In Parliament – Session 2021 - 2022

HS2

# High Speed Rail (Crewe – Manchester)

## Background information and data

### Water resources and flood risk

BID WR-004-0MA01

MA01: Hough to Walley's Green

Water resources assessment baseline data

M315

HS2

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Department for Transport

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## Tables

# 1 Introduction

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

1.1.2 The data have been collected in relation to the Hough to Walley's Green area (MA01).

1.1.3 The HS2 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 which are reported per community area (Volume 5: Appendices WR-003-0MA01 and WR-005-0MA01); and
- a Draft water resources and flood risk 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 which is reported for the western leg of the Proposed Scheme (BID WR-002-00001).

1.1.5 Maps referred to throughout this document are set out 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 Hough to Walley's Green area, the study area has been extended to include Bottoms Flash and Groby's Flash, which form the southern-most unit of the 14 units that make up the Sandbach Flashes Site of Special Scientific Interest (SSSI).

[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 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 the 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 in Section 2.3.

2.1.3 The majority of Tributary of River Weaver 2 is located in the Wimboldsley to Lostock Gralam (MA02) area. The baseline data for this watercourse are presented in BID WR-004-0MA02.

**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 WFD status |
|---|---|---|---|---|---|---|
| Swill Brook WR-01-301 – B4 | Ordinary watercourse | 0.009 | Moderate | Wistaston Brook GB112068055280 | Bad/Good by 2027 | Bad |
| Basford Brook WR-01-301 – B6 | Main river | 0.06 | Moderate | | | |
| Cheer Brook | Main river | 0.005 | 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 is 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 2015 river basin management plan (RBMP). See 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 WFD status |
|---|---|---|---|---|---|---|
| CT-06-303-L4 – A2[9] | | | | | | |
| Tributary of Swill Brook 1<br>WR-01-301 – C5 | Ordinary watercourse | <0.002 | Moderate | | | |
| Tributary of Basford Brook 4<br>WR-01-301 – C6 | Ordinary watercourse | 0.003 | Moderate | | | |
| Tributary of Gresty Brook 1<br>WR-01-301 – C5 | Ordinary watercourse | <0.002 | Moderate | | | |
| Tributary of Gresty Brook 3<br>WR-01-301 – D5 | Ordinary watercourse | <0.002 | Moderate | | | |
| Gresty Brook<br>WR-01-301 – D4 | Main river | 0.06 | High | | | |
| Tributary of Gresty Brook 2<br>WR-01-301 – C7 | Ordinary watercourse | 0.002 | Moderate | | | |
| Valley Brook<br>WR-01-301 – D10 | Main river | 0.01 | High | Valley Brook (Englesea Brook to Weaver)<br>GB112068055310 | Moderate/ Good by 2027 | Moderate |
| Leighton Brook<br>WR-01-301 – H1 | Ordinary watercourse | <0.002 | Moderate | Weaver (Marbury Brook to Dane)<br>GB112068060460 | Poor/Good by 2027 | Poor |
| Groby Road Drain<br>WR-01-301 – H7 | Minor ditch | <0.002 | Low | Fowle Brook<br>GB112068055400 | Poor/Good by 2027 | Poor |
| Broughton Road Drains<br>WR-01-301 – H6 | Minor ditch | <0.002 | Low | | | |
| Parkers Road Drain<br>WR-01-301 – I6 | Minor ditch | <0.002 | Low | | | |
| Tributary of Fowle Brook 1<br>WR-01-301 – I5 | Ordinary watercourse | <0.002 | Low | | | |
| Hoggins Brook<br>WR-01-302a – D6 | Ordinary watercourse | 0.003 | Low | Wheelock (Fowle Brook to Dane)<br>GB112068055380 | Poor/Good by 2027 | Bad |

[9] WR-01 maps do not extend to show the Cheer Brook, reference provided is to the Volume 2 Map Book: Map Series CT-06.

| 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 WFD status |
|---|---|---|---|---|---|---|
| Tributary of River Weaver 1<br>WR-01-302a – D4 | Ordinary watercourse | <0.002 | Moderate | Weaver (Marbury Brook to Dane)<br>GB112068060460 | Poor/Good by 2027 | Poor |

2.1.4 There are no licensed surface water abstractions potentially affected by the Proposed Scheme. Records of private unlicensed surface water abstractions, which comprise those for quantities less than $20m^3$ per day, have been obtained from the local authorities. These data indicate 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.

2.1.5 There are 12 permitted discharges to surface water potentially affected by the Proposed Scheme, as shown in Table 2, one of which is within the land required for the construction of the Proposed Scheme. These have been assessed as low value receptors.

**Table 2: Permitted discharges to surface water**

| Permit identifier (and map grid square) | Distance and direction from route | Discharge type | Receiving water body |
|---|---|---|---|
| 016891954<br>WR-01-301 – D5 | 300m west of the route of the Proposed Scheme (100m south-west of the land required for construction of the Proposed Scheme) | Miscellaneous – surface water | Gresty Brook |
| 0168/820 WR-01-301 – D6 | 20m east of the route of the Proposed Scheme (located within the land required for construction of the Proposed Scheme) | Sewage discharges – final/treated effluent (not water company) | Gresty Brook |
| 016891798<br>WR-01-301 – C7 | 800m east of the Proposed Scheme (20m south of the land required for construction of the Proposed Scheme) | Sewage discharges – pumping station (water company) | Gresty Brook |
| 016810413<br>WR-01-301 – D6 | 230m east of the Proposed Scheme (80m north of the land required for construction of the Proposed Scheme) | Trade discharges – cooling water | Gresty Brook |
| 016891918<br>WR-01-301 – D5 | 500m west of the route of the Proposed Scheme (110m south-west of the land required for construction of the Proposed Scheme) | Trade discharge – process effluent (not water company) | Gresty Brook |

| Permit identifier (and map grid square) | Distance and direction from route | Discharge type | Receiving water body |
|---|---|---|---|
| 01CRE0042<br>WR-01-301 – F5 | 330m west of the route of the Proposed Scheme (545m north-west of the land required for construction of the Proposed Scheme) | Sewage discharges – storm overflow/storm tank (water company) | Valley Brook |
| 01CRE0040<br>WR-01-301 – F5 | 430m west of the route of the Proposed Scheme (655m north-west of the land required for construction of the Proposed Scheme) | Sewage discharges – storm overflow/storm tank (water company) | Valley Brook |
| 01CRE0041<br>WR-01-301 – F5 | 600m west of the route of the Proposed Scheme (790m north-west of the land required for construction of the Proposed Scheme) | Sewage discharges – storm overflow/storm tank (water company) | Valley Brook |
| 01CRE0036<br>WR-01-301 – F4 | 900m west of the route of the Proposed Scheme (1.25km north-west of the land required for construction of the Proposed Scheme) | Sewage discharges – storm overflow/storm tank (water company) | Valley Brook |
| 01CRE0035<br>WR-01-301 – F4 | 970m west of the route of the Proposed Scheme (1.70km north-west of the land required for construction of the Proposed Scheme) | Sewage discharges – storm overflow/storm tank (water company) | Valley Brook |
| 01CRE0037<br>WR-01-301 – F4 | 920m west of the route of the Proposed Scheme (1.35km north-west of the land required for construction of the Proposed Scheme) | Sewage discharges – storm overflow/storm tank (water company) | Valley Brook |
| 01C/136<br>WR-01-301 – I6 | 540m east of the route of the Proposed Scheme (220m south-west of the land required for construction of the Proposed Scheme) | Sewage discharges – final/treated effluent (not water company) | Unknown |

## 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 3. Further details are set out in 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 assessment and flood risk Map Book: map WR-02-301[2] shows the superficial and bedrock formations within MA01.

**Table 3: Summary of geology and hydrogeology in the study area**

| Geology | Distribution | Formation description | Aquifer classification | WFD body (ID) and current overall status[10] /2019 status | WFD objective[11] | Receptor value |
|---|---|---|---|---|---|---|
| **Superficial deposits[12]** | | | | | | |
| Alluvium | Along the valleys of most rivers and tributaries | 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 | Along part of the valley of Gresty Brook and its tributary, Basford Brook. Minor outcrop area near Swill Brook | Sand and gravel | Secondary A | Weaver and Dane Quaternary Sand and Gravel Aquifer (GB41202G991700) Poor/Poor | Good by 2027 | Moderate |
| Lacustrine deposits | Small isolated patch on edge of study area near Shavington | Clay and silt | Unproductive | Not assessed by the Environment Agency | Not assessed by the Environment Agency | Low |
| Glaciofluvial deposits | Outcrop extensive around Weston and Hough at the southern end of the study area. Isolated patches along some valleys | Sand and gravel | Secondary A | Weaver and Dane Quaternary Sand and Gravel Aquifer (GB41202G991700) Poor/Poor | Good by 2027 | Moderate |
| Glaciofluvial sheet deposits | Isolated patch along Valley Brook | Sand and gravel | Secondary A | Weaver and Dane Quaternary Sand and Gravel Aquifer (GB41202G991700) Poor/Poor | Good by 2027 | Moderate |
| Glacial till | Across much of the study area | Sandy silty clay | Secondary (Undifferentiated) | Weaver and Dane Quaternary Sand | Good by 2027 | Moderate |

[10] 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.

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

[12] 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 which do not appear in the table.

| Geology | Distribution | Formation description | Aquifer classification | WFD body (ID) and current overall status[10] /2019 status | WFD objective[11] | Receptor value |
|---|---|---|---|---|---|---|
| | | | | and Gravel Aquifer (GB41202G991700) Poor/Poor | | |
| **Bedrock** | | | | | | |
| Mercia Mudstone Group – Sidmouth Mudstone Formation | Across most of the study area | Mudstone and siltstone | Secondary B | Not assessed by the Environment Agency | Not assessed by the Environment Agency | Moderate |
| Mercia Mudstone Group – Sidmouth Mudstone Formation – Wilkesley Halite Member | Small area close to the southern boundary of the study area | Halite with mudstone parting | Unproductive | Not assessed by the Environment Agency | Not assessed by the Environment Agency | Low |

2.2.3 The alluvium, river terrace deposits glaciofluvial deposits and glaciofluvial sheet deposits in the study area are classified as Secondary A aquifers by the Environment Agency. Glacial till in the study area is designated as a Secondary (Undifferentiated) aquifer. An isolated area of lacustrine deposits is located on the edge of the study area, near Shavington and is designated as Unproductive.

2.2.4 There is one bedrock aquifer in the study area, the Sidmouth Mudstone Formation (part of the Mercia Mudstone Group). The formation comprises structureless mudstone and siltstone and is classified as a Secondary B aquifer. The Wilkesley Halite Member, comprising halite-rich strata within the Sidmouth Mudstone Formation, is present at the southern boundary of the study area. The Wilkesley Halite Member is classified as Unproductive. These units are generally overlain by glacial till.

2.2.5 The structural geology of the study area is complex, with many 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 which monitor groundwater level within the study area. Water strikes recorded on borehole logs available via BGS have been referred to for the purpose of the assessment.

2.2.7 Groundwater in the superficial Secondary A and Secondary (Undifferentiated) aquifers in the study area is expected to be shallow within the river valleys and at slightly greater depth on the valley sides. The direction of groundwater flow is likely to follow the general topography, with the surface watercourses acting as discharge points for converging 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. Groundwater in the glacial till is likely to be largely restricted to discrete granular flow horizons.

2.2.8 Some groundwater flow is expected in the Mercia Mudstone Group. However, permeable horizons within the Mercia Mudstone Group are expected to be laterally discontinuous and associated with thin siltstone and sandstone lenses called skerries. There may also be a small element of fracture flow within the Mercia Mudstone Group.

2.2.9 There are no source protection zones (SPZ) associated with licensed public water supplies within the study area. There are no private abstractions from groundwater (licensed and unlicensed) within the study area.

2.2.10 There is the potential for 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.

2.2.11 There are two permitted discharges to groundwater within the study area and these have been assessed as low value receptors. These are summarised in Table 4.

**Table 4: Permitted discharges to groundwater**

| Permit identifier (and map grid square)[2] | Distance and direction from route | Discharge type | Receiving water body |
|---|---|---|---|
| NPSWQD008929 WR-02-301 – E5 | 240m west of the route of the Proposed Scheme (270m south-west of land required for construction of the Proposed Scheme) | Sewage discharges – final/treated effluent | Groundwater via a soakaway |
| 016892399 WR-02-301 – H5 | 930m west of the route of the Proposed Scheme (110m north of land required for construction of the Proposed Scheme) | Sewage discharges – final/treated effluent | Groundwater via a soakaway |

## 2.3 Groundwater – surface water interactions

2.3.1 Table 5 summarises the potential groundwater – surface water interactions identified within the study area.

2.3.2 Along with the main surface watercourses, which could have connection with groundwater, potential springs and issues 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 5, but are excluded from the groundwater – surface water interactions impact assessment in the Volume 5: Water resources assessment, Appendix WR-003-0MA01 and they are not shown in the table below or on Volume 5, Water resources and flood risk Map Book: map WR-02-301[2], because they are implicitly already 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.

**Table 5: Groundwater – surface water interactions**

| Feature (and map grid square)[2] | Distance and direction from route | Formation | Elevation (mAOD) | Comments |
|---|---|---|---|---|
| **Watercourses** | | | | |
| Swill Brook WR-02-301 – B5 | 750m west of the route of the Proposed Scheme (70m west of land required for construction of the Proposed Scheme) | Alluvium and glaciofluvial sheet deposits over the Mercia Mudstone Group (Sidmouth Mudstone Formation – Wilkesley Halite Member) | 57 | Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits. |
| Basford Brook WR-02-301 – D6 | 500m east of the route of the Proposed Scheme (490m east of land required for construction of the Proposed Scheme) | Alluvium and glaciofluvial sheet deposits over the Mercia Mudstone Group (Sidmouth Mudstone Formation – Wilkesley Halite Member) | 53 | Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits. |
| Tributary of Swill Brook 1 WR-02-301 – D6 | 20m west of the route of the Proposed Scheme (7m north-west of land required for construction of the Proposed Scheme) | Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation) | 61 | Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits. |
| Tributary of Gresty Brook 1 WR-02-301 – D6 | 30m west of the route of the Proposed Scheme (720m north-west of land required for construction of the Proposed Scheme) | Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation) | 59 | Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits. |
| Tributary of Gresty Brook 3 WR-02-301 – E5 | 275m west of the route of the Proposed Scheme (100m south-west of land required for construction of the Proposed Scheme) | Alluvium and glacial till over the Mercia Mudstone Group (Sidmouth Mudstone Formation) | 48 | Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits. |
| Gresty Brook WR-02-301 – E6 | Crossed by route of the Proposed Scheme | Alluvium and glacial till over the Mercia Mudstone Group (Sidmouth Mudstone Formation) | 54 | Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits. |

| Feature (and map grid square)[2] | Distance and direction from route | Formation | Elevation (mAOD) | Comments |
|---|---|---|---|---|
| Tributary of Gresty Brook 2<br>WR-02-301 – D6 | 600m east of the route of the Proposed Scheme (adjacent to land required for construction of the Proposed Scheme) | Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation) | 50 | Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits. |
| Valley Brook<br>WR-02-301 – E6 | Crossed by route of the Proposed Scheme | Alluvium and glacial till over the Mercia Mudstone Group (Sidmouth Mudstone Formation) | 42 | Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits. |
| Leighton Brook<br>WR-02-301 – F5 | 710m west of the route of the Proposed Scheme (within the land required for construction of the Proposed Scheme) | Alluvium and glacial till over the Mercia Mudstone Group (Sidmouth Mudstone Formation) | 49 | Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits. |
| Tributary of Fowle Brook 1<br>WR-02-301 – G5 | Crossed by route of the Proposed Scheme | Glacial till over the Mercia Mudstone Group (Sidmouth Mudstone Formation and Sidmouth Mudstone Formation – Wilkesley Halite Member) | 49 | Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits. |
| Hoggins Brook<br>WR-02-301 – G5 | 340m east of the route of the Proposed Scheme (within the land required for construction of the Proposed Scheme) | Glacial till over the Mercia Mudstone Group (Sidmouth Mudstone Formation) | 46 | Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits. |
| Tributary of the River Weaver 1<br>WR-02-301 – H5 | 420m west of the route of the Proposed Scheme (within the land required for construction of the Proposed Scheme) | Alluvium, glaciofluvial sheet deposits and glacial till over the Mercia Mudstone Group (Sidmouth Mudstone Formation) | 47 | Watercourse is likely to be in hydraulic connection with the underlying and adjacent permeable superficial deposits. |
| **Springs or potential spring features** | | | | |
| Spring 70m east of Chorlton Bank Farm<br>WR-02-301 – C6 | 490m south-east of the route of the Proposed Scheme (330m east of land required for construction of the Proposed Scheme) | Glaciofluvial deposits over Mercia Mudstone Group (Sidmouth Mudstone Formation – Wilkesley Halite Member) | 64 | Surveys confirm this is a buried stream which feeds into a small marsh, acting as a groundwater collect, before discharging into the Basford Brook. This feature is supporting a low value stream but maintains a |

| Feature (and map grid square)[2] | Distance and direction from route | Formation | Elevation (mAOD) | Comments |
|---|---|---|---|---|
| | | | | habitat and is therefore a moderate value receptor. |
| Potential spring at Savoy Road, Crewe<br>WR-02-301 – D6 | 620m east of the route of the Proposed Scheme (160m west of land required for construction of Proposed Scheme) | Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation) | 50 | 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 500m south-west of Moss Farm, north of Crewe<br>WR-02-301 – G5 | Crossed by the route of the Proposed Scheme | Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation) | 49 | Survey has shown this feature is a culvert which discharges to Tributary of Fowle Brook 1 and it is therefore included in the surface water assessment. |
| Potential spring at Moat House Farm, Minshull Vernon<br>WR-02-301 – H5 | 420m west of the route of the Proposed Scheme (within land required for construction of the Proposed Scheme) | Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation) | 47 | Survey has shown this feature is a culvert, which discharges to Tributary of River Weaver 1 and it is therefore included in the surface water assessment. |
| Potential spring at The Woodlands, Minshull Vernon<br>WR-02-301 – I5 | 520m west of the route of the Proposed Scheme (within land required for construction of the Proposed Scheme) | Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation) | 46 | Survey has shown this feature is a culvert, which discharges to Tributary of River Weaver 1 and it is therefore included in the surface water assessment. |
| Potential sink on Worsley Covert, at Woodside Farm<br>WR-02-301 – I5 | 920m west of the route of the Proposed Scheme (530m north-west of land required for construction of the Proposed Scheme) | Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation) | 41 | Survey has shown this feature is a culvert, which takes water from Tributary of River Weaver 1 and it is therefore included in the surface water assessment. |
| Potential spring 260m west of Park Hall Farm, Minshull Vernon<br>WR-02-301 – I5 | 80m west of the route of the Proposed Scheme (within land required for construction of the Proposed Scheme) | Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation) | 49 | Survey has shown this feature is a culvert, which discharges to Tributary of River Weaver 2 and it is therefore included in the surface water assessment. |
| Potential sink 230m west of Wimboldsley Hall<br>WR-02-301 – I5 | 660m west of the route of the Proposed Scheme (on the boundary of land required for construction of the Proposed Scheme) | Glacial till over Mercia Mudstone Group (Sidmouth Mudstone Formation) | 48 | Survey has shown this feature is a culvert, which takes water from Tributary of River Weaver 2 and it is therefore included in the surface water assessment. |

# 2.4 Water dependent habitats

2.4.1 Table 6 summarises the surface water and groundwater dependent habitats within the study area.

**Table 6: Water dependent habitats**

| Name (and map grid square)[13] | Distance and direction from route | Designation | Comments |
|---|---|---|---|
| **Surface water dependent habitats** | | | |
| Sandbach Flashes (Bottoms Flash and Groby's Flash) EC-01-503-R1 – A3 | 1.3km east of the route of the Proposed Scheme (370m east of the land required for construction of the Proposed Scheme). | Site of Special Scientific Interest (SSSI) | Sandbach Flashes SSSI consists of 14 distinct units. Tributary of Fowle Brook 1 issues within the footprint of the Proposed Scheme before it flows into the southern unit of Sandbach Flashes SSSI, known as Bottoms Flash and Groby's Flash. The habitat is dependent on surface water. |
| Basford Brook EC-01-501 – A8 and B8 | 500m east of the route of the Proposed Scheme (490m east of the land required for construction of the Proposed Scheme). | Local Wildlife Site (LWS) | Basford Brook and numerous tributaries of the brook flow through this habitat along the length of Basford Brook. The habitat is dependent on surface water. |
| Mere Gutter with Basford Brook EC-01-501 – G5 and G6 | The route of the Proposed Scheme crosses beneath the watercourse in tunnel (partially adjacent to the land required for the construction of the Proposed Scheme). | LWS | Basford Brook and Mere Gutter flow through this habitat, along Basford Brook and Gresty Brook. The habitat is dependent on surface water. |
| **Groundwater and surface water dependent habitats** | | | |
| Moss Bridge Marsh EC-01-503 – D6 | Crossed by the route of the Proposed Scheme (partially within land required for the construction of the Proposed Scheme) | LWS | Moss Bridge Marsh is a marshy grassland habitat which may be supported by surface water from drainage channels, groundwater from underlying glacial till or rainfall. Groundwater inflow may be small but could be important in dry periods to support the wet woodland, marshland and pool. The site has been included in the surface water assessment on a precautionary basis. |
| Spring Plantation Grassland EC-01-503 – D5 | 90m west of the route of the Proposed Scheme (eastern end of site is located within land required for the | LWS | Spring Plantation Grassland is a grassy field with marshy grassland characteristics (patches of reeds and crack willow) which may be supported by surface water from drainage channels, groundwater from |

[13] 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. This Map Series show water dependent habitats with statutory designations.

| Name (and map grid square)[13] | Distance and direction from route | Designation | Comments |
|---|---|---|---|
| | construction of the Proposed Scheme) | | underlying glacial till or rainfall. Groundwater inflow may be small but could be important in dry periods to support the marshy grassland habitats. The site has been included in the surface water assessment on a precautionary basis. |
| Worsley Covert and Polestead Wood ancient woodland<br>EC-01-504a – C2 | 830m west of the route of the Proposed Scheme (180m west of land required for the construction of the Proposed Scheme) | LWS and ancient woodland | Worsley Covert swamp and marshy grassland habitat may be supported by surface water, groundwater from underlying glacial till, or rainfall. The site has been included in the surface water assessment on a precautionary basis as potentially dependent on both groundwater and surface water. |
| **Groundwater dependent habitats** | | | |
| Ridding Farm Ponds<br>EC-01-503 – H8 | 610m east of the route of the Proposed Scheme (360m east of the land required for the construction of the Proposed Scheme) | LWS | Ridding Farm Ponds are underlain by glacial till (Secondary (Undifferentiated) aquifer). It is unlikely that the ponds are supported by groundwater, but the site has been included in the surface water assessment on a precautionary basis. |

# 3 References

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.

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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