Quality Assessment Score	50
		Habitat Modification Class	4: Significantly modified

Broomedge to Glazebrook (MA04)

2.3.33 The RHS results for the River Bollin (DT01_RH1_160818) are detailed in Table 20.

2.3.34 In the reach surveyed, the River Bollin is a heavily modified watercourse with a HMS of 4,897, categorised as HMC five, indicating severe modification. The watercourse is characterised by a resectioned, reinforced channel through rough unimproved grassland/pasture and semi-natural broadleaf/mixed woodland. Channel vegetation includes emergent reeds, sedges, rushes, grasses or horsetails, free-floating, submerged broad-leaved species and filamentous algae. Giant hogweed and Himalayan balsam are present at this site on both the bank face and bank top.

Table 20: RHS data for the River Bollin in MA04

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
River Bollin (DT01_RH1_160818)	Within and to the east and north-west	Grid reference	SJ7093588380
		Date	16 August 2018
		Predominant valley form	Concave/bowl
		Number of riffles, pools and point bars	0 pools, 0 riffles, 1 unvegetated point bar
		Realigned channel	Yes, >= 33%
		Over-deepened channel	Yes, >= 33%

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Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
		Impoundments	Yes, <33%
		Bank top land use and vegetation structure	Occasional clumps of trees on left bank and occasional clumps of trees on right bank.
		Channel dimensions	Left bank top height 2m Right bank top height 2m Channel bank full width 8m Channel water depth 1m Channel water width 5m
		Location of channel measurements	Glide
		Embankments	Left bank embanked height 4m Right bank embanked height 4m
		Trash line	None visible
		Bed material	Unconsolidated (loose)
		Invasive species	Giant hogweed Himalayan balsam
		Habitat Modification Score	4,897
		Habitat Quality Assessment Score	37
		Habitat Modification Class	5: Severely modified

Risley to Bamfurlong (MA05)

- 2.3.35 The RHS results for Nan Holes Brook (DT05_RH1_040619) are detailed in Table 21.
- 2.3.36 In the reach surveyed, Nan Holes Brook is a heavily modified watercourse with a HMS of 1000, categorised as HMC four, indicating significant modification. The watercourse is characterised by a resectioned channel that flows through rough unimproved grassland/pasture, tall herb/rank vegetation and scrub and shrubs. Channel vegetation includes liverworts, mosses and lichens, emergent broad-leaved herbs and reeds or sedges. Himalayan balsam is present at this site on both the bank face and bank top.

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Ecological baseline data – river habitat, river macrophyte and ditch surveys

Table 21: RHS data for Nan Holes Brook in MA05

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
Nan Holes Brook (DT05_RH1_040619)	Within and to the east and west	Grid reference	SD6056700064
		Date	04 June 2019
		Predominant valley form	Deep vee
		Number of riffles, pools and point bars	0 riffles, 2 pools, 2 unvegetated point bars
		Realigned channel	No
		Over-deepened channel	No
		Impoundments	No
		Bank top land use and vegetation structure	Semi-continuous trees on left bank and continuous trees on right banks.
		Channel dimensions	Left bank top height 1m Right bank top height 1.2m Channel bank full width 2.5m Channel water depth 0.05m Channel water width 0.75m
		Location of channel measurements	Run
		Embankments	Left bank embanked height 0m Right bank embanked height 0m
		Trash line	None visible
		Bed material	Unknown
		Invasive species	Himalayan balsam
		Habitat Modification Score	1,000
		Habitat Quality Assessment Score	47
Habitat Modification Class	4: Significantly modified		

Hulseheath to Manchester Airport (MA06)

- 2.3.37 Surveys were carried out on two watercourses crossed by the Proposed Scheme in MA06: Agden Brook and the River Bollin.
- 2.3.38 The RHS results for Agden Brook (BT13_RHS_250920) are detailed in Table 22.
- 2.3.39 As detailed in Section 2.2, the RHS conducted on Agden Brook was not compliant with the FSMS due to land access constraints.
- 2.3.40 In the reach surveyed, Agden Brook is a modified watercourse with a HMS of 310, categorised as HMC three, indicating obvious modification. The watercourse is characterised by a poached channel through improved/semi-improved grassland, rough unimproved

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grassland/pasture, semi-natural broadleaf/mixed woodland and tall herb/rank vegetation. Channel vegetation includes emergent herbs, reeds and sedges, amphibious and submerged broad-leaved species.

Table 22: RHS data for Agden Brook in MA06

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
Agden Brook (BT13_RHS_250920)	Within	Grid reference	SJ7245584901
		Date	25 September 2020
		Predominant valley form	Concave/bowl
		Number of riffles, pools and point bars	0 riffles, 0 pools, 2 vegetated point bars
		Realigned channel	No
		Over-deepened channel	No
		Impoundments	No
		Bank top land use and vegetation structure	Semi-continuous trees on left bank and isolated/scattered trees on right bank.
		Channel dimensions	Left bank top height 1.6m Right bank top height 1.4m Channel bank full width 7.8m Channel water depth 0.3m Channel water width 1.3m
		Location of channel measurements	Run
		Embankments	Left bank embanked height 0m Right bank embanked height 0m
		Trash line	None visible
		Bed material	Unconsolidated (loose)
		Invasive species	None
		Habitat Modification Score	310
Habitat Quality Assessment Score	47		
Habitat Modification Class	3		

2.3.41 The RHS results for the River Bollin (BT10_RH1_020818) are detailed in Table 23.

2.3.42 In the reach surveyed, the River Bollin is a heavily modified watercourse with a HMS of 3,780, categorised as HMC five, indicating severe modification. The watercourse is characterised by a resectioned, realigned, reinforced channel through semi-natural broadleaf/mixed woodland and rough, unimproved grassland/pasture. Channel vegetation includes liverworts, mosses or lichens, free-floating, submerged-linear leaved species and

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filamentous algae. Japanese knotweed (*Fallopia japonica*) and Himalayan balsam are present at this site on both the bank face and bank top.

Table 23: RHS data for the River Bollin in MA06

Watercourse name	Distance from the land required for the construction of the Proposed Scheme (m) and orientation	Survey parameters	Results
River Bollin (BT10_RH1_020818)	Within and to the east	Grid reference	SJ7936784239
		Date	02 August 2018
		Predominant valley form	Deep vee
		Number of riffles, pools and point bars	7 riffles, 5 pools, 5 unvegetated point bars, 1 vegetated point bar
		Realigned channel	Yes, >= 33% of site
		Over-deepened channel	Yes, <33% of site
		Impoundments	No
		Bank top land use and vegetation structure	Semi-continuous trees on left bank and semi-continuous trees on right bank.
		Channel dimensions	Left bank top height 1.5m Right bank top height 1.5m Channel bank full width 15m Channel water depth 0.3m Channel water width 10m
		Location of channel measurements	Riffle
		Embankments	Left bank embanked height 5m Right bank embanked height 5m
		Trash line	None visible
		Bed material	Consolidated
		Invasive species	Japanese knotweed Himalayan balsam
		Habitat Modification Score	3,780
		Habitat Quality Assessment Score	69
Habitat Modification Class	5: Severely modified		

Davenport Green to Ardwick (MA07)

2.3.43 No RHS surveys were completed within the land required for the construction of the Proposed Scheme. No watercourses were scoped in under FSMS guidance.

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Manchester Piccadilly Station (MA08)

2.3.44 No RHS surveys were completed within the land required for the construction of the Proposed Scheme. No watercourses were scoped in under FSMS guidance.

2.4 Watercourses scoped out of the requirement for river habitat surveys

2.4.1 Watercourses for which the need for RHS and river macrophyte surveys was scoped out, as defined in the FSMS guidance, are listed in Table 24, with reasons for the exclusions in each case.

Table 24: Summary of locations in MA01 to MA08 where RHS and river macrophyte surveys were scoped out

Watercourse name	Location	OS grid reference – crossing point of the route of the Proposed Scheme	Feature type (and reason for scoping out)	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
Tributary of Swill Brook 1	South of Crewe	SJ7172752576	Ordinary watercourse. Heavily modified and straightened drainage ditch with a channel width less than 1m.	MA01	Within and to the east and west
Gresty Brook	South of Crewe	SJ7147253619	Main watercourse. Extensively culverted and modified channel at the crossing point of the route of the Proposed Scheme.	MA01	Within and to the east and west
Valley Brook	Crewe city centre	SJ7105455147	Main watercourse. The channel is heavily modified through extensive straightening and culverting at the crossing point of the route of the Proposed Scheme.	MA01	Within and to the east and west
Leighton Brook	Crewe city centre	SJ6978356629	Ordinary watercourse. The channel is heavily modified through urban land-use pressures and is culverted.	MA01	Within and to the east and west
Broughton Road Drains	North of Crewe	SJ7008057947	Ordinary watercourse. Heavily modified with multiple culverts and extensive straightening on either side of the land required for the construction of the Proposed Scheme.	MA01	Within and to the east

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Watercourse name	Location	OS grid reference – crossing point of the route of the Proposed Scheme	Feature type (and reason for scoping out)	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
Parkers Road Drain	North of Crewe	SJ6991558427	Ordinary watercourse. Heavily modified.	MA01	Within
Tributary of Fowle Brook 1	North of Crewe	SJ6980758734	Ordinary watercourse. Heavily modified agricultural drainage ditch. Channel width less than 1m.	MA01	Within and to the east
Hoggins Brook	West of Warmingham	SJ6975360076	Ordinary watercourse. Heavily modified and straightened drainage ditch. Channel width less than 1m.	MA01	Within and to the north and south
Tributary of River Weaver 1	West of Warmingham	SJ6872861836	Ordinary watercourse. Channel is modified through straightening and culverted reaches. Channel width less than 1m.	MA02	Within and to the north-west
Tributary of River Weaver 2	West of Warmingham	SJ6873061838	Ordinary watercourse. Channel is modified through realignment and culverts with a channel width less than 1m.	MA02	Within and to the west
The Dingle	South of Winsford	SJ6827863067	Ordinary watercourse. Channel is modified through realignment and culverts with a channel width less than 1m.	MA02	Within and to the west
Tributary of River Weaver 4	South of Middlewich	SJ6919165109	Ordinary watercourse. A narrow drainage ditch with a channel width less than 1m.	MA02	Within and to the east
Shropshire Union Canal	West of Middlewich	SJ6851065546	Canal. Heavily modified watercourse.	MA02	Within and to the east and south-west
Tributary of River Wheelock 5	West of Middlewich	SJ6871066071	Ordinary watercourse. A narrow drainage ditch with a channel width less than 1m.	MA02	Within and to the south-east
Birch Lane Drain	West of Middlewich	SJ6890266689	Ordinary watercourse. A narrow drainage ditch with a channel width less than 1m.	MA02	Within and to the west
The Willowbeds	North-east of Winsford Industrial	SJ6783467067	Ordinary watercourse. A narrow drainage ditch with a channel width less than	MA02	Within and to the north and south

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Ecological baseline data – river habitat, river macrophyte and ditch surveys

Watercourse name	Location	OS grid reference – crossing point of the route of the Proposed Scheme	Feature type (and reason for scoping out)	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
	Estate		1m.		
Tributary of River Dane 3	North-west of Middlewich	SJ6850167399	Ordinary watercourse. A narrow drainage ditch with a channel width less than 1m.	MA02	Within and to the east
Hill Wood Drain	North-west of Middlewich	SJ6815368540	Ordinary watercourse. A narrow drainage ditch with a channel width less than 1m.	MA02	Within and to the east
Trent and Mersey Canal - 1st Crossing	North-west of Middlewich	SJ6835868824	Canal. Heavily modified watercourse.	MA02	Within and to the north-west and south-east
Tributary of Trent and Mersey Canal	North-west of Middlewich	SJ6833969358	Canal. Heavily modified watercourse.	MA02	Within and to the east and west
Trent and Mersey Canal - 2nd Crossing	East of Moulton	SJ6836770214	Canal. Heavily modified watercourse.	MA02	Within and to the east and west
Trent and Mersey Canal - 3rd Crossing	East of Moulton	SJ6842370770	Canal. Heavily modified watercourse.	MA02	Within and to the north-west and south-east
Gad Brook	South-east of Northwich	SJ6863371883	Ordinary watercourse. Watercourse is heavily modified through realignment in the upper reaches. Channel width less than 1m.	MA02	Within and to the east and west
Tributary of Gad Brook 3	South-east of Northwich	SJ6864171911	Ordinary watercourse. Channel width less than 1m.	MA02	Within and to the south-east
Tributary of Gad Brook 4	Rudheath	SJ6846772662	Ordinary watercourse. Channel width less than 1m.	MA02	Within and to the south
Broken Cross Drains	East of Northwich	SJ6902873283	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA02	Within and to the west
Square Wood Drains	Lostock Gralam	SJ7036174405	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA02	Within and to the east
Tributary of Peover Eye	Lostock Gralam	SJ7017375545	Ordinary watercourse. Channel width less than 1m.	MA02	Within and to the north-west and south-east
Tributary of Smoker Brook 2	Lostock Gralam	SJ7114276389	Ordinary watercourse. Heavily modified agricultural drainage ditch	MA03	Within and to the north and south

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Ecological baseline data – river habitat, river macrophyte and ditch surveys

Watercourse name	Location	OS grid reference – crossing point of the route of the Proposed Scheme	Feature type (and reason for scoping out)	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
			with a width less than 1m.		
Tributary of Waterless Brook/Arley Brook 2	West of Knutsford	SJ7090877988	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the east
Tributary of Waterless Brook/Arley Brook 4	West of Knutsford	SJ6996878964	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the east
Tributary of Waterless Brook/Arley Brook 5	West of Knutsford	SJ7029579163	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the east and west
Tributary of Tabley Brook 1	West of Knutsford	SJ7083379299	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the south
Tributary of Tabley Brook 2	East of Pickmere	SJ7083579709	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the east and west
Tributary of Tabley Brook 3	West of Knutsford	SJ7098279990	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	0m east
Tributary of Tabley Brook 4	West of Knutsford	SJ7101580532	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the east
Tributary of Tabley Brook 5	West of Knutsford	SJ7127480464	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the east
Tributary of Tabley Brook 6	West of Knutsford	SJ7112780770	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the south
Tributary of Tabley Brook 7	West of Knutsford	SJ7121582940	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the south
Tributary of Tabley Brook 8	West of Knutsford	SJ7114881102	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the south and west

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Ecological baseline data – river habitat, river macrophyte and ditch surveys

Watercourse name	Location	OS grid reference – crossing point of the route of the Proposed Scheme	Feature type (and reason for scoping out)	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
Tributary of Tabley Brook 9	West of Knutsford	SJ7127181640	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the south and east
Hulsheath Lane Drain	West of Knutsford	SJ7219883192	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA03	Within
Winterbottom Lane Drains	West of Knutsford	SJ7128281923	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the west
Hoogreen Lane Drain	West of Knutsford	SJ7118182169	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA03	Within and to the west
Chapel Lane Drain	West of Knutsford	SJ7253383662	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA03	Within and to the east
Tributary of Millington Clough 1	Hulseheath	SJ7168383696	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the north-east and south-west
Tributary of Millington Clough 2	Hulseheath	SJ7170283885	Main watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the east
Tributary of Millington Clough 3	North-east of High Legh	SJ7171884132	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the east and west
Tributary of Millington Clough 4	North-east of High Legh	SJ7172784631	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA03	Within and to the south-east
Agden Lane Road Drain 1	East of Lymm	SJ7147386548	Ordinary watercourse. Channel is heavily modified.	MA04	Within and to the west
Tributary of Agden Brook 1	East of Lymm	SJ7147086559	Ordinary watercourse. Channel heavily modified through multiple culverts on either side of the land required for the Proposed Scheme.	MA04	Within and to the south-west and north-east
Bridgewater Canal	East of Lymm	SJ7140086826	Canal. Heavily modified watercourse.	MA04	Within and to the north-west and south-east

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Ecological baseline data – river habitat, river macrophyte and ditch surveys

Watercourse name	Location	OS grid reference – crossing point of the route of the Proposed Scheme	Feature type (and reason for scoping out)	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
Helsdale Brook	East of Lymm	SJ7100287618	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA04	Within and to the north and south
Old Bollin	North-east of Lymm	SJ7099088402	Ordinary watercourse. Heavily modified channel.	MA04	Within and to the east and west
Tributary of Old Bollin	North-east of Lymm	SJ7091488690	Ordinary watercourse. Heavily modified channel.	MA04	Within and to the west
Tributary of the Manchester Ship Canal 2	North of Warburton	SJ7048090133	Ordinary watercourse. Channel width less than 1m.	MA04	Within and to the east and west
Field Drains A6144	North of Mossbrow	SJ7092089659	Ordinary watercourse. Heavily modified agricultural drainage ditch with a width less than 1m.	MA04	Within
Manchester Ship Canal	Hollins Green	SJ7007390954	Canal. Heavily modified watercourse.	MA04	Within and to the north-east and south-west
Tributary of Glaze Brook 1	Glazebrook	SJ6978391395	Main watercourse. Channel is heavily modified and width less than 1m.	MA04	Within and to the south-east and north-west
Dam Head Lane Drains	West of Glazebrook	SJ6896692447	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA04	Within
Tributary of Glaze Brook 2	Glazebrook	SJ6839792947	Ordinary watercourse. Heavily modified channel with a width less than 1m.	MA04, MA05	Within and to the north-east and south-west
M62 Drainage	South of Culcheth	SJ6786793419	Ordinary watercourse. Heavily modified channel with a width less than 1m.	MA05	Within and to the east and west
Tributary of Holcroft Lane Brook 1	South of Culcheth	SJ6706993920	Main watercourse. Heavily modified channel with a width less than 1m.	MA05	Within and to the north and south
Tributary of Holcroft Lane Brook 2	South of Culcheth	SJ6686394046	Main watercourse. Heavily modified channel with a width less than 1m.	MA05	Within and to the north and south
Tributary of Holcroft Lane Brook 3	South of Culcheth	SJ6684994052	Ordinary watercourse. Heavily modified with a channel width less than 1m.	MA05	Within and to the north and south
Tributary of Holcroft Lane Brook 4	South of Culcheth	SJ6651894160	Ordinary watercourse. Heavily modified with a channel width less than 1m.	MA05	Within and to the north and south

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Ecological baseline data – river habitat, river macrophyte and ditch surveys

Watercourse name	Location	OS grid reference – crossing point of the route of the Proposed Scheme	Feature type (and reason for scoping out)	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
Tributary of Holcroft Lane Brook 5	South of Culcheth	SJ6603394240	Ordinary watercourse. Heavily modified with a channel width less than 1m.	MA05	Within and to the north and south
Tributary of Holcroft Lane Brook 6	South of Culcheth	SJ6675294300	Ordinary watercourse. Heavily modified with a channel width less than 1m.	MA05	Within and to the north and south
Silver Lane Lakes Drains	South of Culcheth	SJ6596794250	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA05	Within
Culcheth Linear Park Drain 1	South of Culcheth	SJ6509094859	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA05	Within
Wigshaw Lane Drains	South of Culcheth	SJ6446594916	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA05	Within
Tributary of Cross Brook 1	North-east of Croft	SJ6460694804	Ordinary watercourse. Heavily modified with a channel width less than 1m.	MA05	Within and to the south
Tributary of Carr Brook 1	North-west of Culcheth	SJ6374196086	Ordinary watercourse. Heavily modified with a channel width less than 1m.	MA05	Within and to the north-east
Carr Brook	East of Golborne	SJ6323997261	Ordinary watercourse. Channel is heavily modified through culverting.	MA05	Within and to the east and south-west
Small Brook	Golborne	SJ6289698104	Main watercourse. Heavily modified with a channel width less than 1m.	MA05	Within and to the east and south-west
Slag Lane Drains	North-east of Golborne	SJ6284398182	Ordinary watercourse. Heavily modified with a channel width less than 1m.	MA05	Within and to the west
Sandy Lane Drain 1	North-east of Golborne	SJ6288894916	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA05	Within
Hey Brook	North of Golborne	SJ6127599955	Main watercourse. Heavily modified channel.	MA05	Within and to the north-east
Tributary of Hey Brook 1	North of Golborne	SJ6235798668	Ordinary watercourse. Heavily modified and managed channel.	MA05	Within and to the north and south
Tributary of	North of	SJ6226398732	Ordinary watercourse. Heavily modified and	MA05	Within and to the north-east and

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Watercourse name	Location	OS grid reference – crossing point of the route of the Proposed Scheme	Feature type (and reason for scoping out)	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
Hey Brook 2	Golborne		managed channel.		south-east
Tributary of Hey Brook 3	North of Golborne	SJ6189098976	Main watercourse. Heavily modified and managed channel.	MA05	Within and to the south-east
Tributary of Hey Brook 5	North-east of Ashton-In-Makerfield	SD6032500469	Ordinary watercourse. Heavily modified and managed channel.	MA05	Within and to the east
Tributary of Hey Brook 6	North of Golborne	SD5987702116	Ordinary watercourse. Heavily modified and managed channel.	MA05	Within
Locker Lane Drain	North of Golborne	SD6027200610	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA05	Within
Haydock Branch Junction Drains	North of Golborne	SJ6028199555	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA05	Within
Wigan Road Drain	North-east of Ashton-In-Makerfield	SJ6063599948	Ordinary watercourse. Heavily modified and managed channel.	MA05	Within and to the south-west
Tributary of Nan Holes Brook 1	North-east of Ashton-In-Makerfield	SJ6067899894	Ordinary watercourse. Heavily modified and managed channel.	MA05	Within and to the north and south
Tributary of Nan Holes Brook 2	North-east of Ashton-In-Makerfield	SD6056900037	Ordinary watercourse. Heavily modified and managed channel.	MA05	Within and to the north and south
Tributary of Coffin Lane Brook 1	North-east of Ashton-In-Makerfield	SD6005801421	Ordinary watercourse. Heavily modified and managed with a channel width of less than 1m.	MA05	Within and to the south
Bamfurlong Drains	North-east of Ashton-In-Makerfield	SD6018301676	Ordinary watercourse. Heavily modified and managed agricultural drainage ditch.	MA05	Within
Leeds and Liverpool Canal	South-west of Wigan	SD6034301662	Canal. Heavily modified watercourse.	MA05	Within and to the west and south-east
Tributary of River Bollin 6	South of Ashley	SJ7380385163	Ordinary watercourse. Heavily modified with a channel width less than 1m.	MA05	Within
Yarwood Heath Drain	South of Ashley	SJ7450085218	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA05	Within
Tributary of	South of Ashley	SJ7562384646	Ordinary watercourse.	MA06	Within and to the

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Watercourse name	Location	OS grid reference – crossing point of the route of the Proposed Scheme	Feature type (and reason for scoping out)	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
Birkin Brook 9			Heavily modified with a channel width less than 1m.		east
Tributary of Birkin Brook 7	South of Ashley	SJ7630783870	Ordinary watercourse. Heavily modified with a channel width less than 1m.	MA06	Within
Tributary of River Bollin 6	North-west of Rostherne	SJ7379985161	Main watercourse. Channel is obviously modified and managed.	MA06	Within and to the north
Tributary of Birkin Brook 5	South of Ashley	SJ7637783870	Ordinary watercourse. Heavily modified with a channel width less than 1m.	MA06	Within
Tributary of Birkin Brook 4	Rostherne	SJ7672584066	Ordinary watercourse. Channel width less than 1m.	MA06	Within and to the south-west
Tributary of Birkin Brook 3	South of Ashley	SJ7752983794	Ordinary watercourse. Channel is culverted and realigned.	MA06	Within and to the north-east
Tributary of Birkin Brook 2	South of Ashley	SJ7806683735	Ordinary watercourse. Channel is modified and managed.	MA06	Within
Tributary of Birkin Brook 1	South of Warburton Green	SJ7739583356	Ordinary watercourse. Channel is modified and managed.	MA06	Within
Brickhill Wood Drains	South of Warburton Green	SJ7926283954	Ordinary watercourse. Channel is modified and managed.	MA06	Within and to the south
Tributary of River Bollin 2	South of Warburton Green	SJ8006284631	Ordinary watercourse. Channel is modified and managed.	MA06	Within and to the south and east
Tributary of River Bollin 3	North-west of Manchester Airport	SJ7939884404	Ordinary watercourse. Channel modified through culverts and width less than 1m.	MA06	Within
Drain to M56 1	North-west of Manchester Airport	SJ7983684584	Ordinary watercourse. Heavily modified channel.	MA06	Within
Drain to M56 2	North-west of Manchester Airport	SJ7992684734	Ordinary watercourse. Heavily modified agricultural drainage ditch.	MA06	Within
Tributary of Timperley Brook 1	North-west of Manchester Airport	SJ8029385462	Ordinary watercourse. Channel is modified though realignment and culverts.	MA06	Within and to the north-west

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Watercourse name	Location	OS grid reference – crossing point of the route of the Proposed Scheme	Feature type (and reason for scoping out)	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
Drain to M56 3	North-west of Manchester Airport	SJ8047485679	Ordinary watercourse. Channel is heavily modified.	MA06	Within
Mill Brook	North-west of Manchester Airport	SJ8129487585	Ordinary watercourse. Heavily modified and channelised in urbanised reaches.	MA07	Route tunnelled in this location. Not within the land required for the construction of the Proposed Scheme.
Baguley Brook	South of Newhall Green	SJ8217188864	Main watercourse. Heavily modified, culverted and channelised.	MA07	Route tunnelled in this location. Not within the land required for the construction of the Proposed Scheme.
Tributary of Baguley Brook	Newhall Green	SJ8228289031	Ordinary watercourse. Heavily modified through an extensive culvert and urban pressures.	MA07	Within
Round Wood Drain	Wythenshawe	SJ8244989288	Ordinary watercourse. Heavily modified through realignment.	MA07	Route tunnelled in this location. Not within the land required for the construction of the Proposed Scheme.
River Mersey	North of Northenden	SJ8320990442	Main watercourse. Channel is heavily modified through flood risk management.	MA07	Route tunnelled in this location. Not within the land required for the construction of the Proposed Scheme.
Tributary of River Mersey 2	North of Northenden	SJ8356590886	Main watercourse. Channel is heavily modified through flood risk management.	MA07	Within
Cringle Brook	East of Fallowfield	SJ8589093439	Main watercourse. Channel is heavily modified through flood risk management.	MA07	Route tunnelled in this location. Not within the land required for the construction of the Proposed Scheme.
Fallowfield Brook	East of Fallowfield	SJ8627793918	Ordinary watercourse. Channel is heavily modified through flood risk management.	MA07	Route tunnelled in this location. Not within the land required for the construction of the Proposed Scheme.

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Watercourse name	Location	OS grid reference – crossing point of the route of the Proposed Scheme	Feature type (and reason for scoping out)	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
Tributary of Platt Brook 1	North-west of Levenshulme	SJ8680494761	Ordinary watercourse. Channel is heavily modified through flood risk management.	MA07	Route tunnelled in this location. Not within the land required for the construction of the Proposed Scheme.
Gore Brook	North-west of Levenshulme	SJ8697795461	Main watercourse. Channel is heavily modified through flood risk management.	MA07	Route tunnelled in this location. Not within the land required for the construction of the Proposed Scheme.
Corn Brook	West Gorton	SJ8656697081	Ordinary watercourse. Channel is heavily modified through flood risk management.	MA07	Route tunnelled in this location. Not within the land required for the construction of the Proposed Scheme.
River Medlock	Manchester Piccadilly	SJ8542497734	Main watercourse. Channel is heavily modified through flood risk management.	MA08	Within
Shooters Brook Downstream	Manchester Piccadilly	SJ8479797978	Ordinary watercourse. Channel is heavily modified through flood risk management.	MA08	Within
Ashton Canal	Manchester Piccadilly	SJ8481198152	Canal. Heavily modified watercourse.	MA08	Within

3 River macrophyte survey

3.1 Methodology

- 3.1.1 River macrophyte surveys followed the methods described in Water Framework Directive – UKTAG River Assessment Methods – Macrophytes and Phytobenthos (River LEAFPACS³).
- 3.1.2 Desk study records for macrophyte surveys in the study area were obtained through an information request submitted to the Environment Agency. The study area considers any watercourse identified by the Environment Agency as a main river, which is crossed by the route of the Proposed Scheme. This follows the approach outlined in the FSMS for RHS survey scoping, which is summarised in Section 2.1. An information request was submitted to the Environment Agency to obtain the associated species data.
- 3.1.3 Scoping for macrophyte surveys followed the approach outlined in the FSMS for RHS surveys, which is summarised in Section 2.1.
- 3.1.4 A summary of locations where the scoping requirements were met and a macrophyte survey was undertaken is provided in Table 25. This information is cross referenced to the accompanying Ecology Map Series EC-10.

Table 25: Summary of accessible locations where river macrophyte survey was undertaken

Ecology survey code	Watercourse name	Feature type	Survey date	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
AT02_MS1_150518	River Dane	Main river	15 May 2018	MA02	Within
AT03_MS1_150518	Puddinglake Brook	Main river	15 May 2018	MA02	Within
BT02_MS1_160518	Peover Eye	Main river	16 May 2018	MA02	Within
BT04_MS1_170518	Smoker Brook	Main river	17 May 2018	MA02, MA03	Within
BT05_MS1_060619	Tributary of Smoker Brook 1	Ordinary watercourse	6 June 2019	MA02, MA03	Within
BT12_MS1_180518	Waterless Brook/Arley Brook	Main river	18 May 2018	MA03	Within
BT03_MS1_180518	Waterless Brook/Arley Brook	Main river	18 May 2018	MA03	Within

³ Water Framework Directive – United Kingdom Advisory Group (WFD-UKTAG) (2014), *UKTAG River Assessment Method Macrophytes and Phytobenthos Macrophytes (River LEAFPACS2)*, Stirling. ISBN: 978-1-906934-44-6.

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Ecology survey code	Watercourse name	Feature type	Survey date	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
BT06_MS1_010818	Millington Clough	Main river	1 August 2018	MA03, MA06	Within
DT03_MS1_040619	Coffin Lane Brook	Main river	4 June 2019	MA05	Within
BT13_MS1_050619	Agden Brook	Main river	5 June 2019	MA06	Within
BT10_MS1_020818	River Bollin	Main river	2 August 2018	MA06	Within

3.2 Deviations, constraints and limitations

- 3.2.1 Macrophyte surveys were conducted together with RHS where this was likely to add to the identification of significant ecological receptors, consistent with FSMS guidelines. Surveys were limited to locations where landowner permission had been obtained within the survey season. Where macrophyte surveys and RHS were scoped in for survey, but land access constrained a compliant RHS (500m), a macrophyte survey only may have been conducted if access to the standard survey length of 100m was granted. Macrophyte surveys require physical access to the river channel, so health and safety concerns or other physical restrictions constrained macrophyte surveys where RHS was conducted from the riverbank.
- 3.2.2 Heavy bank-side vegetation and steep banks constrained physical access to the channel. Health and safety concerns constrained surveys on the River Bollin. Here, the presence of giant hogweed, fast flows, a deep channel and steep banks constrained physical access to the river channel.
- 3.2.3 A summary of locations where the requirement for river macrophyte survey was identified, but where surveys were not conducted due to inadequate access, is provided in Table 26.

Table 26: Summary of locations in MA01 to MA08 that were scoped in, but where inadequate access was available for survey

Watercourse name	Location	OS grid reference – crossing point of the route of the Proposed Scheme	Feature type	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
River Dane	North-east of Winsford and north-west of Middlewich	SJ6820568789	Main river	MA02	Within and to the east
Wade Brook	East of Northwich and south of Lostock Gralam	SJ6957274284	Main river	MA02	Within
Red Brook	West of Partington and next to the Manchester	SJ7013790846	Main river	MA04	Within and to the east and west

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Watercourse name	Location	OS grid reference – crossing point of the route of the Proposed Scheme	Feature type	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
	Ship Canal				
River Bollin	North-east of Lymm and west of Altrincham	SJ7105688134	Main river	MA04	Within and to the east and north-west
Coffin Lane Brook	North of Golborne and west of Leigh	SD6016700994	Main river	MA05	Within and to the east and west
Windy Bank Brook	North of Golborne and west of Leigh	SJ6046099742	Ordinary watercourse	MA05	Within and to the east and west
Nan Holes Brook	North of Golborne and west of Leigh	SD6080200085	Main river	MA05	Within and to the east and west
Blackburn's Brook	South of Altrincham and east of Rostherne Mere	SJ7553084556	Main river	MA06	Within and to the north and south
Birkin Brook	South of Altrincham and east of Rostherne Mere	SJ7578184456	Main river	MA06	Within and to the south
Mobberley Brook	South of Ashley	SJ7678083213	Main river	MA06	Within
Sugar Brook	South of Ashley	SJ7684583289	Main river	MA06	Within
Tributary of Birkin Brook 1	South of Altrincham and east of Rostherne Mere	SJ7734183533	Main river	MA06	Within and to the east and west
Timperley Brook	South-east of Altrincham and north-west of Manchester Airport	SJ8055486060	Main river	MA06	Within and to the west
Fairywell Brook	South-east of Altrincham and north-west of Manchester Airport	SJ8085886760	Main river	MA06, MA07	Within and to the north-west and south-east

3.3 Baseline

Desk study

- 3.3.1 Environment Agency macrophyte survey data was used to inform the desk study. Environment Agency data analysis is based on various indices that include the River Macrophyte Hydraulic Index (RMHI), River Macrophyte Nutrient Index (RMNI), Mean Trophic Rank (MTR) and Mean Flow Rank (MFR) scores. These indices provide an indication of the condition of the river. The desk study data obtained is presented in Table 27.

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Table 27: Environment Agency macrophyte survey data for sites closest to the Proposed Scheme

Water body	EA site name	Grid reference	Sample date	MTR score	MFR score	CA	Distance from land required for the construction of the Proposed Scheme (m) and orientation
Basford Brook	Basford (U/S British Rail)	SJ7242652433	10 September 2004	31.1	1.9	MA01	343m south-west
Valley Brook	U/S Macon Way	SJ7123455247	21 September 2016	45	1.5	MA01	315m north
Puddinglake Brook	PTC River Dane	SJ6760970641	14 August 2013	35	1.5	MA02	316m west
Wade Brook	Wade Brook – at works	SJ6851974344	1 September 2015	37.5	1.3	MA02	165m west
Peover Eye	Peover Eye, Holford Hall, D/S Plumley	SJ7073375597	27 August 2015	35	2	MA02	235m south-east
Smoker Brook	PTC. Peover Eye	SJ7029775970	27 August 2015	34.4	2.1	MA02	Within
River Bollin	Bollin, Warburton Mill, Heatley (KP)	SJ7023088755	12 August 2015	31.5	2	MA04	1m west
Red Brook	U/S Partington Road Bridge, PTC M.S.C.	SJ7130490420	28 August 2015	38.9	1.7	MA04	600m south-east
Birkin Brook	Birkin Brook - PTC R Bollin	SJ7504085285	19 August 2013	25	1.8	MA06	Within
Sugar Brook	PTC Moberley Brook	SJ7687383267	20 September 2012	20	2	MA06	Within
River Bollin	Sunny Bank Lane	SJ7949884217	18 September 2012	37.3	2	MA06	Within
Cringle Brook	Chorlton BK PTC Cringle BK	SJ8425293853	3 July 2015	15	1.6	MA07	1.8km west
River Medlock	Medlock Pinmill Brow	SJ8578697815	8 October 2012	10	1.5	MA08	Within

Hough to Walley's Green (MA01)

Basford Brook

- 3.3.2 The macrophyte assemblage in Basford Brook (U/S British Rail), in September 2004, comprised six scoring taxa. No species data were available for this watercourse. The macrophyte assemblage is indicative of a site either damaged by eutrophication or at risk of becoming eutrophic (MTR score of 31.1).

Valley Brook

- 3.3.3 The macrophyte assemblage in Valley Brook (U/S Macon Way), in September 2016, comprised three scoring taxa. No invasive, non-native species (INNS) or red data book (RDB) species were recorded. Common duckweed (*Lemna minor*), European speedwell (*Veronica beccabunga*) and reed canary grass (*Phalaris arundinacea*) were the most abundant taxa recorded. The macrophyte assemblage is indicative of a site either damaged by eutrophication or at risk of becoming eutrophic (MTR score of 45).

Wimboldsley to Lostock Gralam (MA02)

Puddinglake Brook

- 3.3.4 The macrophyte assemblage in Puddinglake Brook (PTC River Dane), in August 2013, comprised four scoring taxa. No INNS or RDB species were recorded. Hairy willowherb (*Epilobium hirsutum*), common duckweed, European speedwell and European bur-reed (*Sparganium emersum*) were the most abundant taxa recorded. The macrophyte assemblage is indicative of a site either damaged by eutrophication or at risk of becoming eutrophic (MTR score of 35).

Wade Brook

- 3.3.5 The macrophyte assemblage in Wade Brook (Wade Brook – at works), in September 2015, comprised seven scoring taxa. No INNS or RDB species were recorded. Common reed (*Phragmites australis*), reed canary grass, common duckweed and fool's water-cress (*Apium nodiflorum*) were the most abundant taxa recorded. The macrophyte assemblage is indicative of a site either damaged by eutrophication or at risk of becoming eutrophic (MTR score of 37.5).

Peover Eye

- 3.3.6 The macrophyte assemblage in Peover Eye (Peover Eye, Holford Hall, D/S Plumley), in August 2015, comprised three scoring taxa. Two INNS were recorded: annual honesty (*Lunaria annua*) and Himalayan balsam. No RDB species were recorded, though unidentified species of *Fissidens* and *Ranunculus* genera, both of which contain notable and non-notable species,

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were recorded. Common water-moss (*Fontinalis antipyretica*), water forget-me-not (*Myosotis scorpioides*) and common duckweed were the most abundant taxa recorded. The macrophyte assemblage is indicative of a site either damaged by eutrophication or at risk of becoming eutrophic (MTR score of 35).

Smoker Brook

- 3.3.7 The macrophyte assemblage in Smoker Brook (PTC Peover Eye), in August 2015, comprised 15 scoring taxa. One INNS was recorded, which was Himalayan balsam. No RDB species were recorded, though an unidentified species of *Fissidens* genus was recorded at Smoker Brook. Common water-moss, European speedwell, reed canary grass, European bur-reed and green algae (*Cladophora glomerata*) were the most abundant taxa recorded. The macrophyte assemblage is indicative of a site either damaged by eutrophication or at risk of becoming eutrophic (MTR score of 34.4).

Pickmere to Agden and Hulseheath (MA03)

- 3.3.8 There are no Environment Agency macrophyte monitoring data within the Pickmere to Agden and Hulseheath area.

Broomedge to Glazebrook (MA04)

River Bollin

- 3.3.9 The macrophyte assemblage in the River Bollin (Bollin, Warburton Mill, Heatley (KP)), between 2006 and 2015, comprised 14 scoring taxa. No INNS or RDB species were recorded, though unidentified species of *Fissidens* and *Ranunculus* genera were recorded, both of which contain notable and non-notable species. Long-beaked water feathermoss (*Platyhypnidium riparioides*), spiked water-milfoil (*Myriophyllum spicatum*), sago pondweed (*Potamogeton pectinatus*) and water pepper (*Persicaria hydropiper*) were the most abundant taxa recorded. The macrophyte assemblage is indicative of a site either damaged by eutrophication or at risk of becoming eutrophic (MTR score of 31.5).

Red Brook

- 3.3.10 The macrophyte assemblage in Red Brook (U/S Partington Road Bridge, PTC M.S.C.), in August 2015, comprised six scoring taxa. No species data were available for this watercourse. The macrophyte assemblage is indicative of a site either damaged by eutrophication or at risk of becoming eutrophic (MTR score of 38.9).

Risley to Bamfurlong (MA05)

- 3.3.11 There are no Environment Agency macrophyte monitoring data within the Risley to Bamfurlong area.

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Hulseheath to Manchester Airport (MA06)

Birkin Brook

- 3.3.12 The macrophyte assemblage in Birkin Brook (Birkin Brook - PTC R Bollin), in August 2013, comprised four scoring taxa. One INNS was recorded, which was Himalayan balsam. No RDB species were recorded and spiked water-milfoil, slim sedge (*Carex acuta*), swamp sedge (*Carex acutiformis*), Canadian pondweed (*Elodea canadensis*) and common duckweed were the most abundant taxa recorded. The macrophyte assemblage is indicative of a site either damaged by eutrophication or at risk of becoming eutrophic (MTR score of 25).

Sugar Brook

- 3.3.13 The macrophyte assemblage in Sugar Brook (PTC Mobberley Brook), in September 2012, comprised three scoring taxa. No species data were available for this watercourse. The macrophyte assemblage is indicative of a site damaged either by eutrophication, organic pollution, toxicity or physical damage (MTR score of 20).

River Bollin

- 3.3.14 The macrophyte assemblage in the River Bollin (Sunny Bank Lane), in September 2012, comprised two scoring taxa. Three INNS were recorded: Himalayan balsam, Japanese knotweed and giant hogweed. No RDB species were recorded, and star duckweed (*Lemna trisulca*) was the most abundant taxa. The macrophyte assemblage is indicative of a site either damaged by eutrophication or at risk of becoming eutrophic (MTR score of 37.3).

Davenport Green to Ardwick (MA07)

Cringle Brook

- 3.3.15 The macrophyte assemblage in Cringle Brook (Chorlton BK PTC Cringle BK), in July 2015, comprised four scoring taxa. No species data was available for this watercourse. The macrophyte assemblage is indicative of a site badly damaged either by eutrophication, organic pollution, toxicity or physical damage (MTR score of 15).

Manchester Piccadilly Station (MA08)

River Medlock

- 3.3.16 The macrophyte assemblage in the River Medlock (Medlock Pinmill Brow), in October 2012, comprised two scoring taxa. No species data was available for this watercourse. The macrophyte assemblage is indicative of a site badly damaged either by eutrophication, organic pollution, toxicity or physical damage (MTR score of 10).

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Survey data

3.3.17 Baseline data relating to river macrophyte data for MA01 to MA08 are provided in Table 28.

Table 28: A summary of the river macrophyte survey baseline data

Ecology survey code	Centroid OS grid reference	Survey date	Description	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
AT02_MS1_150518	SJ6770769585	15 May 2018	The River Dane was severely modified in the surveyed reach. Three macrophyte species were recorded: fennel pondweed (<i>Potamogeton pectinatus</i>), river water-crowfoot (<i>Ranunculus fluitans</i>) and European speedwell. Overall macrophyte coverage was 75% of the surveyed reach.	MA02	Within
AT03_MS1_150518	SJ68843370071	15 May 2018	Puddinglake Brook was severely modified in the surveyed reach. No macrophyte species were recorded.	MA02	Within
BT02_MS1_160518	SJ7021975684	16 May 2018	Peover Eye was severely modified and heavily shaded in the surveyed reach, typical of this watercourse within the land required for the construction of the Proposed Scheme. No macrophyte species were recorded.	MA02	Within
BT04_MS1_170518	SJ7041760260	17 May 2018	Smoker Brook was severely modified and heavily shaded in the surveyed reach, typical of this watercourse within the land required for the construction of the Proposed Scheme. No macrophyte species were recorded.	MA02, MA03	Within
BT05_MS1_060619	SJ7022576146	6 June 2019	Tributary of Smoker Brook 1 was obviously modified in the surveyed reach. Three macrophyte species were recorded: watercress (<i>Rorippa nasturtium-aquaticum</i>), greater yellowcress (<i>Rorippa</i>	MA02, MA03	Within

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Ecology survey code	Centroid OS grid reference	Survey date	Description	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
			<i>amphibia</i>) and green algae (<i>Cladophora glomerata</i>). Overall macrophyte coverage was 6% of the surveyed reach.		
BT03_MS1_180518	SJ7068778681	18 May 2018	Waterless Brook/Arley Brook was severely modified and heavily shaded in the surveyed reach, typical of this watercourse within the land required for the construction of the Proposed Scheme. No macrophyte species were recorded.	MA03	Within
BT12_MS1_180518	SJ7032975995	18 May 2018	Waterless Brook/Arley Brook was severely modified and heavily shaded in the surveyed reach, typical of this watercourse within the land required for the construction of the Proposed Scheme. No macrophyte species were recorded.	MA03	Within
BT06_MS1_010818	SJ7221584169	1 May 2018	Millington Clough was significantly modified in the surveyed reach. No macrophytes were recorded in the surveyed reach.	MA03, MA06	Within
DT03_MS1_040619	SD6016600994	4 June 2019	Five macrophyte species were recorded in Coffin Lane Brook: water hemlock, water starwort (<i>Callitriche sp.</i>), reed canary grass and jointleaf rush (<i>Juncus articulatus</i>). Overall macrophyte coverage was 91% of the surveyed reach.	MA05	Within
BT13_MS1_050619	SJ7251084726	5 June 2019	Nine macrophyte species were recorded in Agden Brook: European speedwell, floating sweet-grass (<i>Glyceria fluitans</i>), fool's water-cress, great manna grass (<i>Glyceria maxima</i>), water hemlock (<i>Oenanthe crocata</i>), water pepper, reed canary grass,	MA06	Within

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Ecology survey code	Centroid OS grid reference	Survey date	Description	CA	Distance from the land required for the construction of the Proposed Scheme (m) and orientation
			watercress and green algae. Overall macrophyte coverage was 25% of the surveyed reach.		
BT10_MS1_020818	SJ7936784239	2 May 2018	Five macrophyte species were recorded in the surveyed reach of the River Bollin. These were: floating sweet-grass (<i>Glyceria fluitans</i>), river water-crowfoot, fat duckweed (<i>Lemna gibba</i>), common duckweed and fennel pondweed. Overall macrophyte coverage was 75% of the surveyed reach.	MA06	Within

Hough to Walley's Green (MA01)

- 3.3.18 No detailed aquatic macrophyte surveys were scoped in for MA01. No suitable watercourses were identified.

Wimboldsley to Lostock Gralam (MA02)

River Dane

- 3.3.19 The River Dane (AT02_MS1_150518) will be crossed twice by the route of the Proposed Scheme. Detailed macrophyte surveys were scoped in at both locations. One of these surveys, located east of Bostock Hall, was constrained by physical access to the river channel. This is outlined in Section 3.2. At the crossing point located north-east of Bostock Hall, the River Dane was surveyed from one side of the bank. Access to the opposite river bank was constrained, in parts. The watercourse in this reach was deep, with large piles of woody debris and some urban trash. Three macrophyte species were recorded: fennel pondweed, river water-crowfoot and European speedwell. None of these species are considered notable. The final macrophyte Ecological Quality Ratio (EQR) score of 0.287 is the equivalent of Poor WFD status, indicating nutrient input was causing, or likely to cause, eutrophication.

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Puddinglake Brook

- 3.3.20 Puddinglake Brook (AT03_MS1_150518) will be crossed by the route of the Proposed Scheme at Whatcroft, where a detailed survey was undertaken. The watercourse was accessed from both banks, as well as in-channel. The majority of the watercourse was accessible for survey, though some parts were densely vegetated with bankside vegetation. No macrophyte species were recorded in this reach, only terrestrial species touching the water from the bankside.

Peover Eye

- 3.3.21 Peover Eye (BT02_MS1_160518) will be crossed by the route of the Proposed Scheme south-east of Higher Wincham, where a detailed survey was undertaken. The watercourse was accessed from the right-hand bank, through woodland. The watercourse was fast flowing in parts, with many debris-dams recorded. The channel substrate was noted as unstable in places, with sandy and silty sediment. No macrophyte species were recorded in this reach. This watercourse was heavily shaded at the crossing point of the route of the Proposed Scheme, making it unsuitable for macrophyte growth.

Smoker Brook

- 3.3.22 Smoker Brook (BT04_MS1_170518) will be crossed by the route of the Proposed Scheme east of Higher Wincham, where a detailed survey was undertaken. The watercourse was accessed from the both banks and in-channel. The watercourse, which was set in woodland, was deep in sections where pools had formed. The sediment was cobbles and fine grains, with a number of discrete sediment deposit beds noted. No macrophyte species were recorded in this reach, only terrestrial species. The watercourse was heavily shaded in this reach, making it unsuitable for macrophyte growth.

Tributary of Smoker Brook 1

- 3.3.23 Tributary of Smoker Brook 1 (BT05_MS1_060619) will be crossed by the land required for the construction of the Proposed Scheme east of Higher Wincham, where a detailed survey was undertaken. The watercourse flows through an area of woodland, with shading throughout. A small section of the watercourse is culverted. Very few aquatic plants were present in the channel or wetted zone. Watercress, greater yellowcress and green algae were recorded in this watercourse. None of these species are considered notable. The final macrophyte EQR score of 0.127 is the equivalent of Bad WFD status, indicating likely impacts of nutrient enrichment.

Pickmere to Agden and Hulseheath (MA03)

Waterless Brook/Arley Brook

- 3.3.24 Waterless Brook/Arley Brook (BT03_MS1_180518) will be crossed by the route of the Proposed Scheme north-east of Pickmere, where a detailed survey was undertaken. The watercourse was fast flowing and dominated by deep water. Sediment was silty and unstable in most locations. The channel was heavily shaded in the surveyed reach that limited macrophyte growth. No macrophytes were recorded in this reach, though they were noted in the fast flowing, deep sections where they could not be accessed.
- 3.3.25 An additional survey on Waterless Brook/Arley Brook (BT12_MS1_180518) downstream of the route of the Proposed Scheme was conducted. However, the channel here was also heavily shaded and no macrophytes were recorded.

Millington Clough

- 3.3.26 Millington Clough (BT06_MS1_010819) will be crossed by the route of the Proposed Scheme south-west of Booth Bank where a detailed macrophyte survey was undertaken. The banks were noted as unstable and made of earth. Banks were poached from livestock along the reach. No macrophyte species were recorded in this reach.

Broomedge to Glazebrook (MA04)

- 3.3.27 No detailed macrophyte surveys were conducted in MA04 due to access constraints, as detailed in Section 3.2.

Risley to Bamfurlong (MA05)

Coffin Lane Brook

- 3.3.28 Coffin Lane Brook (DT03_MS1_040619) will be crossed by the route of the Proposed Scheme north-east of Ashton-In-Makerfield. Very few aquatic species were present on this watercourse, which was dominated by terrestrial species in the riparian zone. There was a high coverage of blanketweed throughout the survey reach and the final 15m of the reach was heavily overgrown, which limited physical access to the watercourse. Green algae, water hemlock, water starwort, reed canary grass and jointleaf rush were recorded on this watercourse. None of these species are considered notable. The final macrophyte EQR score of 0.28 is equivalent of Poor WFD status, indicating eutrophic nutrient conditions.

Hulseheath to Manchester Airport (MA06)

Agden Brook

- 3.3.29 Agden Brook (BT13_MS1_050619) will be crossed by the route of the Proposed Scheme south of Booth Bank. Limited in-channel diversity was recorded. European speedwell, floating sweet-grass, fool's water-cress, great manna grass, water hemlock, water pepper, reed canary grass, watercress and green algae were recorded. None of these species are considered notable. The final macrophyte EQR score of 0.439 is equivalent to Moderate WFD status, indicating mesotrophic to eutrophic nutrient conditions.

River Bollin

- 3.3.30 The River Bollin (BT10_MS1_020818) will be crossed by the route of the Proposed Scheme south of Warburton Green, where a detailed macrophyte survey was undertaken. The watercourse was fast flowing and deep but in several places the channel was shallow enough to be crossed. Five macrophyte species were recorded in the surveyed reach: floating sweet-grass, river water-crowfoot, fat duckweed, common duckweed and fennel pondweed. None of these species are considered notable. The final macrophyte EQR score of 0.262 is equivalent to Poor WFD status, indicating nutrient input was causing, or likely to cause, eutrophication.

Davenport Green to Ardwick (MA07)

Fairywell Brook

- 3.3.31 Fairywell Brook will be crossed by the route of the Proposed Scheme north-east of Davenport Green. The channel here was dry in 2019. No surveys could be conducted.

Manchester Piccadilly Station (MA08)

- 3.3.32 No detailed aquatic macrophyte surveys were scoped in for MA08.

3.4 Watercourses scoped out of the requirement for river macrophyte survey

- 3.4.1 The screening criteria used to scope river macrophyte surveys were consistent with those used to screen for RHS.
- 3.4.2 Watercourses for which the need for river macrophyte surveys were scoped out are listed in Table 24 within Section 2.4, with reasons for the exclusions in each case.

4 Ditch vegetation

4.1 Methodology

- 4.1.1 Details of the standard methodology used for ditch vegetation surveys are provided in the FSMS.
- 4.1.2 No ditches were identified for survey in MA01, MA07 and MA08. Seven ditches were scoped in for vegetation surveys, but no surveys were undertaken as watercourses were found to be dry or identified as streams, rather than ditches. Where ditches were identified as streams, a macrophyte survey was conducted where the watercourse had been scoped in.

4.2 Deviations, constraints and limitations

- 4.2.1 Seven ditches were identified for survey in MA01 to MA08, of which five were dry and two were streams: Gad Brook (MA02) and Millington Clough (MA06).

4.3 Baseline

Hough to Walley's Green (MA01)

- 4.3.1 No ditch habitat was identified within or adjacent to the land required for the construction of the Proposed Scheme.

Wimboldsley to Lostock Gralam (MA02)

- 4.3.2 A single ditch was identified, from desk study, within the land required for the construction of the Proposed Scheme in MA02. The ditch was identified as Gad Brook by surveyors and therefore not suitable for ditch survey methodology. Aquatic invertebrate surveys were scoped in for this watercourse, but it was not considered suitable for macrophyte survey under FSMS guidance.

Pickmere to Agden and Hulseheath (MA03)

- 4.3.3 Two ditches were identified within the land required for the construction of the Proposed Scheme in MA03. Both were dry at the time of survey.

Broomedge to Glazebrook (MA04)

- 4.3.4 A single ditch was identified within the land required for the construction of the Proposed Scheme in MA04. This ditch was dry at the time of survey.

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Risley to Bamfurlong (MA05)

- 4.3.5 A single ditch was identified within the land required for the construction of the Proposed Scheme MA05. This ditch was dry at the time of survey.

Hulseheath to Manchester Airport (MA06)

- 4.3.6 Two ditches were identified within the land required for the construction of the Proposed Scheme in MA06. One of these ditches was dry at the time of survey. The other was identified as Millington Clough by surveyors and therefore deemed unsuitable for ditch survey methodology. Millington Clough was scoped in for river macrophyte survey, see Section 3.

Davenport Green to Ardwick (MA07)

- 4.3.7 No ditch habitat was identified within or adjacent to the land required for the construction of the Proposed Scheme.

Manchester Piccadilly Station (MA08)

- 4.3.8 No ditch habitat was identified within or adjacent to the land required for the construction of the Proposed Scheme.

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5 References

Buglife (2013), *Manual for the Survey and Evaluation of the Aquatic Plant and invertebrate Assemblages of Grazing Marsh Ditch Systems*, Version 6.

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