

High Speed Rail (Crewe – Manchester)

Supplementary Environmental Statement 1 and Additional Provision 1 Environmental Statement

Volume 5: Map Book

Water resources and flood risk (WR-02)

High Speed Rail (Crewe – Manchester)

Supplementary Environmental Statement 1 and Additional Provision 1 Environmental Statement

Volume 5: Map Book

Water resources and flood risk (WR-02)



Department
for Transport

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

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

Telephone: 08081 434 434

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.hs2.org.uk

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

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

MWJV

Mott MacDonald | WSP

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

© High Speed Two (HS2) Limited, 2022, except where otherwise stated.

Copyright in the typographical arrangement rests with High Speed Two (HS2) Limited.

This information is licensed under the Open Government Licence v3.0. To view this licence, visit www.nationalarchives.gov.uk/doc/open-government-licence/version/3 **OGL** or write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or e-mail: psi@nationalarchives.gsi.gov.uk. Where we have identified any third-party copyright information you will need to obtain permission from the copyright holders concerned.



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

Contents

Mapping explanatory notes

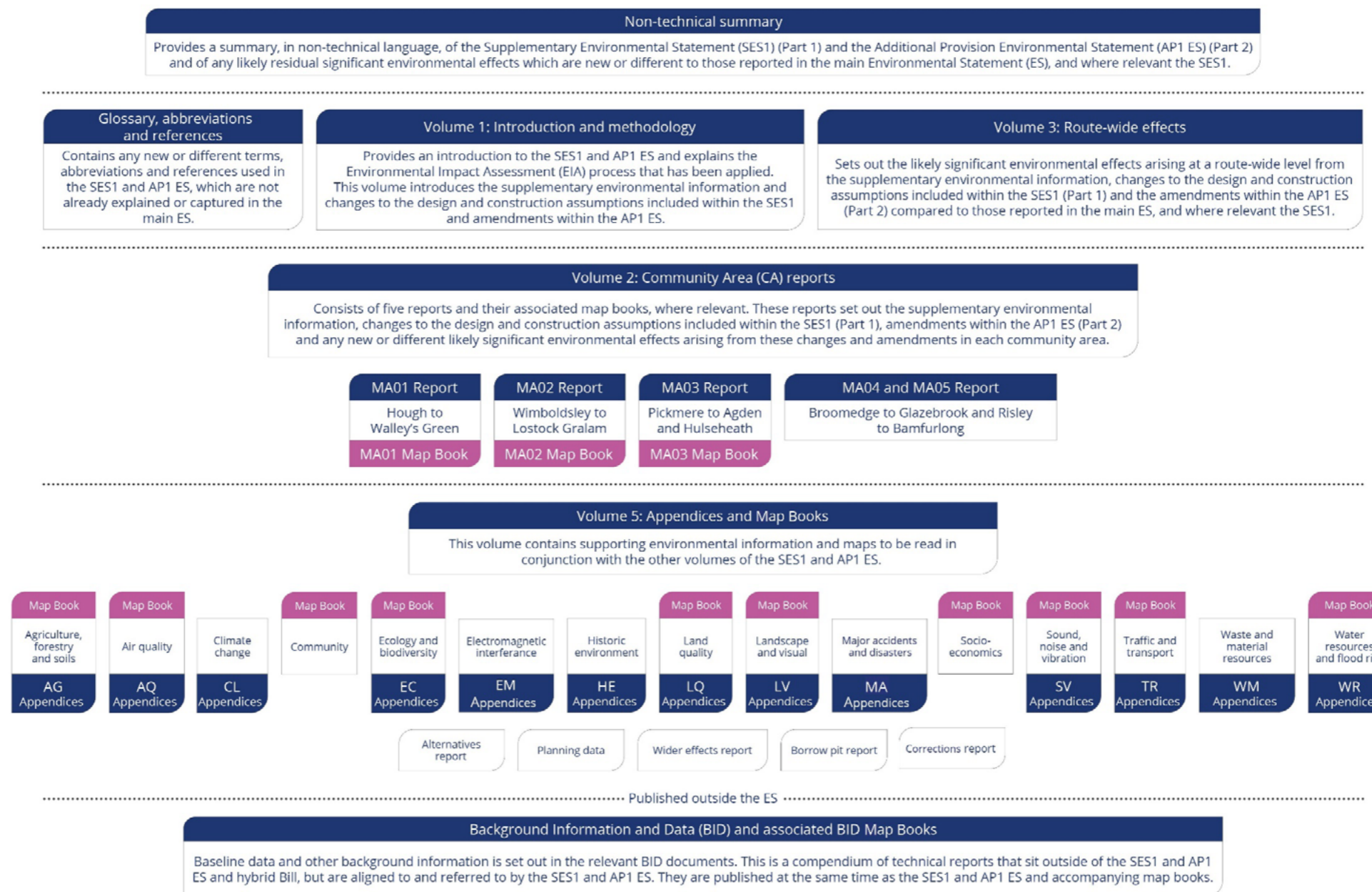
Data dictionary and definitions

Map series name	WR-02 - Groundwater Baseline
Map series description	These maps show geology and hydrogeological features such as aquifers and groundwater abstractions that are referred to in the Environmental Impact Assessment (EIA).
Community Area name	
MA01 Hough to Walley's Green	
MA02 Wimboldsley to Lostock Gralam	
MA03 Pickmere to Agden and Hulseheath	✓
MA04 Broomedge to Glazebrook	
MA05 Risley to Bamfurlong	

Mapping explanatory notes

Structure of the Supplementary Environmental Statement 1 and the Additional Provision 1 Environmental Statement

This map book is part of the suite of documents that make up the Supplementary Environmental Statement 1 (SES1) and the Additional Provision 1 Environmental Statement (AP1 ES) for the High Speed Rail (Crewe – Manchester) scheme. The SES1 and the AP1 ES are separate documents; however, they are bound together and presented in a number of volumes shown in Figure 1.



Copyright statements

Copyright statements are presented in the data dictionary and definitions section at the front of the map book, due to limited space to include this on the individual maps themselves.

Ordnance Survey data

All maps produced as part of the SES1 and AP1 ES contain Ordnance Survey (OS) data. HS2 Ltd use the most up to date mapping available, where possible, supplied by the OS and as such, we cannot be held responsible for any inaccuracies within this data. As part of our licence conditions, all digital maps carry a watermark.

Chainage

Most of the maps presented as part of the SES1 and AP1 ES have a chainage value shown next to the alignment. Chainage is presented on the maps in black font, in the form of XXX+YYY, e.g. 192+000 or 239+500.

Chainage (known as reference chainage) is referenced from Euston Station, which is 0+000, and the value presented is in metres, e.g. 192+000 refers to the point, 192,000m, or 192km, from Euston Station. Chainage values increase in intervals dependent on the map scale. For maps at 1:50,000 scale chainage is shown at 5km intervals. For maps at 1:25,000 scale chainage is shown at 2km intervals. For maps at 1:20,000, 1:10,000, 1:5,000 and 1:2,500 scales, chainage is shown at 1km intervals.

Chainage has been included on the maps as a useful tool for comparing different map sets showing the different environmental themes or engineering plans, due to map sets having different scales, and therefore, showing differing amounts of alignment on the map.

Map sheet layout

Each map in Volume 2 is presented twice, with the main ES map (In Parliament - Session 2021 - 2022) on the left-hand page and the SES1 and the AP1 ES map on the right. For the CT-05 and CT-06 map series, the SES1 and the AP1 ES is shown with different coloured hatching, annotated with labels, which highlights the areas of change. The coloured text box provides a brief description of the design change and amendment, and gives the SES1 and the AP1 ES reference number. In some instances where the effect covers a large area, a box without hatching but with a label, is shown. Only maps which have been amended as a result of the SES1 and the AP1 ES are included within the map books. Other design changes which are within the existing limits of the Bill and do not result in new or different likely significant effects are also shown on the maps, but are not indicated by hatching.

Each Volume 5 map is annotated to describe the change to a receptor or significant effect, and to give the SES1 and the AP1 ES reference number. For more detailed information about the SES1 and the AP1 ES annotation, refer to the map series legend. Only maps which have been amended as a result of the SES1 and the AP1 ES are included within the map book.

Map orientation

The majority of the maps presented in these map books are presented with the railway alignment running horizontally across the page. The direction of travel to London would be following the alignment to the left hand side of the page, and Manchester to the right.

The exception to this, are map series LV-00, LV-02, LV-07 and LV-08, which present the alignment running from bottom to top of the page. This is to allow more of the modelled outputs to be shown at the appropriate map scale. In this instance, the direction of travel to London would be to the bottom of the page, and Manchester to the top.

Further details on the approach to mapping is set out in Section 6 of Volume 1 of the SES1 and AP1 ES.

Map books

In total, there are 14 map books included in the SES1 and AP1 ES Volume 2 and Volume 5. A list of the map book titles and map series is provided below for reference.

Map book title (map series)	Name
Volume 2: Map book – MA01: Hough to Walley's Green (CT-05, CT-06, CT-10, LV-01, LV-03, LV-04, SV-05)	Volume 5: Map book – Land quality (LQ-01)
Volume 2: Map book – MA02: Wimboldsley to Lostock Gralam (CT-05, CT-06, CT-10, LV-01, LV-03, LV-04, SV-05)	Volume 5: Map book – Landscape and visual (LV-00, LV-02, LV-07, LV-08, LV-17)
Volume 2: Map book – MA03: Pickmere to Agden and Hulseheath (CT-05, CT-06, CT-10, LV-01, LV-03, LV-04, SV-05)	Volume 5: Map book – Planning Data/Committed Development (CT-13)
Volume 5: Map book – Agriculture (AG-01, AG-04)	Volume 5: Map book – Socio-economics (SE-01)
Volume 5: Map book – Air quality (AQ-01)	Volume 5: Map book – Sound, noise and vibration (SV-02, SV-03, SV-08, SV-09)
Volume 5: Map book – Community (CM-01)	Volume 5: Map book – Traffic and transport (TR-03, TR-04, TR-08)
Volume 5: Map book – Ecology and biodiversity (EC-01)	Volume 5: Map book – Water resources and flood risk (WR-02)

High Speed Rail (Crewe – Manchester)

Supplementary Environmental Statement 1 and Additional Provision 1 Environmental Statement

Data dictionary and definitions

Data dictionary and definitions

Legend features	Definition	Source	Copyright
Airport	Airport location derived from Ordnance Survey Vector map data.	Ordnance Survey	© Crown copyright. Reproduced by permission of Ordnance Survey Licence Number 100049190. Year of Publication 2021.
Community area boundary	The Environmental Statement has been split into sections called Community Areas.	High Speed Two (HS2) Ltd	© Crown copyright. Reproduced by permission of Ordnance Survey Licence Number 100049190. Year of Publication 2019.
Consented discharge to groundwater	A discharge to groundwater under permit regulations (the Environmental Permitting, England and Wales Regulations, 2010 (EPR)).	Environment Agency	© Environment Agency copyright and/or database right 2021. All rights reserved.
County boundary	County boundaries from Ordnance Survey boundary mapping.	Ordnance Survey	© Crown copyright. Reproduced by permission of Ordnance Survey Licence Number 100049190. Year of Publication 2021.
Depot, station, headhouse or portal building	Extends to cover operational footprint of each depot and station and the footprint of each tunnel vent shaft and headhouse at surface level. Excludes any ancillary buildings associated with these structures.	High Speed Two (HS2) Ltd	
District/Borough boundary	Ordnance Survey local authority boundary mapping.	Ordnance Survey	© Crown copyright. Reproduced by permission of Ordnance Survey Licence Number 100049190. Year of Publication 2021.
Geological fault line	The surface of a fault fracture along which the rocks have been displaced. The data that comprises the geological theme of 'Linear' as depicted on the 1:50,000 published map DiGMapGB-50	British Geological Survey (BGS)	Collins English Dictionary – Complete and Unabridged © HarperCollins Publishers 1991, 1994, 1998, 2000, 2003. Reproduced with the permission of the British Geological Survey ©NERC. All rights Reserved.

Legend features	Definition	Source	Copyright
Groundwater source protection zones	Source Protection Zones (SPZs) have been defined for approximately two thousand groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. The maps show three main zones; SPZ1 - inner, SPZ2 - outer and SPZ3 - total catchment.	Environment Agency	© Environment Agency copyright and/or database right 2021. All rights reserved.
Lakes & Reservoirs	A body of water such as a lake or pond forming a geographical feature. Based on Ordnance Survey Vector Map District.	Ordnance Survey	© Crown copyright. Reproduced by permission of Ordnance Survey Licence Number 100049190. Year of Publication 2021.
Licensed groundwater abstraction	A groundwater abstraction licence issued by the Environment Agency, which abstracts more than 20 cubic metres a day. Excludes the precise location of public water supplies in order to comply with Security and Environmental Measures Direction 1998.	Environment Agency	© Environment Agency copyright and/or database right 2021. All rights reserved.
Route in tunnel	Represents the proposed route of HS2, split into route on surface and tunnelled sections.	High Speed Two (HS2) Ltd	
Route on surface	Represents the proposed route of HS2, split into route on surface and tunnelled sections.	High Speed Two (HS2) Ltd	
Springs	A surface expression of a groundwater body	High Speed Two (HS2) Ltd	
Unlicensed private groundwater abstraction	A private water supply from a groundwater source, which abstracts less than 20 cubic metres a day. Local authorities currently hold a register of private water supplies. The local authorities are required in accordance with The Private Water Supplies Regulations 2009, to ensure that unlicensed abstractions meet certain quality standards.	Environment Agency	© Environment Agency copyright and/or database right 2021. All rights reserved.

This page is left intentionally blank

High Speed Rail (Crewe – Manchester)

Supplementary Environmental Statement 1 and Additional Provision 1 Environmental Statement

MA03: Pickmere to Agden and Hulseheath

WR-02 – Groundwater Baseline

Bedrock Geology

BNT-MDLM	BARNSTONE MEMBER - MUDSTONE AND LIMESTONE, INTERBEDDED	HA-SDST	HALESOWEN FORMATION - SANDSTONE (Secondary A aquifer)	TRBR-SDST	TRENCHERBONE ROCK - SANDSTONE (Secondary A aquifer)
CTM-MDST	COTHAM MEMBER - MUDSTONE (Secondary Undifferentiated aquifer)	HANS-SDST	HANCHURCH SANDSTONE BED - SANDSTONE (Secondary A aquifer)	TUPR-SDST	TUPTON ROCK - SANDSTONE (Secondary A aquifer)
WBV-MDSI	WESTBURY FORMATION - MUDSTONE AND SILTSTONE (Secondary B aquifer)	HTS-SDST	HOLT TOWN SANDSTONE BED - SANDSTONE (Secondary A aquifer)	WGF-SDST	WINGFIELD FLAGS - SANDSTONE (Secondary A aquifer)
WBV-MDST	WESTBURY FORMATION - MUDSTONE (Secondary Undifferentiated aquifer)	SPPS-SDST	SPRINGPOOL SANDSTONE BED - SANDSTONE (Secondary A aquifer)	WH-SDST	WOODHEAD HILL ROCK - SANDSTONE (Secondary A aquifer)
BAN-MDST	BLUE ANCHOR FORMATION - MUDSTONE (Secondary B aquifer)	WIT-LMST	WHITACRE MEMBER - LIMESTONE (Principal aquifer)	ETM-MDSC	ETRURIA FORMATION - MUDSTONE, SANDSTONE AND CONGLOMERATE (Secondary A aquifer)
BCMU-DSLST	BRANSCOMBE MUDSTONE FORMATION - SILTSTONE, DOLOMITIC (Secondary B aquifer)	WIT-MDSI	WHITACRE MEMBER - MUDSTONE AND SANDSTONE (Principal aquifer)	ETM-SDST	ETRURIA FORMATION - SANDSTONE (Secondary A aquifer)
BCMU-MDST	BRANSCOMBE MUDSTONE FORMATION - MUDSTONE (Secondary B aquifer)	WIT-SDST	WHITACRE MEMBER - SANDSTONE (Principal aquifer)	ETM-STM	ETRURIA FORMATION - SANDSTONE AND MUDSTONE (Secondary A aquifer)
AS-SDSM	ARDEN SANDSTONE FORMATION - SANDSTONE, SILTSTONE AND MUDSTONE (Principal Aquifer)	ACR-SDST	ACKTON ROCK - SANDSTONE (Secondary A aquifer)	MGCY-SDST	UNNAMED SANDSTONE OF YEADONIAN AGE (IN MILLSTONE GRIT GROUP) - SANDSTONE
AS-SDST	ARDEN SANDSTONE FORMATION - SANDSTONE (Secondary A aquifer)	AR-SDST	ACKWORTH ROCK - SANDSTONE (Secondary A aquifer)	RF-SDST	ROUGH ROCK FLAGS - SANDSTONE
COT-SDST	COTGRAVE SANDSTONE MEMBER - SANDSTONE (Secondary A aquifer)	BADR-SDST	BADSWORTH ROCK - SANDSTONE (Secondary A aquifer)	ROSSE-MDSI	ROSSENDALE FORMATION - MUDSTONE AND SILTSTONE (Secondary A aquifer)
EDW-DSLST	EDWALTON MEMBER - SILTSTONE, DOLOMITIC (Secondary B aquifer)	BYR-SDST	BRIERLEY ROCK - SANDSTONE (Secondary A aquifer)	ROSSE-SDST	ROSSENDALE FORMATION - SANDSTONE (Secondary A aquifer)
EDW-MDST	EDWALTON MEMBER - MUDSTONE (Secondary B aquifer)	DLT-SDST	DALTON ROCK - SANDSTONE (Secondary A aquifer)	RR-SDST	ROUGH ROCK - SANDSTONE (Secondary A aquifer)
WHT-HAMD	WILKESLEY HALITE MEMBER - HALITE-STONE AND MUDSTONE (Unproductive)	GH-SDST	GLASS HOUGHTON ROCK - SANDSTONE (Secondary A aquifer)	ASG-SDST	ASHOVER GRIT - SANDSTONE (Secondary A aquifer)
DIS-SDST	DISEWORTH SANDSTONE - SANDSTONE (Secondary B aquifer)	MXR-SDST	MEXBOROUGH ROCK - SANDSTONE (Secondary A aquifer)	CHG-SDST	CHATSWORTH GRIT - SANDSTONE (Secondary A aquifer)
BOM-MDST	BOLLIN MUDSTONE MEMBER - MUDSTONE (Secondary B aquifer)	NEWR-SDST	NEWSTEAD ROCK - SANDSTONE (Secondary A aquifer)	EC-SDST	EAST CARLTON GRIT - SANDSTONE
BREE-BREC	BREEDON BRECCIA - BRECCIA (Secondary B aquifer)	NHSS-SDST	NEWTON HEATH SANDSTONE - SANDSTONE (Secondary A aquifer)	GSYG-SDST	GUISELEY GRIT - SANDSTONE
GUN-DSLST	GUNTHORPE MEMBER - SILTSTONE, DOLOMITIC (Secondary B aquifer)	NR-SDST	NOB END ROCK - SANDSTONE (Secondary A aquifer)	HDW-SDST	HUDDERSFIELD WHITE ROCK - SANDSTONE
GUN-MDST	GUNTHORPE MEMBER - MUDSTONE (Secondary B aquifer)	OPS-SDST	OPENSHAW SANDSTONE - SANDSTONE (Secondary A aquifer)	MARSD-MDSI	MARSDEN FORMATION - MUDSTONE AND SILTSTONE (Secondary A aquifer)
GUN-SDST	GUNTHORPE MEMBER - SANDSTONE (Secondary B aquifer)	PUCM-MDSS	PENNINE UPPER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE (Secondary A aquifer)	MG CZ-SDST	UNNAMED SANDSTONE OF MARSDENIAN AGE (IN MILLSTONE GRIT GROUP) - SANDSTONE (Secondary A aquifer)
GUN-SLST	GUNTHORPE MEMBER - SILTSTONE (Secondary B aquifer)	PUCM-SDST	PENNINE UPPER COAL MEASURES FORMATION - SANDSTONE (Secondary A aquifer)	MGG-SDST	MIDGLEY GRIT - SANDSTONE
HEY-MDST	HELSEY SANDSTONE FORMATION - MUDSTONE (Principal aquifer)	RVR-SDST	RAVENFIELD ROCK - SANDSTONE (Secondary A aquifer)	RE-SDST	REDMIRES FLAGS - SANDSTONE
HEY-PESST	HELSEY SANDSTONE FORMATION - SANDSTONE, PEBBLY (GRAVELLY) (Principal aquifer)	WDR-SDST	WORSLEY DELF ROCK - SANDSTONE (Secondary A aquifer)	AD-SDST	ADDLETHORPE GRIT - SANDSTONE
HEY-SDST	HELSEY SANDSTONE FORMATION - SANDSTONE (Principal aquifer)	WYR-SDST	WICKERSLEY ROCK - SANDSTONE (Secondary A aquifer)	AE-SDST	ADDINGHAM EDGE GRIT - SANDSTONE
NWHF-HAMD	NORTHWICH HALITE MEMBER - HALITE-STONE AND MUDSTONE (Unproductive)	ABR-SDST	ABDY ROCK - SANDSTONE (Secondary A aquifer)	DSS-SDST	DOUBLER STONES SANDSTONE - SANDSTONE
RDCF-MDSI	RADCLIFFE MEMBER - MUDSTONE AND SILTSTONE (Secondary B aquifer)	BAR-SDST	BARDSLEY ROCK - SANDSTONE (Secondary A aquifer)	HMSA-SDST	HIGH MOOR SANDSTONE - SANDSTONE
RDCF-MDST	RADCLIFFE MEMBER - MUDSTONE (Secondary Undifferentiated aquifer)	BNR-SDST	BARNSLEY ROCK - SANDSTONE	LPG-SDST	LOWER PLOMPTON GRIT - SANDSTONE
RDCF-SLST	RADCLIFFE MEMBER - SILTSTONE (Secondary B aquifer)	CRRO-SDST	CRIGGESTONE ROCK - SANDSTONE (Secondary A aquifer)	LRSS-SDST	LONG RIDGE SANDSTONE - SANDSTONE
SHSA-MDST	SHEPshed SANDSTONE MEMBER - MUDSTONE (Principal aquifer)	HMR-SDST	HAIGH MOOR ROCK - SANDSTONE (Secondary A aquifer)	MGCK-SDST	UNNAMED SANDSTONE OF KINDERSCOUTIAN AGE (IN MILLSTONE GRIT GROUP) - SANDSTONE (Secondary A aquifer)
SHSA-SDST	SHEPshed SANDSTONE MEMBER - SANDSTONE (Principal aquifer)	HNC-SDST	HUNCLIFFE ROCK - SANDSTONE (Secondary A aquifer)	UPG-SDST	UPPER PLOMPTON GRIT - SANDSTONE
CHES-MDST	CHESTER FORMATION - MUDSTONE (Principal Aquifer)	HRR-SDST	HORBURY ROCK - SANDSTONE (Secondary A aquifer)	UF-SDST	UPPER FOLLIFOOT GRIT - SANDSTONE
CHES-PESST	CHESTER FORMATION - SANDSTONE, PEBBLY (GRAVELLY) (Principal Aquifer)	KNR-SDST	KENT'S ROCK - SANDSTONE	MORRI-MDSS	MORRIDGE FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE (Secondary A aquifer)
CHES-SCON	CHESTER FORMATION - SANDSTONE AND CONGLOMERATE, INTERBEDDED (Principal aquifer)	OR-SDST	OAKS ROCK - SANDSTONE (Secondary A aquifer)	MG-MDSS	MILLSTONE GRIT GROUP [SEE ALSO MIGR] - MUDSTONE, SILTSTONE AND SANDSTONE (Secondary A aquifer)
CHES-SDST	CHESTER FORMATION - SANDSTONE (Principal aquifer)	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE (Secondary A aquifer)	MG-SDST	MILLSTONE GRIT GROUP [SEE ALSO MIGR] - SANDSTONE (Secondary A aquifer)
SIM-DSLST	SIDMOUTH MUDSTONE FORMATION - SILTSTONE, DOLOMITIC (Secondary Undifferentiated aquifer)	PMCM-SDST	PENNINE MIDDLE COAL MEASURES FORMATION - SANDSTONE (Secondary A aquifer)	EYL-LMST	EYAM LIMESTONE FORMATION - LIMESTONE (Principal aquifer)
SIM-MDST	SIDMOUTH MUDSTONE FORMATION - MUDSTONE (Secondary B aquifer)	PMR-SDST	PEMBERTON ROCK - SANDSTONE (Secondary A aquifer)	EYLK-LMST	EYAM LIMESTONES FORMATION (KNOLL-REEF) - LIMESTONE
TPSF-MDSI	TARPORLEY SILTSTONE FORMATION - MUDSTONE AND SILTSTONE (Secondary Undifferentiated aquifer)	PR-SDST	PEEL HALL ROCK - SANDSTONE (Secondary A aquifer)	MO-LMST	MONSAL DALE LIMESTONE FORMATION - LIMESTONE
TPSF-MDSS	TARPORLEY SILTSTONE FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE (Secondary B aquifer)	THR-SDST	TOP HARD ROCK - SANDSTONE (Secondary A aquifer)	TIL-LMST	TICKNALL LIMESTONE FORMATION - LIMESTONE (Principal aquifer)
TPSF-MDST	TARPORLEY SILTSTONE FORMATION - MUDSTONE (Secondary B aquifer)	TR-SDST	THORNHILL ROCK - SANDSTONE (Secondary A aquifer)	BSG-MDSS	BOWLAND SHALE FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE (Secondary A aquifer)
TPSF-SDST	TARPORLEY SILTSTONE FORMATION - SANDSTONE (Secondary A aquifer)	WE-SDST	WOOLLEY EDGE ROCK - SANDSTONE (Secondary A aquifer)	FV-TUF	FALLGATE VOLCANIC FORMATION - TUFF (Secondary B aquifer)
TPSF-SIMS	TARPORLEY SILTSTONE FORMATION - SILTSTONE, MUDSTONE AND SANDSTONE (Secondary B aquifer)	BLR-SDST	BLENFIRE ROCK - SANDSTONE (Secondary A aquifer)	WDF-LSMD	WIDMERPOOL FORMATION - LIMESTONE AND MUDSTONE, INTERBEDDED (Secondary A aquifer)
TPSF-SISD	TARPORLEY SILTSTONE FORMATION - SILTSTONE AND SANDSTONE (Secondary B aquifer)	BRSR-SDST	BIRSTALL ROCK - SANDSTONE	WDF-MDST	WIDMERPOOL FORMATION - MUDSTONE (Secondary Undifferentiated aquifer)
KNSF-SDST	KINNERTON SANDSTONE FORMATION - SANDSTONE (Principal aquifer)	CAR-SDST	CANNEL ROCK (SOUTH LANCASHIRE) - SANDSTONE (Secondary A aquifer)	CLHD-DLMDM	CLOUD HILL DOLOSTONE FORMATION - DOLOSTONE (Principal aquifer)
MMG-MDST	MERCIA MUDSTONE GROUP - MUDSTONE (Secondary B aquifer)	CHBR-SDST	CHAMBER ROCK - SANDSTONE (Secondary A aquifer)	CLHD-DOLO	CLOUD HILL DOLOSTONE FORMATION - DOLOSTONE (Principal aquifer)
WLSF-SDST	WILMSLOW SANDSTONE FORMATION - SANDSTONE (Principal aquifer)	CLRK-SDST	CLIFTON ROCK - SANDSTONE (Secondary A aquifer)	MI-DOLO	MILLDALE LIMESTONE FORMATION - DOLOSTONE (Principal aquifer)
WRS-SDST	WILDMOOR SANDSTONE MEMBER - SANDSTONE (Principal aquifer)	CRS-SDST	CRAWSHAW SANDSTONE - SANDSTONE (Secondary A aquifer)	MI-LMST	MILLDALE LIMESTONE FORMATION - LIMESTONE (Principal aquifer)
BTH-DOLMST	BROTHERTON FORMATION - LIMESTONE, DOLOMITIC (Principal Aquifer)	DHR-SDST	DEEP HARD ROCK - SANDSTONE (Secondary A aquifer)	MMI-LMPY	MIDLANDS MINOR INTRUSIVE SUITE - LAMPROPHYRES (Secondary B aquifer)
CDF-CAMDST	CADEBY FORMATION - MUDSTONE, CALCAREOUS (Principal aquifer)	EF-SDST	ELLAND FLAGS - SANDSTONE (Secondary A aquifer)	MPSH-MDST	MONKS PARK SHALE FORMATION - MUDSTONE (Secondary B aquifer)
CDF-DOLO	CADEBY FORMATION - DOLOSTONE (Principal Aquifer)	ER-SDST	EMLEY ROCK - SANDSTONE (Secondary A aquifer)	MVSH-MDST	MEREVALE SHALE FORMATION - MUDSTONE (Secondary B aquifer)
CDF-MDST	CADEBY FORMATION - MUDSTONE (Principal aquifer)	GM-SDST	GREENMOOR ROCK - SANDSTONE (Secondary A aquifer)	BLK-VCBR	BLACKBROOK RESERVOIR FORMATION - VOLCANIC-LIMESTONE-BRECCIA (Secondary B aquifer)
EDT-CAMDST	EDLINGTON FORMATION - MUDSTONE, CALCAREOUS (Secondary B aquifer)	GR-SDST	GRENSIDE SANDSTONE - SANDSTONE (Secondary A aquifer)	BLK-VCSST	BLACKBROOK RESERVOIR FORMATION - VOLCANIC-LIMESTONE-BRECCIA (Secondary B aquifer)
EDT-MDSD	EDLINGTON FORMATION - MUDSTONE AND SANDSTONE (Secondary B aquifer)	GR-SDST	GRENSIDE SANDSTONE - SANDSTONE (Secondary A aquifer)	BLK-VLSS	BLACKBROOK RESERVOIR FORMATION - VOLCANIC-LIMESTONE-BRECCIA (Secondary B aquifer)
LNS-SDST	LENTON SANDSTONE FORMATION - SANDSTONE (Secondary B aquifer)	KKBS-SDST	KIRKBURTON SANDSTONE - SANDSTONE (Secondary A aquifer)	CMBT-VCCLST	BRADGATE FORMATION - VOLCANIC-LIMESTONE-BRECCIA (Secondary B aquifer)
MM-MDST	MANCHESTER MARLS FORMATION - MUDSTONE (Secondary B aquifer)	LER-SDST	LOXLEY EDGE ROCK - SANDSTONE (Secondary A aquifer)	CMCL-PYRBR	CHARNWOOD LODGE VOLCANIC FORMATION - PYROCLASTIC-BRECCIA (Secondary B aquifer)
MOI-BREC	MOIRA FORMATION - BRECCIA (Principal aquifer)	MBR-SDST	MIDDLE BAND ROCK - SANDSTONE	CMCL-VCBR	CHARNWOOD LODGE VOLCANIC FORMATION - VOLCANIC-LIMESTONE-BRECCIA (Secondary B aquifer)
MOI-MDST	MOIRA FORMATION - MUDSTONE (Principal aquifer)	OL-SDST	OLD LAWRENCE ROCK - SANDSTONE (Secondary A aquifer)	CVB-PYRBR	CADEMAN VOLCANIC BRECCIA MEMBER - PYROCLASTIC-BRECCIA (Secondary B aquifer)
ROX-CAMDST	ROXBYP FORMATION - MUDSTONE, CALCAREOUS (Secondary B aquifer)	PKR-SDST	PARKGATE ROCK - SANDSTONE (Secondary A aquifer)	GVA-AND	GRIMLEY ANDESITE - ANDESITE (Secondary B aquifer)
SSG-SDST	SHERWOOD SANDSTONE GROUP - SANDSTONE (Principal Aquifer)	PLCM-MDSI	PENNINE LOWER COAL MEASURES FORMATION - MUDSTONE AND SILTSTONE (Secondary A aquifer)	IVH-TFASST	IVES HEAD FORMATION - TUFFACEOUS-SANDSTONE (Secondary B aquifer)
CS-SDST	COLLYHURST SANDSTONE FORMATION - SANDSTONE (Principal aquifer)	PLCM-MDSS	PENNINE LOWER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE (Secondary A aquifer)	IVH-VCSST	IVES HEAD FORMATION - VOLCANIC-LIMESTONE-BRECCIA (Secondary B aquifer)
HPBR-BREC	HOPWAS BRECCIA FORMATION - BRECCIA (Principal aquifer)	PLCM-MDST	PENNINE LOWER COAL MEASURES FORMATION - MUDSTONE (Secondary A aquifer)	KHT-PYRBR	KITE HILL TUFF MEMBER - PYROCLASTIC-BRECCIA (Secondary B aquifer)
HPBR-BRSS	HOPWAS BRECCIA FORMATION - BRECCIA AND SANDSTONE, INTERBEDDED (Principal aquifer)	PLCM-SDST	PENNINE LOWER COAL MEASURES FORMATION - SANDSTONE (Secondary A aquifer)	PLD-VCBR	PELDAR DACITE BRECCIA - VOLCANIC-LIMESTONE-BRECCIA (Secondary B aquifer)
YWS-SDST	YELLOW SANDS FORMATION - SANDSTONE (Principal Aquifer)	RHR-SDST	RAVENHEAD ROCK - SANDSTONE (Secondary A aquifer)	SQB-VCBR	SOUTH QUARRY BRECCIA MEMBER - VOLCANIC-LIMESTONE-BRECCIA (Secondary B aquifer)
ALY-MDSD	ALVELEY MEMBER - MUDSTONE AND SANDSTONE (Secondary A aquifer)	SBF-SDST	SOFT BED FLAGS - SANDSTONE (Secondary A aquifer)	YVR-VCBR	SWANNYMOTE BRECCIA MEMBER - VOLCANIC-LIMESTONE-BRECCIA (Secondary B aquifer)
ALY-SDST	ALVELEY MEMBER - SANDSTONE (Secondary A aquifer)	SBR-SDST	SLACK BANK ROCK - SANDSTONE (Secondary A aquifer)	SYP-DA	SHARPLEY PORPHYRITIC DACITE - DACITE (Secondary B aquifer)
GML-LMST	GREAT MINE LIMESTONE - LIMESTONE (Secondary A aquifer)	SR-SDST	SILKSTONE ROCK - SANDSTONE (Secondary A aquifer)		
HA-LMST	HALESOWEN FORMATION - LIMESTONE (Principal aquifer)	STNR-SDST	STANNINGLEY ROCK - SANDSTONE (Secondary A aquifer)		
HA-MDSS	HALESOWEN FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE (Secondary A aquifer)	TKS-SDST	THICK STONE - SANDSTONE (Secondary A aquifer)		

Map Number **WR-02 - Legend**

Map Name **WR-02 - Full Geological Legend with Rock Unit Names and Aquifer Status**



HS2 Ltd accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.

Registered in England. Registration number 06791686.
Registered office: Two Snowhill, Snow Hill Queensway, Birmingham B4 6GA.

© Crown copyright and database rights 2021
OS 100049190

Doc Number: 2EV01-ARP-GI-MAP-M000-000253

Date: 05/05/21

Superficial Deposits

ALV-XCZ	ALLUVIUM - CLAY AND SILT (Secondary A aquifer)
ALV-XCZSV	ALLUVIUM - CLAY, SILT, SAND AND GRAVEL (Secondary A aquifer)
ALV-XVZC	ALLUVIUM - GRAVEL, SAND, SILT AND CLAY (Secondary A aquifer)
LABD-XSV	LACUSTRINE BEACH DEPOSITS - SAND AND GRAVEL (Secondary A aquifer)
TFD-XCZS	TIDAL FLAT DEPOSITS - CLAY, SILT AND SAND (Secondary Undifferentiated aquifer)
BREI-S	BREIGHTON SAND FORMATION - SAND (Secondary A aquifer)
ESKRM-CSV	ESCRICK MORAINES MEMBER - CLAY, SANDY, GRAVELLY (Secondary Undifferentiated aquifer)
GFDUD-XSV	GLACIOFLUVIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL (Secondary A aquifer)
GFICD-XSV	GLACIOFLUVIAL ICE CONTACT DEPOSITS, DEVENSIAN - SAND AND GRAVEL (Secondary A aquifer)
GFSDD-XSV	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN - SAND AND GRAVEL (Secondary A aquifer)
GFTDD-XSV	GLACIOFLUVIAL TERRACE DEPOSITS, DEVENSIAN - SAND AND GRAVEL (Secondary A aquifer)
GLLDD-C	GLACIOLACUSTRINE DEPOSITS, DEVENSIAN - CLAY (Secondary A aquifer)
GLLDD-S	GLACIOLACUSTRINE DEPOSITS, DEVENSIAN - SAND (Secondary A aquifer)
GLLDD-XCZ	GLACIOLACUSTRINE DEPOSITS, DEVENSIAN - CLAY AND SILT (Unproductive)
HEM-CZ	HEMINGBROUGH GLACIOLACUSTRINE FORMATION - CLAY, SILTY (Unproductive)
HMGDD-DMTN	HUMMOCKY (MOUNDY) GLACIAL DEPOSITS, DEVENSIAN - DIAMICTON (Secondary Undifferentiated aquifer)
HMGDD-XSV	HUMMOCKY (MOUNDY) GLACIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL (Secondary A aquifer)
SSA-S	SHIRDLEY HILL SAND FORMATION - SAND (Secondary A aquifer)
SYSG-XSV	SYSTON MEMBER - SAND AND GRAVEL (Secondary A aquifer)
TILDI-DMTN	TILL, DEVENSIAN (IRISH SEA ICE) - DIAMICTON (Secondary Undifferentiated aquifer)
TILLD-CSVZ	TILL, DEVENSIAN - CLAY, SANDY, GRAVELLY, SILTY (Secondary Undifferentiated aquifer)
TILLD-DMTN	TILL, DEVENSIAN - DIAMICTON (Secondary Undifferentiated aquifer)
TILLD-XCS	TILL, DEVENSIAN - CLAY AND SAND (Secondary A aquifer)
TILLD-XCSV	TILL, DEVENSIAN - CLAY, SAND AND GRAVEL (Secondary B aquifer)
TILLD-XDSV	TILL, DEVENSIAN - DIAMICTON, SAND AND GRAVEL (Secondary Undifferentiated aquifer)
VYORK-CSV	VALE OF YORK FORMATION - CLAY, SANDY, GRAVELLY (Secondary Undifferentiated aquifer)
VYORK-SV	VALE OF YORK FORMATION - SAND, GRAVELLY
WASG-XSV	WANLIP MEMBER - SAND AND GRAVEL (Secondary A aquifer)
YORKM-SV	YORK MORAINES MEMBER - SAND, GRAVELLY
BISG-XSV	BIRSTALL MEMBER - SAND AND GRAVEL (Secondary A aquifer)
BOSG-XSV	BORROWASH SAND AND GRAVEL - SAND AND GRAVEL (Secondary A aquifer)
OKSG-XSV	OCKBROOK SAND AND GRAVEL - SAND AND GRAVEL (Secondary A aquifer)
BOSW-XCZ	BOSWORTH CLAY MEMBER - CLAY AND SILT (Secondary Undifferentiated aquifer)
HRT-CSV	HARROGATE TILL FORMATION - CLAY, SANDY, GRAVELLY (Secondary Undifferentiated aquifer)
ODT-DMTN	OADBY MEMBER - DIAMICTON (Secondary Undifferentiated aquifer)
THT-DMTN	THRUSINGTON MEMBER - DIAMICTON (Secondary Undifferentiated aquifer)
GFDMP-XSV	GLACIOFLUVIAL DEPOSITS, MID PLEISTOCENE - SAND AND GRAVEL (Secondary A aquifer)
GLLMP-XCZS	GLACIOLACUSTRINE DEPOSITS, MID PLEISTOCENE - CLAY, SILT AND SAND (Unproductive)
GLLMP-XSV	GLACIOLACUSTRINE DEPOSITS, MID PLEISTOCENE - SAND AND GRAVEL (Secondary A aquifer)
TILMP-DMTN	TILL, MID PLEISTOCENE - DIAMICTON (Secondary Undifferentiated aquifer)
BSSG-XSV	BEESTON SAND AND GRAVEL MEMBER - SAND AND GRAVEL (Secondary A aquifer)
EGSG-XSV	EGGINGTON COMMON SAND AND GRAVEL MEMBER - SAND AND GRAVEL (Secondary A aquifer)
EMSG-XSV	EAGLE MOOR SAND AND GRAVEL MEMBER - SAND AND GRAVEL (Secondary A aquifer)
ETSG-XSV	ETWALL SAND AND GRAVEL MEMBER - SAND AND GRAVEL (Secondary Undifferentiated aquifer)
GDU-XCZS	GLACIAL DEPOSITS - CLAY, SILT AND SAND (Secondary Undifferentiated aquifer)
GLDD-XCZS	GLACIOLACUSTRINE DELTAIC DEPOSITS - CLAY, SILT AND SAND (Secondary B aquifer)
GLLD-XCZ	GLACIOLACUSTRINE DEPOSITS - CLAY AND SILT (Unproductive)
GLLD-XSV	GLACIOLACUSTRINE DEPOSITS - SAND AND GRAVEL (Secondary A aquifer)
HETD-XSV	HEMINGTON MEMBER - SAND AND GRAVEL (Secondary A aquifer)
HETD-XZV	HEMINGTON MEMBER - SILT AND GRAVEL (Secondary A aquifer)
HPSG-XSV	HOLME PIERREPONT SAND AND GRAVEL MEMBER - SAND AND GRAVEL (Secondary A aquifer)
ALF-XCZS	ALLUVIAL FAN DEPOSITS - CLAY, SILT AND SAND (Secondary A aquifer)
ALF-XCZSV	ALLUVIAL FAN DEPOSITS - CLAY, SILT, SAND AND GRAVEL
ALF-XSV	ALLUVIAL FAN DEPOSITS - SAND AND GRAVEL (Secondary A aquifer)
ALF-XSZ	ALLUVIAL FAN DEPOSITS - SAND AND SILT (Secondary A aquifer)
ALTD-XSV	ALLENTON TERRACE DEPOSITS - SAND AND GRAVEL (Secondary A aquifer)
ANSG-XSV	ANKER SAND AND GRAVEL - SAND AND GRAVEL (Secondary A aquifer)
GFDU-XSV	GLACIOFLUVIAL DEPOSITS - SAND AND GRAVEL (Secondary A aquifer)
HEAD-B	HEAD - BOULDERS (Secondary Undifferentiated aquifer)
HEAD-DMTN	HEAD - DIAMICTON (Secondary B aquifer)
HEAD-XCSV	HEAD - CLAY, SAND AND GRAVEL (Secondary A aquifer)
HEAD-XCZSV	HEAD - CLAY, SILT, SAND AND GRAVEL (Secondary Undifferentiated aquifer)
LDE-XCZ	LACUSTRINE DEPOSITS - CLAY AND SILT (Secondary Undifferentiated aquifer)
LDE-XCZS	LACUSTRINE DEPOSITS - CLAY, SILT AND SAND (Secondary Undifferentiated aquifer)
LDE-XSV	LACUSTRINE DEPOSITS - SAND AND GRAVEL (Secondary A aquifer)
LNSG-XSV	LEEN SAND AND GRAVEL - SAND AND GRAVEL (Secondary A aquifer)
PEAT-P	PEAT - PEAT (Unproductive)
RTD1-XSV	RIVER TERRACE DEPOSITS, 1 - SAND AND GRAVEL (Secondary A aquifer)
RTD2-XSV	RIVER TERRACE DEPOSITS, 2 - SAND AND GRAVEL (Secondary A aquifer)
RTD3-XSV	RIVER TERRACE DEPOSITS, 3 - SAND AND GRAVEL (Secondary A aquifer)
RTDU-XSV	RIVER TERRACE DEPOSITS (UNDIFFERENTIATED) - SAND AND GRAVEL (Secondary A aquifer)
TUFA-CATUFA	TUFA - TUFA, CALCAREOUS (Secondary A aquifer)

Map Number **WR-02 - Legend**

Map Name **WR-02 - Full Geological Legend with Rock Unit Names and Aquifer Status**



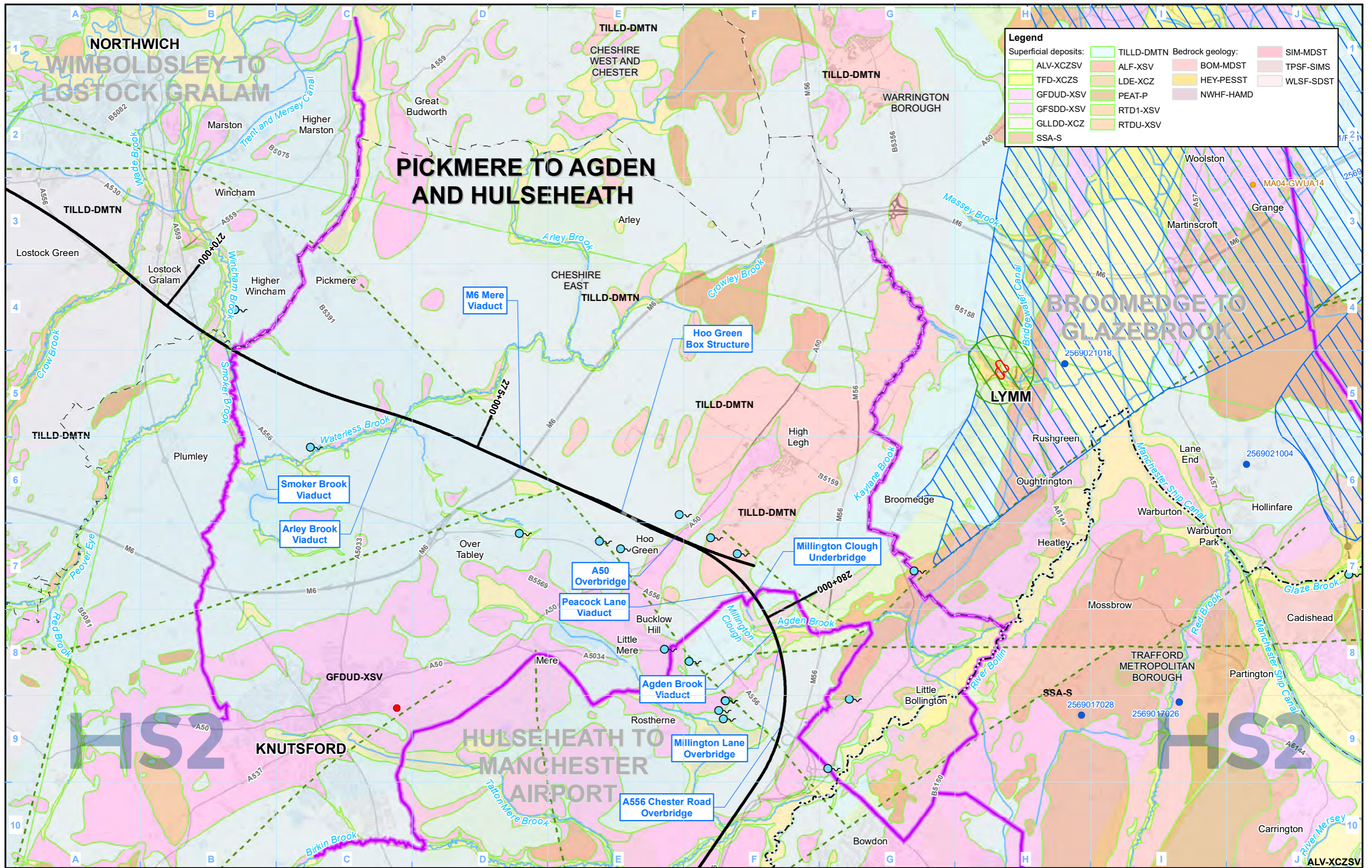
HS2 Ltd accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.

Registered in England. Registration number 06791686.
Registered office: Two Snowhill, Snow Hill Queensway, Birmingham B4 6GA.

© Crown copyright and database rights 2021
OS 100049190

Doc Number: 2EV01-ARP-GI-MAP-M000-000252

Date: 05/05/22



Legend	
Superficial deposits:	Bedrock geology:
ALV-XCZSV	ALF-XSV
TFD-XCZS	LDE-XCZ
GFDUD-XSV	PEAT-P
GFSDD-XSV	RTD1-XSV
GLLD-XCZ	RTDU-XSV
SSA-S	
TILLD-DMTN	BOM-MDST
	HEY-PESST
	NWHF-HAMD
	SIM-MDST
	TPSF-SIMS
	WLSF-SDST

Legend	
	Route in tunnel
	Route on surface
	Depot, station, headhouse or portal building
	Community area boundary
	County boundary
	District/Borough boundary
	Airport
	Lakes & Reservoirs
	Geological fault line
	Licensed groundwater abstraction (excluding public water supplies)
	Unlicensed private groundwater abstraction
	Consented discharge to groundwater
	Springs
	Groundwater source protection zone:
	Zone 1
	Zone 2
	Zone 3

For full geological legend including strata names and aquifer status please refer to WR-02 - Legend

Map Number	WR-02-303
Map Name	Groundwater Baseline SES1 and AP1 ES
Community Area MA03: Pickmere to Agden and Hulseheath	

HS2 Ltd accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.

Registered in England. Registration number 06791686.
Registered office: Two Snowhill, Snow Hill Queensway, Birmingham B4 6GA.

© Crown copyright and database rights 2021
OS 100049190

Doc Number: 2PT24-MWJ-EV-MAP-M000-000313-P01

Scale at A3: 1:50,000

Metres

Date: 20/04/22