In Parliament – Session 2021 - 2022

HS2

High Speed Rail (Crewe – Manchester)

Background information and data

Water resources and flood risk

BID WR-004-0MA06

MA06: Hulseheath to Manchester Airport

Water resources assessment baseline data

M320

HS2

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Water resources assessment baseline data

M320

Department for Transport

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1 Introduction

1.1.1 This document presents baseline data relating to the water resources assessment that has been undertaken for the Proposed Scheme.

1.1.2 The data has been collected in relation to the Hulseheath to Manchester Airport area (MA06).

1.1.3 The Environmental Statement[1] should be referred to for details of:

- the Water Framework Directive (WFD) compliance assessment (Volume 3: Route-wide effects and Volume 5: Appendix WR-001-00000);
- the water resources assessments and flood risk assessments that are reported per community area (Volume 5: Appendices WR-003-0MA06 and WR-005-0MA06);
- the hydraulic modelling reports that support the flood risk assessments (Volume 5: Appendix WR-006-00007); and
- a Draft water resources operation and maintenance plan (Volume 5: Appendix WR-007-00000).

1.1.4 Additional information is also included in Background Information and Data (BID), WFD compliance assessment baseline data that is reported for the Proposed Scheme (BID WR-002-00001).

1.1.5 Maps referred to throughout this document are set out in the in Volume 5, Water resources and flood risk Map Book: Map Series WR-01 and WR-02[2].

1.1.6 Unless indicated otherwise, the spatial scope of the assessment (the study area) is based upon the identification of surface water and groundwater features within 1km of the route of the Proposed Scheme. In the Hulseheath to Manchester Airport area, the study area has been extended to include the springs and watercourses that feed into Rostherne Mere Ramsar site, Site of Special Scientific Interest (SSSI) and National Nature Reserve (NNR).

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

[2] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement. Volume 5 Water resources and flood risk Map Book*. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement.

2 Baseline data

2.1 Surface water

2.1.1 The surface water features potentially affected by the Proposed Scheme, including their location, current overall WFD status, and future overall status objectives, are shown in Table 1; further details are set out in the Water Framework Directive compliance assessment baseline data (BID WR-002-00001). The receptor values attributed to each individual watercourse, based on the methodologies set out in Environmental Impact Assessment Scope and Methodology Report (SMR)[3], are also provided.

2.1.2 Those surface water features potentially affected by groundwater interactions are described separately in Section 2.3.

Table 1: Surface water body receptors

Water body name and location[4]	Type (at point closest to the Proposed Scheme)[5]	Q95 value (m^3/s)[6]	Receptor value	Parent WFD water body name and identification number[7]	Current WFD status/ objective[8]	2019 Status
Millington Clough WR-01-308b – B6	Main river	0.004	High	Bollin (Ashley Mill to Manchester Ship Canal) GB112069061382	Moderate/ Moderate by 2015	Moderate
Agden Brook WR-01-308b – B5	Main river	0.01	Moderate			
Tributary of River Bollin 10 WR-01-308b – D4	Ordinary watercourse	<0.002	Moderate			
Tributary of River Bollin 11	Main river	0.003	Moderate			

[3] 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.

[4] The feature locations are indicated by the grid coordinates on the relevant Volume 5, Water resources and flood risk Map Book, Map Series WR-01.

[5] The term 'minor ditch' has been used to denote a small trench or drain that has been constructed for the purpose of draining water from the land or roads and is isolated from the wider river network.

[6] This is the flow within the watercourse that is exceeded for 95% of the time. The Q95 has been provided as an indication of watercourse size but is only one of several criteria used to inform receptor value. Other criteria include the WFD watercourse classification which takes into account the value of any habitat which the watercourse supports. Details are provided in the SMR.

[7] The Environment Agency has attributed each surface water and groundwater body a unique water body identification (ID) number.

[8] Status and objectives are based on those set out in the current river basin management plan. Environment Agency (2015), *River Basin Management Plan, North West River Basin District.* Available online at: https://www.gov.uk/government/publications/north-west-river-basin-district-river-basin-management-plan.

Water body name and location[4]	Type (at point closest to the Proposed Scheme)[5]	Q95 value (m^3/s)[6]	Receptor value	Parent WFD water body name and identification number[7]	Current WFD status/ objective[8]	2019 Status
WR-01-308b – D4						
Rostherne Mere WR-01-308b – D6	Static water body	N/A	High	Rostherne Mere GB31232650	Bad/Good by 2027	Bad
Rostherne Brook WR-01-308b – D8	Main river	0.01	Moderate	Birkin Brook - Mobberley Brook to River Bollin (including Rostherne Brook) GB112069061370	Bad/ Moderate by 2027	Bad
Yarwood Heath Drain WR-01-308b – D4	Minor ditch	<0.002	Low			
Blackburn's Brook WR-01-308b – E6	Main river	0.02	Moderate			
Tributary of Blackburn's Brook WR-01-308b – E6	Main River	0.002	Moderate			
Birkin Brook WR-01-308b – F6	Main river	0.1	High	Birkin Brook - Source to Mobberley Brook GB112069061340	Poor/ Moderate by 2027	Poor
Tributary of Birkin Brook 9 WR-01-308b – F5	Main river	<0.002	Low	Birkin Brook - Mobberley Brook to River Bollin (including Rostherne Brook) GB112069061370	Bad/ Moderate by 2027	Bad
Tributary of Birkin Brook 8 WR-01-308b – F6	Ordinary watercourse	<0.002	Low			
Tributary of Birkin Brook 7 WR-01-308b – F6	Ordinary watercourse	<0.002	Low			
Tributary of Birkin Brook 6 WR-01-308b – F6	Ordinary watercourse	<0.002	Low			
Tributary of Birkin Brook 5 WR-01-308b – F6	Ordinary watercourse	<0.002	Low			
Tributary of Birkin Brook 4 WR-01-308b – G6	Ordinary watercourse	<0.002	Low			
Tributary of Birkin Brook 1 WR-01-308b – G7	Main river	<0.002	Moderate			
Mobberley Brook WR-01-308b – G8	Main river	0.04	Moderate	Mobberley Brook GB112069061330	Moderate by 2027	Moderate
Tributary of Sugar Brook WR-01-308b – H9	Main river	<0.002	Moderate	Sugar Brook GB112069061350	Moderate/ Good for 2027	Moderate

Water body name and location[4]	Type (at point closest to the Proposed Scheme)[5]	Q95 value (m^3/s)[6]	Receptor value	Parent WFD water body name and identification number[7]	Current WFD status/ objective[8]	2019 Status
Sugar Brook WR-01-308b – H9	Main river	0.01	Moderate			
Tributary of Mobberley Brook WR-01-308b – H10	Main river	<0.002	Moderate	Mobberley Brook GB112069061330	Moderate by 2027	Moderate
Tributary of Birkin Brook 3 WR-01-308b – G8	Ordinary watercourse	<0.002	Low	Birkin Brook - Mobberley Brook to River Bollin (including Rostherne Brook) GB112069061370	Bad/ Moderate by 2027	Bad
Tributary of Birkin Brook 2 WR-01-308b – H6	Ordinary watercourse	<0.002	Low			
Brickhill Wood Drains WR-01-308b – I7	Minor ditch	<0.002	Low			
Tributary of River Bollin 7 WR-01-308b – H5	Ordinary watercourse	<0.002	Moderate	Bollin (River Dean to Ashley Mill) GB112069061381	Moderate/ Moderate by 2015	Moderate
Tributary of River Bollin 6 WR-01-308b – I5	Ordinary watercourse	<0.002	Moderate			
River Bollin WR-01-309a – B7	Main river	0.3	Very high			
Tributary of River Bollin 4 WR-01-309a – B6	Ordinary watercourse	<0.002	Moderate			
Tributary of River Bollin 8 WR-01-309a – B5	Ordinary watercourse	<0.002	Moderate			
Tributary of River Bollin 3 WR-01-309a – B7	Ordinary watercourse	<0.002	Moderate			
Tributary of River Bollin 2 WR-01-309a – B7	Ordinary watercourse	<0.002	Moderate			
Tributary of River Bollin 1 WE-01-309a – B7	Ordinary watercourse	<0.002	Moderate			
Cotteril Clough Brook WR-01-309a – B8	Ordinary watercourse	0.003	Moderate			
Tributary of River Bollin 5	Ordinary watercourse	<0.002	Moderate			

Water body name and location[4]	Type (at point closest to the Proposed Scheme)[5]	Q95 value (m^3/s)[6]	Receptor value	Parent WFD water body name and identification number[7]	Current WFD status/ objective[8]	2019 Status
WR-01-309a – B6						
Drain to M56 1 WR-01-309a – B7	Minor ditch	<0.002	Low	Timperley Brook GB112069061260	Moderate/ Good by 2027	Moderate
Drain to M56 2 WR-01-309a – B8	Minor ditch	<0.002	Low			
Tributary of River Bollin 9 WR-01-309a – C5	Ordinary watercourse	<0.002	Moderate	Bollin (River Dean to Ashley Mill) GB112069061381	Moderate/ Moderate by 2015	Moderate
Tributary of Timperley Brook 1 WR-01-309a – D6	Ordinary watercourse	<0.002	Low	Timperley Brook GB112069061260	Moderate/ Good by 2027	Moderate
Drain to M56 3 WR-01-309a – D6	Minor ditch	<0.002	Low	Bollin (River Dean to Ashley Mill) GB112069061381	Moderate/ Moderate by 2015	Moderate
Timperley Brook WR-01-309a – D5	Main river	0.003	Moderate	Timperley Brook GB112069061260	Moderate/ Good by 2027	Moderate
Tributary of Timperley Brook 2 WR-01-309a – D5	Ordinary watercourse	<0.002	Moderate			
Tributary of Timperley Brook 3 WR-01-309a – D5	Ordinary watercourse	<0.002	Low			

2.1.3 Table 2 summarises the surface water abstractions potentially affected by the Proposed Scheme. Their locations are shown on Volume 5, Water resources and flood risk Map Book: map WR-01-308b and WR-01-309a[2]. There are two licensed surface water abstractions in this area. The Estate Office, Rostherne abstraction is assessed to be a high value receptor and the Ringway Golf Club abstraction is assessed to be moderate value receptor. None of these abstractions are for public water supply (PWS). One of these is located within the land required for the construction of the Proposed Scheme.

2.1.4 Records of private unlicensed surface water abstractions, that comprise those for quantities less than $20m^3$ per day, have been obtained from the local authorities. This data indicates that there are no registered private unlicensed surface water abstractions within the study area. As there is no obligation to register private water supplies, unregistered private surface water supplies may be present. Private water supplies will be assessed as high value receptors unless details obtained from the owner indicate otherwise.

Table 2: Surface water abstractions

Name, licence number (and map grid square)[2]	Distance and direction from route	Abstraction source	Maximum annual abstraction quantity (m^3)	Maximum daily abstraction quantity (m^3)	Purpose
Private licensed water supplies					
Estate Office, Rostherne, Knutsford 2569020032 WR-01-308b – F5	45m south of the route of the Proposed Scheme (located within the land required for construction of the Proposed Scheme)	Birkin Brook at Mereside Farm Mere	4,500	400	Spray irrigation-direct
Ringway Golf Club, Altrincham 2569017036/R02 WR-01-309a – C5	990m west of the route of the Proposed Scheme (305m west of the land required for construction of the Proposed Scheme)	Underground storage tank fed by local surface drainage	5,000	60	Spray irrigation-direct

2.1.5 There are 21 permitted discharges to surface water potentially affected by the Proposed Scheme, as shown in Table 3, one of which is within the land required for the construction of the Proposed Scheme. These have been assessed as low value receptors.

Table 3: Permitted discharges to surface water

Permit identifier (and map grid square)	Distance and direction from route	Discharge type	Receiving water body
016892564 WR-01-308b – B6	180m north west of the route of the Proposed Scheme (25m north of the land required for construction of the Proposed Scheme)	Sewage discharge - final/treated effluent (not water company)	Tributary of Millington Clough 4
016892417 WR-01-308b – B4	500m north west of the route of the Proposed Scheme (located within the land required for construction of the Proposed Scheme)	Sewage discharge - final/treated effluent (not water company)	Agden Brook
016991418 WR-01-308b – C6	660m south east of the route of the Proposed Scheme (95m south-east of the land required for construction of the Proposed Scheme)	Sewage discharge - final/treated effluent (not water company)	River Bollin
016940002 WR-01-308b – G4	720m north east of the route of the Proposed Scheme (150m north-east of the land required for construction of the Proposed Scheme)	Sewage discharge - final/treated effluent (water company)	River Bollin
01TRA0053 WR-01-308b – G4	760m north-east of the route of the Proposed Scheme (located adjacent to the land required for construction of the Proposed Scheme)	Sewage discharges - storm overflow/storm tank (water company)	River Bollin

Permit identifier (and map grid square)	Distance and direction from route	Discharge type	Receiving water body
016910022 WR-01-308b – G5	670m north-east of the route of the Proposed Scheme (60m west of the land required for construction of the Proposed Scheme)	Sewage discharge - final/treated effluent (water company)	Tributary of Birkin Brook 9
016981478 WR-01-308b – G6	360m north of the route of the Proposed Scheme (40m east of the land required for construction of the Proposed Scheme)	Miscellaneous discharges - emergency discharges	Tributary of Birkin Brook 3
01MAC0076 WR-01-308b – G6	360m north of the route of the Proposed Scheme (40m east of the land required for construction of the Proposed Scheme)	Sewage discharges - storm overflow/storm tank (water company)	Tributary of Birkin Brook 3
0171/1482 WR-01-308b – H6	445m north of the route of the Proposed Scheme (located adjacent to the land required for construction of the Proposed Scheme)	Sewage discharge - final/treated effluent (not water company)	Tributary of Birkin Brook 3
016982142 WR-01-308b – H6	335m north-east of the route of the Proposed Scheme (100m south of the land required for construction of the Proposed Scheme)	Miscellaneous discharges - emergency discharges	Tributary of Birkin Brook 3
016891704 WR-01-308b – I7	570m south-east of the route of the Proposed Scheme (190m south of the land required for construction of the Proposed Scheme)	Sewage discharge - final/treated effluent (not water company)	Brickhill Wood Drains
016982808 WR-01-309a – B5	970m north-west of the route of the Proposed Scheme (560m north-west of the land required for construction of the Proposed Scheme)	Pumping station on sewerage network (water company)	River Bollin
01TRA0030 WR-01-309a – B7	250m north-west of the route of the Proposed Scheme (40m east of the land required for construction of the Proposed Scheme)	Sewage discharges - storm overflow/storm tank (water company)	Tributary of River Bollin 3
0171/1379 WR-01-309a – B7	85m south-east of the route of the Proposed Scheme (located adjacent to the land required for construction of the Proposed Scheme)	Sewage discharge - final/treated effluent (not water company)	River Bollin
016891948 WR-01-309a – B8	370m south-east of the route of the Proposed Scheme (210m north-west of the land required for construction of the Proposed Scheme)	Sewage discharge - final/treated effluent (not water company)	River Bollin

Permit identifier (and map grid square)	Distance and direction from route	Discharge type	Receiving water body
EPRGB3398RG WR-01-309a – B8	795m south-east of the route of the Proposed Scheme (125m south-east of the land required for construction of the Proposed Scheme)	Trade Discharges - Site Drainage	River Bollin
EPRCB3299EN WR-01-309a – D8	970m south-east of the route of the Proposed Scheme (510m south-east of the land required for construction of the Proposed Scheme)	Trade Discharges - Site Drainage	River Bollin
016993345 WR-01-309a – D7	200m east of the route of the Proposed Scheme (70m east of the land required for construction of the Proposed Scheme)	Sewage discharge - final/treated effluent (not water company)	Tributary of Timperley Brook 1
01TRA0018 WR-01-309a – D5	670m north-west of the route of the Proposed Scheme (45m north-west of the land required for construction of the Proposed Scheme)	Pumping station on sewerage network (water company)	Timperley Brook
EPRHB3690WL WR-01-309a – D7	485m south-east of the route of the Proposed Scheme (250m north-east of the land required for construction of the Proposed Scheme)	Trade discharge - process effluent (not water company)	Timperley Brook
01M/333 WR-01-309a – D5	410m north-west of the route of the Proposed Scheme (110m north-west of the land required for construction of the Proposed Scheme)	Sewage discharge - final/treated effluent (not water company)	Tributary of Timperley Brook 3

2.2 Groundwater

2.2.1 The groundwater features crossed by the Proposed Scheme within the study area, including their location, current overall WFD status and future overall status objectives, are shown in Table 4. Further details are set out in the Water Framework Directive compliance assessment baseline data (BID WR-002-00001). The receptor values attributed to each individual feature are based on the methodologies set out in the SMR[3].

2.2.2 Volume 5, Water resources and flood risk Map Book: map WR-02-306[2] shows the superficial and bedrock formations within the Hulseheath to Manchester Airport area.

Table 4: Summary of geology and hydrogeology in the study area

Geology	Distribution	Formation description	Aquifer classification	WFD body (ID) and current overall status[9]/2019 status	WFD objective[10]	Receptor value
Superficial deposits[11]						
Alluvium	Along the valleys of most rivers and tributaries and at Rostherne Mere	Clay, silt, sand and gravel	Secondary A	Weaver and Dane Quaternary Sand and Gravel Aquifer (GB41202G991700) Poor/Poor	Good by 2027	Moderate
River terrace deposits	Minor area in the east near Well Green	Sand and gravel	Secondary A	Weaver and Dane Quaternary Sand and Gravel Aquifer (GB41202G991700) Poor/Poor	Good by 2027	Moderate
Shirdley Hill Sand Formation	In the west near Arthill and south of Ashley	Sand	Secondary A	Weaver and Dane Quaternary Sand and Gravel Aquifer (GB41202G991700) Poor/Poor	Good by 2027	Moderate
Glaciofluvial deposits	Along parts of the valley of the River Bollin, and to the west of Rostherne Mere	Sand and gravel	Secondary A	Weaver and Dane Quaternary Sand and Gravel Aquifer (GB41202G991700) Poor/Poor	Good by 2027	Moderate
Glaciofluvial sheet deposits	Extensive areas in the River Bollin and Birkin	Sand and gravel	Secondary A	Weaver and Dane Quaternary	Good by 2027	Moderate

[9] Based on the 2015 RBMP. Note that where the Environment Agency have not assigned an individual water body ID to a unit, it has been assumed that it is connected to the underlying/overlying water body.

[10] Status and objectives are based on those set out in the 2015 RBMP.

[11] Superficial deposits are not necessarily listed in the order of superposition. Other superficial deposits may be present between the deposits shown in the table and bedrock, including deposits that do not appear in the table.

Geology	Distribution	Formation description	Aquifer classification	WFD body (ID) and current overall status[9]/2019 status	WFD objective[10]	Receptor value
	Brook catchments			Sand and Gravel Aquifer (GB41202G991700) Poor/Poor		
Glacial till	Across much of the study area	Sandy silty clay	Secondary (Undifferentiated)	Weaver and Dane Quaternary Sand and Gravel Aquifer (GB41202G991700) Poor/Poor	Good by 2027	Moderate
Bedrock						
Mercia Mudstone Group – Sidmouth Mudstone Formation – Northwich Halite Member	In the western region of the study area around Rostherne Mere	Halite with mudstone partings	Unproductive	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Low
Mercia Mudstone Group – Sidmouth Mudstone Formation – Bollin Mudstone Member	Located across most of the study area	Mudstone	Secondary B	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Moderate
Mercia Mudstone Group – Tarporley Siltstone Formation	In parts of the west and centre of the study area	Siltstone, mudstone and sandstone	Secondary B	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Moderate
Sherwood Sandstone Group – Helsby Sandstone Formation	Near the western boundary of the study area	Pebbly sandstone	Principal	Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone Aquifers (GB41201G101700)	Good by 2027	High

Geology	Distribution	Formation description	Aquifer classification	WFD body (ID) and current overall status[9]/2019 status	WFD objective[10]	Receptor value
				Poor/Poor		

2.2.3 The alluvium, river terrace deposits, glaciofluvial deposits, glaciofluvial sheet deposits and the Shirdley Hill Sand Formation in the study area are classified as Secondary A aquifers by the Environment Agency. The glacial till present across much of the study area is classified as a Secondary (Undifferentiated) aquifer.

2.2.4 The Bollin Mudstone Member of the Sidmouth Mudstone Formation (Mercia Mudstone Group), and the Tarporley Siltstone Formation (Mercia Mudstone Group), are classified as Secondary B aquifers. The Sherwood Sandstone Group, comprising the Helsby Sandstone Formation in the study area, is classified as a Principal aquifer. The Northwich Halite Member of the Mercia Mudstone Group (Sidmouth Mudstone Formation) is classified as Unproductive.

2.2.5 The structural geology of the study area is complex, with a series of north to south and north-west to south-east trending major faults traversing the study area, some of which have vertical displacements of over 200m in places.

2.2.6 There are no Environment Agency observation boreholes that monitor groundwater level within the study area.

2.2.7 No groundwater monitoring data are available for the Principal, Secondary A and Secondary B aquifers in the study area. Water strikes recorded on borehole logs available via the British Geological Survey (BGS) have been referred to for the purpose of the assessment.

2.2.8 Groundwater in the superficial aquifers in the study area is, in general, expected to be shallow within the river valleys and at greater depth on the valley sides and interfluves. The direction of groundwater flow is likely to follow the general topography, with the surface watercourses acting as discharge locations for groundwater flow. Where groundwater levels are not known, they have been assumed to be at or close to ground level for the purpose of a precautionary assessment.

2.2.9 In the superficial Secondary A aquifers (alluvium, river terrace deposits, Shirdley Hill Sand Formation, glaciofluvial deposits and glaciofluvial sheet deposits) and Secondary (Undifferentiated) aquifer (glacial till), most groundwater flow is expected to be through the intergranular matrix of these unconsolidated superficial deposits. Groundwater in the glacial till is likely to be largely restricted to discrete granular flow horizons.

2.2.10 Some groundwater flow is expected in the Mercia Mudstone Group. However, permeable horizons are expected to be laterally discontinuous and associated with thin siltstone and sandstone lenses called ‘skerries’. Considering the complex faulting in the area, localised fracture flow may also be important within the Mercia Mudstone Group.

2.2.11 Groundwater in the Sherwood Sandstone is expected to flow approximately east to west, based on hydrogeology maps available from the BGS[12], although due to the lack of groundwater level data it is not possible to confirm this at this time. Groundwater flow is likely to be strongly influenced by anisotropy within the aquifer, that typically exhibits greater horizontal than vertical permeability. The complex faulting in the area will influence flow significantly and fracture flow is expected to play a significant role in groundwater flow in the Sherwood Sandstone.

2.2.12 Table 5 summarises groundwater abstractions and their locations are shown on Volume 5, Water resources and flood risk Map Book: map WR-02-306[2].

2.2.13 There are no groundwater abstraction licences for public water supply (PWS), or source protection zones associated with licensed public water supplies, in the study area.

2.2.14 There are four private unlicensed abstraction from groundwater in the study area. The unlicensed abstraction west of Lower House Farm is listed as non-domestic and is assumed to be a moderate value receptor. For the other three abstractions, the abstraction purpose is unknown, hence, they are assumed to be high value receptors. They do not have a mapped SPZ but, if used for potable supply and some other purposes, will have a nominal Source Protection Zone (SPZ)1 of 50m[13].

2.2.15 The private water supply information has been provided by the local authorities. Information regarding deregulated abstractions has been provided by the Environment Agency. Where land access has been available, surveys have been undertaken to confirm unlicensed abstraction details. Where the exact details of an unlicensed abstraction are not known, a precautionary assessment has been undertaken.

2.2.16 There is the potential for further unlicensed abstractions to exist, as a licence is not required for abstraction volumes below 20m^3 per day and not all unlicensed abstractions are registered with the local authority. These may also need to be protected.

[12] British Geological Survey (1989), *Hydrogeological map of Clwyd and the Cheshire Basin including parts of the hydrometric areas 54, 65, 66, 67, 68 69 and 70.* Available online at: https://webapps.bgs.ac.uk/data/maps/maps.cfc?method=viewRecord&mapId=11567.

[13] Environment Agency (2017), *Protect groundwater and prevent groundwater pollution*. Available online at: https://www.gov.uk/government/publications/protect-groundwater-and-prevent-groundwater-pollution/protect-groundwater-and-prevent-groundwater-pollution.

Table 5: Summary of groundwater abstractions

Name, licence number (and map grid square)[14]	Distance and direction from route	Abstraction source	Maximum annual abstraction quantity (m^3)	Maximum daily abstraction quantity (m^3)	Purpose	Number of boreholes
Private unlicensed water supplies						
Abstraction west of Lower House Farm WR-02-303 – D6	450m south of the route of the Proposed Scheme (30m east of land required for the construction of the Proposed Scheme)	Glacial till	N/A	N/A	Non-domestic purposes	1
Well at Birtles Farm WR-02-303 – D6	770m south of the route of the Proposed Scheme (20m east of land required for the construction of the Proposed Scheme)	Glacial till	N/A	N/A	Unknown	1
Well at Mobberley Road WR-02-303 – D6	520m south of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Glacial till	N/A	N/A	Unknown	1
Well at Arden House WR-02-303 – D6	240m south of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Glacial till	N/A	N/A	Unknown	1

2.2.17 There are no permitted discharges to groundwater in the study area.

[14] Map grid squares on Volume 5, Water resources assessment and flood risk Map Book: map WR-02-303 for SPZ, licence numbers (for licensed abstractions) and unique map identification (ID) numbers (for unlicensed groundwater abstractions). Abstraction features in the study area are generally listed from south to north.

2.3 Groundwater – surface water interactions

2.3.1 Table 6 summarises the potential groundwater – surface water interactions identified within the study area.

2.3.2 Along with the main surface watercourses, that could have connection with groundwater, potential springs and sinks have been identified within the study area from Ordnance Survey (OS) maps and detailed river network data provided by the Environment Agency. Where land access has been available, these have been surveyed to check if they are true expressions of groundwater (and therefore could contribute to flows to surface water bodies), or if they are simply land drainage features. Where surveys have proved the latter, the features are recorded as such in Table 6, but are excluded from the groundwater – surface water interactions impact assessment in Volume 5: Water resources assessment, Appendix WR-003-0MA06 and they are not shown in the table below or on Volume 5, Water resources and flood risk Map Book: map WR-02-306[2], because they are implicitly included in the assessment of surface waters. Where they are inflows to minor ditches, for example, then any related impacts will be identified as part of the assessment on surface water features. In the absence of site surveys, the potential spring features have been assumed to comprise springs and to be high value receptors. Where a spring does not support water dependant habitat then the corresponding value of the receiving surface watercourse is applied. In the case that a seasonal spring with no water dependant habitat feeds a watercourse of high or very high value then the spring value is classed as moderate due to its ephemeral contribution to base flow.

Table 6: Groundwater – surface water interactions

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
Watercourses				
Millington Clough WR-02-306 – B3	Crossed by the route of the Proposed Scheme	Alluvium over Mercia Mudstone Group (Tarporley Siltstone Formation)	50	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Agden Brook WR-02-306 – C3	Crossed by the route of the Proposed Scheme	Alluvium and glaciofluvial deposits over Mercia Mudstone Group (Tarporley Siltstone Formation) and Sherwood Sandstone Group (Helsby Sandstone Formation)	39	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.

[15] Volume 5, Water resources assessment and flood risk Map Book: map WR-02-306. Watercourses cross several map grid squares and are labelled. Map grid squares are provided for the springs and potential spring locations within the study area. These features are listed from south to north.

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
Rostherne Brook WR-02-306 – C4	970m south of the route of the Proposed Scheme (690m south of the land required for the construction of the Proposed Scheme)	Alluvium and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Northwich Halite Member)	21	Discharges into Rostherne Mere. Supported by spring flows from superficial aquifers, mainly the glaciofluvial deposits and glacial till, in the catchment to the south of Rostherne Mere. The Rostherne Brook catchment also includes The Mere, Mere and Little Mere in MA03.
Blackburn's Brook WR-02-306 – D4	Crossed by the route of the Proposed Scheme	Alluvium, glaciofluvial deposits and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member and Northwich Halite Member)	20	Outflow from Rostherne Mere. Blackburn's Brook is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of Blackburn's Brook WR-02-306 – D5	640m south of the route of the Proposed Scheme (220m south of land required for the construction of the Proposed Scheme)	Alluvium, glaciofluvial deposits and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	24	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of River Bollin 10 WR-02-306 – C3	460m north of the route of the Proposed Scheme (350m north of land required for the construction of the Proposed Scheme)	Alluvium and glaciofluvial deposits over Mercia Mudstone Group (Tarporley Siltstone Formation and Sidmouth Mudstone Formation – Bollin Mudstone Member)	32	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of River Bollin 11 WR-02-306 – C3	150m north of the route of the Proposed Scheme (within the land required for the construction of the Proposed Scheme)	Alluvium and glaciofluvial deposits over Mercia Mudstone Group (Tarporley Siltstone Formation and Sidmouth Mudstone Formation – Bollin Mudstone Member)	30	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of Birkin Brook 9 WR-02-306 – D4	100m north of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Alluvium, glaciofluvial deposits and glacial till over Mercia Mudstone Group (Tarporley Siltstone Formation and Sidmouth	33	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
		Mudstone Formation – Bollin Mudstone Member)		
Birkin Brook WR-02-306 – D5	Crossed by the route of the Proposed Scheme	Alluvium and glacial till over Mercia Mudstone Group (Tarporley Siltstone Formation and Sidmouth Mudstone Formation – Bollin Mudstone Member)	20	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
River Bollin WR-02-306 – D4 and E7	Crossed by the route of the Proposed Scheme	Alluvium, glaciofluvial deposits and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	30	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of Birkin Brook 8 WR-02-306 – D5	330m south of the route of the Proposed Scheme (adjacent to land required for the construction of the Proposed Scheme)	Glaciofluvial sheet deposits and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	21	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of Birkin Brook 7 WR-02-306 – D5	330m south of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Glaciofluvial sheet deposits and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	21	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of Birkin Brook 6 WR-02-306 – D5	330m south of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Alluvium, glaciofluvial sheet deposits and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	21	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of Birkin Brook 5 WR-02-306 – D5	330m south of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Alluvium and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	21	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of Birkin Brook 4 WR-02-306 – D5	20m south of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Alluvium, glaciofluvial sheet deposits and glacial till over Mercia Mudstone Group (Sidmouth Mudstone	23	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
		Formation – Bollin Mudstone Member)		
Tributary of Birkin Brook 1 WR-02-306 – D6	230m south of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Alluvium and glacial till over Mercia Mudstone Group (Tarporley Siltstone Formation and Sidmouth Mudstone Formation – Bollin Mudstone Member)	28	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Mobberley Brook WR-02-306 – D6	510m south of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Alluvium and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	23	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Sugar Brook WR-02-306 – D6	670m south of the route of the Proposed Scheme (400m south of land required for the construction of the Proposed Scheme)	Alluvium and glacial till over Mercia Mudstone Group (Tarporley Siltstone Formation and Sidmouth Mudstone Formation – Bollin Mudstone Member)	26	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of Sugar Brook WR-02-306 – D7	520m south of the route of the Proposed Scheme (250m south of land required for the construction of the Proposed Scheme)	Alluvium and glacial till over Mercia Mudstone Group (Tarporley Siltstone Formation and Sidmouth Mudstone Formation – Bollin Mudstone Member)	48	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of Birkin Brook 3 WR-02-306 – D6	Crossed by the route of the Proposed Scheme	Alluvium and glacial till over Mercia Mudstone Group (Tarporley Siltstone Formation and Sidmouth Mudstone Formation – Bollin Mudstone Member)	37	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of Birkin Brook 2 WR-02-306 – E6	Adjacent to the route of the Proposed Scheme, on the south side (within land required for the construction of the Proposed Scheme)	Alluvium and glacial till over Mercia Mudstone Group (Tarporley Siltstone Formation and Sidmouth Mudstone Formation – Bollin Mudstone Member)	43	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Cotteril Clough Brook	840m south-east of the route of the Proposed Scheme	Alluvium and glacial till over Mercia Mudstone Group (Sidmouth	41	Watercourse is likely to be in hydraulic connection with the underlying and adjacent

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
WR-02-306 – F7	(610m south-east of land required for the construction of the Proposed Scheme)	Mudstone Formation – Bollin Mudstone Member)		permeable superficial deposits.
Tributary of River Bollin 1 WR-02-306 – E7	430m south-east of the route of the Proposed Scheme (220m south-east of land required for the construction of the Proposed Scheme)	Alluvium and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	57	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of River Bollin 2 WR-02-306 – F7	150m south-east of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Alluvium and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	54	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of River Bollin 3 WR-02-306 – E7	90m north-west of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Alluvium and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	47	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of River Bollin 4 WR-02-306 – E6	410m north of the route of the Proposed Scheme (adjacent to land required for the construction of the Proposed Scheme)	Glaciofluvial deposits over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	44	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of River Bollin 5 WR-02-306 – E6	330m north-west of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Alluvium, glaciofluvial deposits and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	55	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of River Bollin 6 WR-02-306 – E6	360m north of the route of the Proposed Scheme (290m north of land required for the construction of the Proposed Scheme)	Glaciofluvial deposits and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	45	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of River Bollin 7 WR-02-306 – E6	550m north of the route of the Proposed Scheme (350m north-east of land required for the construction of the Proposed Scheme)	Glaciofluvial deposits and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	44	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
Tributary of River Bollin 8 WR-02-306 – E6	840m north-west of the route of the Proposed Scheme (430m north-west of land required for the construction of the Proposed Scheme)	Alluvium and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	54	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of River Bollin 9 WR-02-306 – F6	780m north-west of the route of the Proposed Scheme (580m north-west of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	57	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of Timperley Brook 1 WR-02-306 – F6	Crossed by the route of the Proposed Scheme	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	63	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Timperley Brook WR-02-306 – F6	Crossed by the route of the Proposed Scheme	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	57	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of Timperley Brook 2 WR-02-306 – F5	740m north-west of the route of the Proposed Scheme (300m north-west of the land required for the construction of the Proposed Scheme)	River terrace deposits and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	51	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Tributary of Timperley Brook 3 WR-02-306 – F6	350m north-west of the route of the Proposed Scheme (adjacent to the land required for the construction of the Proposed Scheme)	Alluvium and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	54	Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits.
Springs or potential spring features				
Potential spring at Blackshaw Heys Farm WR-02-306 – D7	830m south of the route of the Proposed Scheme (730m east of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	45	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from the glacial till.
Potential spring in Bucklow Hill WR-02-306 – B4	1.5km south-east of the route of the Proposed Scheme (70m east of land required for the	Glaciofluvial deposits over Mercia Mudstone Group (Sidmouth Mudstone Formation –	52	Surveys unable to locate a groundwater feature at this site (shown as issues on OS mapping). This feature is therefore a high value

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
	construction of the Proposed Scheme)	Northwich Halite Member)		receptor, on a precautionary basis, until further surveys can be carried out.
Potential spring east of Chester Road WR-02-306 – C4	1.2km south-east of the route of the Proposed Scheme (330m north of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Tarporley Siltstone Formation)	55	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from the glacial till.
Potential spring at Ecclesfield Wood WR-02-306 – E6	40m south of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	46	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from the glacial till.
Spring at Sunbank Wood east, 230m north of Memorial Stone WR-02-306 – E7	620m south-east of the route of the Proposed Scheme (290m north-east of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	55	Surveys confirmed groundwater spring supporting a moderate value watercourse. This feature is therefore a moderate value receptor.
Potential spring at Lamb Lane, west of Stock Farm WR-02-306 – D5	30m south-west of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	29	Surveys have shown this is a land drainage feature that discharges to Tributary of Birkin Brook 4 and it is therefore included in the surface water assessment.
Potential spring at Cotteril Clough nature reserve WR-02-306 – F7	810m south-east of the route of the Proposed Scheme (490m north-east of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	61	Surveys have shown this is a land drainage feature that discharges to Cotteril Clough Brook and it is therefore included in the surface water assessment.
Potential spring at Sunbank Wood east, 267m north of Memorial Stone WR-02-306 – E7	600m south-east of the route of the Proposed Scheme (300m north-east of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	55	Surveys have shown this is a land drainage feature that discharges to Tributary of River Bollin 1 and it is therefore included in the surface water assessment.
Spring 130m south-east of Pigleystair Bridge, River Bollin WR-02-306 – E7	220m south-east of the route of the Proposed Scheme (300m north-east of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	38	Surveys confirmed a seasonal spring (flow observed from spring in survey conducted in May 2018 but not in survey conducted in October 2020) with no supported habitat flowing into a moderate

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
				value tributary of the very high value River Bollin. The spring is therefore a moderate value receptor. A land drainage outfall at the same site is defined as a low value receptor.
Spring 115m south-east of Pigleystair Bridge, River Bollin WR-02-306 – E7	200m south-east of the route of the Proposed Scheme (100m south-east of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	41	Surveys confirmed a seasonal spring (flow observed from spring in survey conducted in May 2018 but not in survey conducted in October 2020) with no supported habitat flowing into a moderate value tributary of the very high value River Bollin. This feature is therefore a moderate value receptor.
Spring at Sunbank Wood east, 316m north of Memorial Stone WR-02-306 – E7	570m south-east of the route of the Proposed Scheme (330m north-east of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	58	Surveys confirmed a spring supporting a moderate value watercourse. This feature is therefore a moderate value receptor.
Potential spring at Harpers Bank Wood, 216m east of Hunters Moon, Rostherne Lane WR-02-306 – C4	880m south of the route of the Proposed Scheme (510m south-east of land required for the construction of the Proposed Scheme)	Glacial till close to contact with glaciofluvial deposits over Mercia Mudstone Group (Sidmouth Mudstone Formation – Northwich Halite Member)	43	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from glaciofluvial deposits at the contact with glacial till.
Spring at Pigleystair Bridge, River Bollin WR-02-306 – E7	100m south-east of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Mercia Mudstone Group (Sidmouth Mudstone Formation – Northwich Halite Member)	35	Surveys confirmed a seasonal spring (flow observed from spring in survey conducted in May 2018 but not in survey conducted in October 2020) with no supported habitat flowing directly into the very high value River Bollin. As this feature is a seasonal spring, it is therefore a moderate value receptor. A land drainage outfall at the same site is defined as a low value receptor.

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
Potential spring at Hunters Moon, Rostherne Lane WR-02-306 – C4	820m south of the route of the Proposed Scheme (350m south-east of land required for the construction of the Proposed Scheme)	Glaciofluvial deposits (with glacial till nearby) over Mercia Mudstone Group (Sidmouth Mudstone Formation – Northwich Halite Member)	43	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from the glaciofluvial deposits.
Potential spring at Hunters Moon, Rostherne Lane WR-02-306 – C4	820m south of the route of the Proposed Scheme (350m south-east of land required for the construction of the Proposed Scheme)	Glaciofluvial deposits (with glacial till nearby) over Mercia Mudstone Group (Sidmouth Mudstone Formation – Northwich Halite Member)	41	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from the glaciofluvial deposits.
Potential spring in Harpers Bank Wood WR-02-306 – C4	800m south of the route of the Proposed Scheme (350m south-east of land required for the construction of the Proposed Scheme)	Alluvium and glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Northwich Halite Member)	25	Source not surveyed. However, there is evidence of a spring-fed channel seen below the source and, therefore, assumed to be a high value receptor unless verified otherwise by surveys. If present, the spring may discharge at the contact between alluvium and glacial till.
Potential spring 222m west of Pigleystair Bridge, River Bollin WR-02-306 – E7	90m north-west of the route of the Proposed Scheme (20m west of land required for the construction of the Proposed Scheme)	Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	36	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it may discharge from the glacial till.
Potential spring 110m west of telecommunication mast at Castle Mill Lane WR-02-306 – E6	560m north of the route of the Proposed Scheme (110m north of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	42	Surveys have shown this is a land drainage feature that discharges to River Bollin and it is therefore included in the surface water assessment.
Potential spring at Sunbank Wood, 400m east of Halebank Farm WR-02-306 – F7	470m south-east of the route of the Proposed Scheme (330m south-east of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	58	Surveys have shown this is a land drainage feature that discharges to Tributary of River Bollin 2 and it is therefore included in the surface water assessment.
Potential spring 115m north-west of telecommunication mast at Castle Mill Lane WR-02-306 – E6	620m north-west of the route of the Proposed Scheme (200m north-west of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	42	Surveys have shown this is a land drainage feature that discharges to an unnamed drainage ditch and it is therefore included in the surface water assessment.

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
Potential spring 75m north of Lower Thornsgreen Farm WR-02-306 – E6	420m north-west of the route of the Proposed Scheme (160m west of land required for the construction of the Proposed Scheme)	Glaciofluvial deposits close to contact with glacial till, over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	43	Surveys have shown this is a land drainage feature that discharges to an unnamed drainage ditch and it is therefore included in the surface water assessment.
Spring 90m north of Lower Thornsgreen Farm WR-02-306 – E6	420m north-west of the route of the Proposed Scheme (160m west of land required for the construction of the Proposed Scheme)	Glaciofluvial deposits close to contact with glacial till, over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	43	Surveys confirmed groundwater spring supporting a low value watercourse. This feature is therefore a low value receptor.
Potential spring at Oak Farm Cottages, Sunbank Lane WR-02-306 – F7	490m south-east of the route of the Proposed Scheme (250m south-east of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	61	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from the glacial till.
Potential spring 60m north-east of River Bollin M56 subway WR-02-306 – E6	450m north-west of the route of the Proposed Scheme (90m north-west of land required for the construction of the Proposed Scheme)	Alluvium over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	33	Surveys unable to locate a groundwater feature at this site (shown as collects on OS mapping). This feature is therefore a low value receptor.
Potential spring 60m north-east of River Bollin M56 subway WR-02-306 – E6	450m north-west of the route of the Proposed Scheme (40m north-west of land required for the construction of the Proposed Scheme)	Alluvium over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	33	Surveys unable to locate a groundwater feature at this site (shown as collects on OS mapping). This feature is therefore a low value receptor.
Potential spring 60m north-east of River Bollin M56 subway WR-02-306 – E6	450m north-west of the route of the Proposed Scheme (40m north-west of land required for the construction of the Proposed Scheme)	Alluvium over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	33	Surveys unable to locate a groundwater feature at this site (shown as collects on OS mapping). This feature is therefore a low value receptor.
Potential spring 127m south-east of Keepers Cottage, Sunbank Lane WR-02-306 – F7	270m south-east of the route of the Proposed Scheme (40m south-east of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	60	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from the glacial till.

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
Spring at Keepers Cottage, Sunbank Lane (south) WR-02-306 – F7	140m south-east of the route of the Proposed Scheme (20m north of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	59	Surveys confirmed a groundwater spring supporting wetland habitat. This feature is therefore a high value receptor.
Potential spring 120m east of Keepers Cottage, Sunbank Lane WR-02-306 – F7	250m south-east of the route of the Proposed Scheme (20m south-east of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	61	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from the glacial till.
Potential spring at Keepers Cottage, Sunbank Lane (north) WR-02-306 – F7	130m south-east of the route of the Proposed Scheme (20m south-east of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	60	Not surveyed. Assumed to be a high value receptor until this verified by surveys. If present, it is likely to discharge from the glacial till.
Potential spring 70m south of Haslemere Avenue, Hale WR-02-306 – E6	400m north-west of the route of the Proposed Scheme (110m north of land required for the construction of the Proposed Scheme)	Glaciofluvial deposits near contact with glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	54	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from the glaciofluvial deposits.
Potential spring in woodland, 160m south-west of Haslemere Avenue, Hale WR-02-306 – E6	550m north-west of the route of the Proposed Scheme (160m north of land required for the construction of the Proposed Scheme)	Glacial till close to contact with Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member) outcrop.	50	Surveys have shown this is a land drainage feature that discharges to an unnamed tributary of the River Bollin and it is therefore included in the surface water assessment.
Potential spring at Jackson's Bank, 35m west of Hale Golf Course south WR-02-306 – E6	920m north-west of the route of the Proposed Scheme (520m north-east of land required for the construction of the Proposed Scheme)	Glaciofluvial deposits over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	37	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from the glaciofluvial deposits.
Potential sink at Jackson's Bank, 20m west of Hale Golf Course south WR-02-306 – E6	950m north-west of the route of the Proposed Scheme (550m north-west of land required for the construction of the Proposed Scheme)	Glaciofluvial deposits over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	30	Not surveyed. Shown as a sink on OS maps. If present, it is likely to discharge to glaciofluvial deposits. Assumed to be a high value receptor until verified by surveys.

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
Spring 90m west of Haslemere Avenue, Hale WR-02-306 – E6	580m north-west of the route of the Proposed Scheme (230m north of land required for the construction of the Proposed Scheme)	Glaciofluvial deposits close to contact with glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	52	Surveys confirmed groundwater spring supporting a moderate value habitat. This feature is therefore a moderate value receptor.
Potential spring at River Mead Avenue, Hale WR-02-306 – E6	850m north-west of the route of the Proposed Scheme (440m north-west of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	51	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from the glacial till.
Spring at Carrwood, 45m west of Pump House WR-02-306 – E6	980m north of the route of the Proposed Scheme (610m north-west of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	42	Surveys confirmed groundwater spring supporting a tributary feeding into a high value river. This feature is therefore a high value receptor.
Potential spring at Carrwood, 75m east of Pump House WR-02-306 – E6	990m north-west of the route of the Proposed Scheme (580m north-west of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	47	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from the glacial till.
Potential spring 310m north of Mereside Farm, Chester Road, Millington WR-02-306 – C3	150m north of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	32	Surveys have shown this is a land drainage feature that discharges to Tributary of River Bollin 11 and it is therefore included in the surface water assessment.
Potential spring at Fish House Plantation WR-02-306 – D4	960m north-east of the route of the Proposed Scheme (760m north-east of land required for the construction of the Proposed Scheme)	Glaciofluvial deposits over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	33	Surveys have shown this is a land drainage feature that discharges to an unnamed tributary of the River Bollin and it is therefore included in the surface water assessment.
Potential spring 100m west of Bowdon View, Coe Lane WR-02-306 – C3	450m north-west of the route of the Proposed Scheme (350m north of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	33	Surveys have shown this is a land drainage feature that discharges to Tributary of River Bollin 10 and it is therefore included in the surface water assessment.

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
Potential spring at hotel on Hasty Lane WR-02-306 – F6	10m west of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	63	Not surveyed. Assumed to be a high value receptor until verified by surveys. If present, it is likely to discharge from the glacial till.
Potential sink at Brook Cottage, Spodegreen Lane WR-02-306 – C3	600m north-west of the route of the Proposed Scheme (400m north-west of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	27	Surveys confirmed this is a drain connected to the local drainage network and not a groundwater feature. Not carried forward to the assessment.
Potential spring at Ringway Golf Club, north on Shay Lane WR-02-306 – F5	900m north-west of the route of the Proposed Scheme (280m north-west of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	46	Surveys confirmed this is a constructed ditch and not a groundwater feature. Not carried forward to the assessment.
Spring at Davenport Green, Roaring Gate Lane WR-02-306 – F6	340m north-west of the route of the Proposed Scheme (10m west of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	55	Surveys confirmed a groundwater spring supporting a low value tributary. This feature is therefore a low value receptor.
Potential spring 145m west of Roaring Gate Farm, Roaring Gate Lane WR-02-306 – F5	670m west of the route of the Proposed Scheme (420m north-west of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	54	Not surveyed. Shown as spreads[16] on OS mapping. Assumed to be a high value receptor until verified by surveys. If present, it could discharge into glacial till.
Potential spring at Ryecroft Covert WR-02-306 – D5	222m north-east of route of the Proposed Scheme (40m north-east of land required for the construction of the Proposed Scheme)	Glacial till over Mercia Mudstone (Sidmouth Mudstone Formation – Bollin Mudstone Member)	35	Surveys have shown this to be a culvert that discharges to Tributary of Birkin Brook 9 and it is therefore included in the surface water assessment
Potential sink 140m north of River Bollin, M56 subway WR-02-306 – E6	540m north-west of the route of the Proposed Scheme (130m north-west of land required for the construction of the Proposed Scheme)	Alluvium over Mercia Mudstone Group (Sidmouth Mudstone Formation – Bollin Mudstone Member)	34	Surveys have shown this to be a culvert that discharges to an unnamed tributary of the River Bollin and it is therefore included in the surface water assessment.

[16] A 'spreads' is where a surface water channel discharges across an area of land where it seeps into the ground.

Feature (and map grid square)[15]	Distance and direction from route	Formation	Elevation (mAOD)	Comments
Potential spring at River Bollin, 100m east of Hale Golf Course south WR-02-306 – E6	870m north of the Proposed Scheme (670m north of land required for the construction of the Proposed Scheme)	Alluvium over Mercia Mudstone (Sidmouth Mudstone Formation – Bollin Mudstone Member)	30	Surveys have shown this to be a culvert that discharges to an unnamed tributary of the River Bollin and it is therefore included in the surface water assessment.

2.4 Water dependent habitats

2.4.1 Table 7 summarises the groundwater dependent habitats and surface water dependent habitats within the study area.

Table 7: Water dependent habitats

Name (and map grid square)[17]	Distance and direction from route	Designation	Comments
Groundwater dependent habitats			
Grey's Gorse EC-01-519 – D2	580m north of the route of the Proposed Scheme (530m north of land required for the construction of the Proposed Scheme)	Site of Biological Importance (SBI) and Local Wildlife Site (LWS)	A series of ponds located within this habitat, could be supported by groundwater from the underlying Shirdley Hill Sand Formation and glacial till. The site has been included as a groundwater dependent habitat on a precautionary basis.
Yarwood Heath Covert EC-01-519 – G3	250m north of the route of the Proposed Scheme (partially within land required for the construction of the Proposed Scheme)	LWS	The site consists of six hydrologically linked ponds that do not appear to be connected to the main river network. It is currently unclear whether this habitat is supported by groundwater, although there may be groundwater support from the underlying glaciofluvial deposits. The site has therefore been included as a groundwater dependent habitat on a precautionary basis.
Hancock's Bank North EC-01-519 – I5	160m north of the route of the Proposed Scheme (90m north-west of land required for the construction of the Proposed Scheme)	LWS and ancient woodland	It is currently unclear whether this habitat is supported by rainfall or groundwater. There may be groundwater supporting the site from the alluvium, glaciofluvial deposits and glacial till underlying the site. The site has been included as a groundwater dependent habitat on a precautionary basis.

[17] High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement. Volume 5 Ecology, Map Book Map Series EC-01.* Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement. Water dependent habitats often cross several grid squares. The Map grid square provided at the location closest to the Proposed Scheme.

Name (and map grid square)[17]	Distance and direction from route	Designation	Comments
Ryecroft Covert EC-01-520 – B6	30m north of the route of the Proposed Scheme (within land required for the construction of the Proposed Scheme)	LWS and ancient woodland	Surveys identified several springs and minor watercourses not shown on OS maps, together with areas of standing water. It is likely, therefore, that this site is at least partially groundwater dependent, with discharge from the underlying alluvium, glaciofluvial deposits and glacial till supporting the habitat.
Old Deer Enclosure, Tatton Park EC-01-520 – D10	900m south of the route of the Proposed Scheme (690m south-west of land required for the construction of the Proposed Scheme)	LWS	It is currently unclear whether this habitat is supported by groundwater or rainfall. There may be groundwater supporting the site from the underlying alluvium, glaciofluvial deposits, Shirdley Hill Sand Formation and glacial till. Springs and drains are shown on OS maps within the habitat. The site has been included as a groundwater dependent habitat on a precautionary basis.
Ecclesfield Wood EC-01-521 – B5	Crossed by the route of the Proposed Scheme	LWS	There is a spring shown on OS mapping in the north-east of the site, although this spring has not been surveyed. It is currently unclear whether the habitat is supported by rainfall or groundwater. There may be groundwater supporting the site from the glacial till underlying the site. The site has been included as a groundwater dependent habitat on a precautionary basis.
Brickhill Wood EC-01-521 – D7	180m south of the route of the Proposed Scheme (on the boundary of land required for the construction of the Proposed Scheme)	LWS and ancient woodland	No evidence of groundwater dependency was identified during survey. However, only a partial survey was completed due to land access restrictions. As such, it is currently unclear whether this habitat is supported by rainfall or groundwater. There may be groundwater supporting the site from the glacial till underlying the site. The site has been included as a groundwater dependent habitat on a precautionary basis until further surveys of the remaining habitat are completed.
Bollin Oxbow at Castle Hill EC-01-521– F10	820m south-west of the route of the Proposed Scheme (150m south-west of land required for the construction of the Proposed Scheme)	LWS	The site is underlain by alluvium and glacial till. It is currently unclear whether this site is supported by groundwater or rainfall, and it has been included on a precautionary basis.
Rossmill EC-01-521 – F5	440m north of the route of the Proposed Scheme (120m north of land required for the construction of	SBI	It is currently unclear whether this habitat is supported by groundwater or rainfall. There may be groundwater supporting the site from the alluvium and glacial till underlying the site. The site has been included as a groundwater dependent habitat on a precautionary basis.

Name (and map grid square)[17]	Distance and direction from route	Designation	Comments
	the Proposed Scheme)		
Wood Near Chapel Lane (Hennersley Bank) EC-01-521 – F6	190m north of the route of the Proposed Scheme (adjacent to land required for the construction of the Proposed Scheme)	SBI (and ancient woodland)	The habitat consists of woodland located alongside a tributary of the River Bollin flowing through the site. While surveys suggest the site is more likely to be dependent on land drainage, it is unclear if the drainage is largely sourced from groundwater and it has been included on a precautionary basis
Surface water and groundwater dependent habitats			
Rostherne Mere EC-01-519 – F4	80m south of the route of the Proposed Scheme (10m south of land required for the construction of the Proposed Scheme)	Ramsar, Site Special Scientific Interest (SSSI), National Nature Reserve (NNR) and ancient woodland (applies to Harpers Bank Wood and Wood Bongs within the SSSI).	The main inflows to Rostherne Mere are from the Rostherne Brook, that is supported by spring discharges in the upstream catchment. Inflows also occur from seepages and springs in the hillsides around the mere and, occasionally, reversal of flow in the outflow channel (Blackburn's Brook) in wet weather. Rostherne Mere is therefore a groundwater and surface water dependent site.
Cotteril Clough EC-01-521 – G10	780m south-east of the route of the Proposed Scheme (140m east of land required for the construction of the Proposed Scheme)	SSSI, ancient woodland and SBI	The site is located in a ravine, or clough, that has been cut down into the bedrock by the Cotteril Clough Brook. Cotteril Clough Brook may be fed by springs originating from the glacial till (Secondary (Undifferentiated) aquifer). Most of the site is woodland with associated stream habitat and is the most diverse clough woodland on base-rich soils in Greater Manchester. It is currently unclear whether this habitat is supported by groundwater, including discharge from springs, or runoff from rainfall events. The site has been included as a surface water and groundwater dependent habitat on a precautionary basis.
Hancock's Bank South (including Birkin House Ancient Woodland) EC-01-519 – I5	Crossed by the route of the Proposed Scheme	SBI, LWS and ancient woodland	The citation for this site includes habitats associated with wet hollows, and a margin of marshy grassland along the brook. These hollows and marshy margins to the brook may be supported by groundwater from the underlying alluvium, glaciofluvial deposits and glacial till as well as surface water. Therefore, this site has been included on a precautionary basis.
Jackson's Bank East EC-01-521 – D4	550m north of the route of the Proposed Scheme (113m north of land required for the construction of	LWS	There are springs shown on OS mapping within or close to the habitat. The citation for this site records wet woodland species associated with a localised damp area. They are also present at the banks of the River Bollin. It is currently unclear whether this habitat is dependent on surface

Name (and map grid square)[17]	Distance and direction from route	Designation	Comments
	the Proposed Scheme)		water or groundwater and it has been included on a precautionary basis.
Mill Wood, Castle Mill EC-01-521 – F7	190m south-west of the route of the Proposed Scheme (on the boundary of land required for the construction of the Proposed Scheme)	LWS	The habitat that is located on the bank of the River Bollin. is supported by surface water runoff. Several seasonal springs have also been identified in close proximity to the habitat along the bank of the River Bollin, indicating that the site is potentially supported by groundwater from the alluvium and glacial till underlying the area. As a result, therefore, the habitat is likely to be partially groundwater dependent.
Warburton Wood EC-01-521 – F5	440m north-west of the route of the Proposed Scheme (70m north of land required for the construction of the Proposed Scheme)	Ancient woodland	Ponds with marginal habitat supported by overland flow and a spring located within the site partially supports the woodland habitat and therefore the site is deemed surface water and groundwater dependent. More widespread groundwater seepages from the underlying glaciofluvial deposits and glacial till may also support the habitat.
Sunbank Wood and Ponds (including Bollin Bank Ancient Woodland) EC-01-521 – F7	Crossed by the route of the Proposed Scheme	Ancient woodland and SBI	Several ponds and two main streams are located within the habitat, including Tributary of River Bollin 1 and Tributary of River Bollin 2. The streams are supported by springs discharging from glacial till. There may also be groundwater supporting parts of the site from the underlying glacial till. As a result, this habitat is at least partially groundwater dependent.
Ponds at Davenport Green EC-01-522a – D4	450m north-west of the route of the Proposed Scheme (110m north-west of land required for the construction of the Proposed Scheme)	SBI	A series of ponds located at the site, could be at least partially supported by groundwater from the underlying glacial till. The site has been included as a groundwater dependent habitat on a precautionary basis.
Surface water dependent habitats			
Wood near Arden House (including East Arden House) EC-01-520 – F7	190m south of the route of the Proposed Scheme (partially within the land required for the construction of the Proposed Scheme)	LWS and ancient woodland (applies to East Arden House)	The habitat is flooded by the Tributary of Birkin Brook 1 that flows through the habitat, creating wetland habitat alongside the watercourse. Therefore, it is likely this is a surface water dependent habitat.
Davenport Green Wood EC-01-522a – C6	Crossed by the route of the Proposed Scheme	SBI	Timperley Brook flows through this site. No evidence of groundwater dependency was identified during the partial site survey, or in the citation information. As such, the site has been included as a surface water dependent habitat.

3 References

British Geological Survey (1989), *Hydrogeological map of Clwyd and the Cheshire Basin including parts of the hydrometric areas 54, 65, 66, 67, 68 69 and 70.* Available online at: https://webapps.bgs.ac.uk/data/maps/maps.cfc?method=viewRecord&mapId=11567.

Environment Agency (2015), *River Basin Management Plan, North West River Basin District*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718335/North_West_RBD_Part_1_river_basin_management_plan.pdf.

Environment Agency, (2017), *Protect groundwater and prevent groundwater pollution*. Available online at: https://www.gov.uk/government/publications/protect-groundwater-and-prevent-groundwater-pollution/protect-groundwater-and-prevent-groundwater-pollution.

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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