

High Speed Rail (Crewe – Manchester)

Supplementary Environmental Statement 1 and Additional Provision 1 Environmental Statement

Volume 5: Appendix SV-003-00000

Sound, noise and vibration

Operational sound, noise and vibration report

MA01: Hough to Walley's Green

MA02: Wimboldsley to Lostock Gralam

MA03: Pickmere to Agden and Hulseheath

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Department for Transport

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

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1 Introduction

1.1 Structure of this appendix

- 1.1.1 This report is an appendix to the sound, noise and vibration assessment which forms part of Volume 5 of the Supplementary Environmental Statement 1 (SES1) and Additional Provision 1 Environmental Statement (AP1 ES).
- 1.1.2 This appendix provides details of changes to the operational sound, noise and vibration assessment since the production of the High Speed Two (HS2) High Speed Rail (Crewe – Manchester) Environmental Statement (ES)¹ published in 2022 (the main ES).
- 1.1.3 This report should be read in conjunction with Volume 5, Appendices: SV-001-00000² and SV-002-0MA01 to SV-002-0MA03 which formed part of the main ES.
- 1.1.4 This report covers the following community areas (CA):
- Hough to Walley's Green (MA01);
 - Wimboldsley to Lostock Gralam (MA02); and
 - Pickmere to Agden and Hulseheath (MA03).
- 1.1.5 SES1 and AP1 ES changes and amendments are reported separately in this report for each of the above community areas.
- 1.1.6 Maps referred to in this appendix are contained in the SES1 and AP1 ES Volume 5, Sound, noise and vibration Map Book: Map Series SV-02, SV-08 and SV-09. Map Series SV-02 presents the operational airborne noise and vibration impacts and likely significant effects; Map series SV-08 presents the daytime operational sound contours and Map Series SV-09 presents the night-time operational sound contours.
- 1.1.7 The SES1 and AP1 ES sound, noise and vibration assessment is detailed in the:
- SES1 and AP1 ES Volume 2, Community Area reports;
 - SES1 and AP1 ES Volume 5, Appendix: SV-002-00000; and
 - SES1 and AP1 ES Volume 5, Appendix: SV-003-00000 (this report).
- 1.1.8 In order to differentiate between the original proposals assessed as part of the main ES and subsequent changes, the following terms are used:

¹ High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement*. Available online at: <https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement>.

² High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement, Sound, noise and vibration methodology, assumptions and assessment*, Volume 5, Appendix: SV-001-00000. Available online at: <https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement>.

- ‘the original scheme’ – the Bill scheme submitted to Parliament in January 2022, which was assessed in the main ES;
- ‘the SES1 scheme’ – the original scheme with the changes described in SES1 that are within the existing powers of the Bill; and
- ‘the AP1 revised scheme’ – the original scheme as amended by the SES1 changes and AP1 amendments.

1.2 Scope of the assessment

- 1.2.1 This assessment presents the predicted operational sound, noise and vibration where materially altered by either an SES1 change or an AP1 amendment.

1.3 Methodology, data sources, assumptions and limitations

- 1.3.1 The assessment scope, key assumptions and limitations are as set out in the main ES Environmental Impact Assessment Scope and Methodology Report (SMR)³ (see main ES Volume 5, Appendix: CT-001-00001).
- 1.3.2 The following SES1 changes have the potential to lead to changes in significant noise effects from those assessed in the main ES:
- MA02 and MA03: Additional environmental baseline information;
 - MA03: Removal of the HS2 West Coast Main Line (WCML) connection (SES1-004-001); and
 - MA03: Changes to the Peacock Lane realignment (SES1-003-002).
- 1.3.3 In some cases, these SES1 changes and AP1 amendments have resulted in a change in traffic flow on roads within the relevant community area. The in-combination effects of SES1 changes and AP1 amendments are presented in the SES1 sections.
- 1.3.4 The following AP1 amendments have the potential to lead to changes in significant noise effects from those assessed in the main ES:
- MA01: Additional land permanently required for the realignment and extension of Crewe tunnel (AP1-001-001); and
 - MA01: Additional land permanently required for the provision of landscape earthworks adjacent to Coppenhall Moss north embankment (AP1-001-007).

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-phase2b-crewe-manchester-environmental-statement>.

- 1.3.5 An assessment of these changes and amendments is presented in this appendix. Details of the standard methodology used for determining significance of effects for sound, noise and vibration are presented in the main ES Volume 5, Appendix: SV-001-00000.

Evaluation of impacts and effects

- 1.3.6 This appendix provides a quantitative assessment of operational noise and vibration impacts and effects and a qualitative assessment of likely significant effects, based on the impacts and effects identified and other local context information consistent with the scope and methodology defined for the SES1 scheme.
- 1.3.7 Indirect effects arising from permanent changes in traffic patterns on the existing road and rail networks as a consequence of the SES1 scheme are also reported in this appendix, where they would occur within the study area as defined in the main ES Volume 5, Appendix: SV-001-00000.
- 1.3.8 Route-wide impacts, effects and significant effects associated with noise or vibration from the operation of the SES1 scheme are reported in SES1 and AP1 ES Volume 3, Route-wide effects.
- 1.3.9 The assessment of impacts has been undertaken at assessment locations that are representative of a number of dwellings or other sensitive receptors. The operational assessment locations employed in this assessment are presented in the SES1 and AP1 ES Volume 5, Sound, noise and vibration Map Book: Map Series SV-02.
- 1.3.10 Baseline sound level data have been collected at locations representative of the airborne sound-sensitive receptors and presented in the main ES and SES1.

2 Community area assessments

2.1 Hough to Walley's Green (MA01)

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- 2.1.1 There are no changes in the ground-borne noise and vibration or airborne noise effects compared to the main ES as a result of the SES1 changes.
- 2.1.2 SES1 and AP1 ES Volume 5, Appendix: CT-009-00000 lists several corrections to the number of properties represented by assessment locations as presented in Table 2 of the main ES Volume 5, Appendix: SV-003-0MA01.

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Effects arising during operation

Introduction

- 2.1.3 The assessment is first reported for ground-borne sound and vibration and then for airborne sound. Under each of these headings, the results of the quantitative identification of impacts, effects and significant effects are presented.

Avoidance and mitigation measures

- 2.1.4 In the main ES, a noise fence barrier was located along the western side of the route of the original scheme, from the existing Parkers Road overbridge to Coppenhall Moss north embankment. This has been reduced from 1.3km in length and up to 5m in height to 880m in length and 3m in height in the AP1 revised scheme due to the tunnel realignment and extension (AP1-001-001). Otherwise, the avoidance and mitigation measures are as set out in the main ES Volume 2, Community Area report: Hough to Walley's Green (MA01).

Quantitative identification of impacts and effects

Ground-borne sound and vibration

- 2.1.5 Assessment locations defined for the quantitative assessment of impacts are shown on Volume 5, Sound, noise and vibration, Map Book: Map Series SV-02. Map Series SV-02 also displays ground-borne noise and vibration impacts and any resultant significant effects.
- 2.1.6 For each assessment location where new or different effects are forecast as a result of the AP1 revised scheme, the assessment results for residential and non-residential receptors are presented in Table 2. All of the changes to assessment results compared to the main ES are as a result of the tunnel realignment and extension (AP1-001-001). Explanation of the

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information in Table 2 is provided in Volume 5, Appendix: SV-001-00000 of the main ES, with additional notes in Table 1, below.

Table 1: Explanatory notes for operational ground-borne sound and vibration assessment results

Symbol	Explanation
V1-V4	Type of receptor (ground-borne vibration) – (V1) vibration sensitive research and manufacturing; hospitals with vibration sensitive equipment operations; universities with vibration sensitive research equipment operations, (V2) hotels, hospital wards and education dormitories, (V3) offices, schools and places of worship, (V4) workshops.
G1-G4	Type of receptor (ground-borne sound) – (G1) theatres large auditoria and concert halls, (G2) sound recording broadcast studios, (G3) places of meeting for religious worship, courts, cinemas, lecture theatres, museums, small auditoria or halls, (G4) offices, schools, colleges, hospitals, hotels and libraries.
NA	Type of effect – Generally no adverse effect.
A	Ground-borne sound or vibration levels from the AP1 revised scheme exceed Lowest Observed Adverse Effect Level (LOAEL): the significance criteria set out in the main ES Volume 5, Appendix: SV-001-00000, Annex A are considered when establishing significant effects.
S	Ground-borne sound or vibration levels from the SES1 scheme/AP1 revised scheme exceed Significant Observed Adverse Effect Level (SOAEL).
VDV	Vibration Dose Value.
~	When considered under the significance criteria set out in the main ES Volume 5, Appendix: SV-001-00000, Annex A, these adverse effects are not considered to be significant on a community basis.
<>	The quantitative impact methodology has identified an impact at this receptor which, based upon further qualitative receptor information, (see assessment text) does not give rise to a significant effect.
	Where the significant effect column is highlighted in pink, then a significant effect is identified at the referenced residential community area, or individual receptor.
	For residential receptors yellow denotes a low ground-borne noise impact or a minor ground-borne vibration impact.
	For residential receptors orange denotes a medium ground-borne noise impact or a moderate ground-borne vibration impact.
	For residential receptors red denotes a high ground-borne noise impact or a major ground-borne vibration impact.
	For residential receptors dark red denotes a very high ground-borne noise impact.

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Table 2: MA01 Operational ground-borne sound and vibration levels, noise and vibration impacts and effects for residential and non-residential receptors (AP1 revised scheme)

Assessment location		Impact criteria				Significance criteria								Significant effect
Reference	Area represented	Ground-borne sound level dB L _{pASmax}	VDV m/s ^{1.75} Daytime (07:00-23:00)	VDV m/s ^{1.75} Night-time (23:00-07:00)	% increase or decrease in VDV	Number of impacts represented	Type of effect	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation effect	
610026	The Wharf Residence, Thomas Street, Crewe	36	0.12	0.06	-	1	A	R	T	-	-	-	-	MA01-O-C1
610045	Middlewich Street, Crewe	32	0.08	0.04	-	6	NA	R	T	-	-	-	-	
610055	Greenacres, Crewe	31	0.07	0.04	-	9	NA	R	T	-	-	-	-	
610103	Bridge Farm, Parkers Road, Leighton	48	0.47	0.25	-	1	S	R	T	-	-	-	-	MA01-O-C1
610509	Maplins Moss Place, Crewe	36	0.12	0.06	-	18	A	R	T	-	-	-	-	MA01-O-C1
610600	Broughton Road, Crewe	40	0.18	0.1	-	1	A	R	T	-	-	-	-	MA01-O-C1
610601	Broughton Road, Crewe	44	0.28	0.15	-	2	A	R	T	-	-	-	-	MA01-O-C1
610603	North Street, Crewe	34	0.1	0.05	-	2	NA	R	T	-	-	-	-	
610604	Hazel Grove, Crewe	44	0.27	0.14	-	2	A	R	T	-	-	-	-	MA01-O-C1
610605	Hazel Grove, Crewe	34	0.1	0.05	-	8	NA	R	T	-	-	-	-	
610606	Hazel Grove, Crewe	42	0.24	0.13	-	1	A	R	T	-	-	-	-	MA01-O-C1
610607	Hazel Grove, Crewe	42	0.23	0.12	-	2	A	R	T	-	-	-	-	MA01-O-C1
610608	Hazel Grove, Crewe	35	0.11	0.06	-	1	A	R	T	-	-	-	-	MA01-O-C1
610609	Hazel Grove, Crewe	43	0.27	0.14	-	2	A	R	T	-	-	-	-	MA01-O-C1

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Assessment location		Impact criteria				Significance criteria								Significant effect
Reference	Area represented	Ground-borne sound level dB L _{pASmax}	VDV m/s ^{1.75} Daytime (07:00-23:00)	VDV m/s ^{1.75} Night-time (23:00-07:00)	% increase or decrease in VDV	Number of impacts represented	Type of effect	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation effect	
610610	Hazel Grove, Crewe	38	0.14	0.08	-	2	A	R	T	-	-	-	-	MA01-O-C1
610611	Hazel Grove, Crewe	44	0.27	0.14	-	1	A	R	T	-	-	-	-	MA01-O-C1
610612	Hazel Grove, Crewe	37	0.13	0.07	-	1	A	R	T	-	-	-	-	MA01-O-C1
610613	Hazel Grove, Crewe	43	0.26	0.14	-	7	A	R	T	-	-	-	-	MA01-O-C1
610614	Hazel Grove, Crewe	38	0.15	0.08	-	2	A	R	T	-	-	-	-	MA01-O-C1
610615	Chapelmere Court, Crewe	38	0.14	0.08	-	2	A	R	T	-	-	-	-	MA01-O-C1
610616	Chapelmere Court, Crewe	43	0.26	0.14	-	1	A	R	T	-	-	-	-	MA01-O-C1
610617	Hazel Grove, Crewe	34	0.1	0.05	-	1	NA	R	T	-	-	-	-	
610618	Chapelmere Court, Crewe	43	0.26	0.14	-	1	A	R	T	-	-	-	-	MA01-O-C1
610619	Chapelmere Court, Crewe	37	0.13	0.07	-	2	A	R	T	-	-	-	-	MA01-O-C1
610620	Hazel Grove, Crewe	42	0.22	0.11	-	2	A	R	T	-	-	-	-	MA01-O-C1
610621	Chapelmere Court, Crewe	36	0.13	0.07	-	1	A	R	T	-	-	-	-	MA01-O-C1
610622	Chapelmere Court, Crewe	43	0.26	0.14	-	1	A	R	T	-	-	-	-	MA01-O-C1
610623	Hazel Grove, Crewe	43	0.26	0.14	-	2	A	R	T	-	-	-	-	MA01-O-C1
610624	Hazel Grove, Crewe	35	0.12	0.06	-	1	A	R	T	-	-	-	-	MA01-O-C1
610625	Hazel Grove, Crewe	36	0.12	0.06	-	2	A	R	T	-	-	-	-	MA01-O-C1
610626	Hazel Grove, Crewe	36	0.13	0.07	-	2	A	R	T	-	-	-	-	MA01-O-C1

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Assessment location		Impact criteria				Significance criteria							Significant effect	
Reference	Area represented	Ground-borne sound level dB L _{pASmax}	VDV m/s ^{1.75} Daytime (07:00-23:00)	VDV m/s ^{1.75} Night-time (23:00-07:00)	% increase or decrease in VDV	Number of impacts represented	Type of effect	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact		Mitigation effect
610627	Broad Street, Crewe	33	0.09	0.05	-	3	NA	R	T	-	-	-	-	
610628	Hazel Grove, Crewe	43	0.25	0.13	-	1	A	R	T	-	-	-	-	MA01-O-C1
610629	Broad Street, Crewe	43	0.25	0.13	-	10	A	R	T	-	-	-	-	MA01-O-C1
610630	Broad Street, Crewe	43	0.25	0.13	-	3	A	R	T	-	-	-	-	MA01-O-C1
610631	Broad Street, Crewe	35	0.1	0.05	-	6	A	R	T	-	-	-	-	MA01-O-C1
610632	Broad Street, Crewe	38	0.15	0.08	-	2	A	R	T	-	-	-	-	MA01-O-C1
610633	Broad Street, Crewe	43	0.25	0.13	-	2	A	R	T	-	-	-	-	MA01-O-C1
610634	Cross Way, Crewe	35	0.1	0.05	-	7	A	R	T	-	-	-	-	MA01-O-C1
610635	Cross Way, Crewe	33	0.08	0.04	-	4	NA	R	T	-	-	-	-	
610636	Greenacres, Crewe	43	0.24	0.13	-	3	A	R	T	-	-	-	-	MA01-O-C1
610637	Lime Street, Crewe	43	0.24	0.13	-	3	A	R	T	-	-	-	-	MA01-O-C1
610638	Greenacres, Crewe	35	0.1	0.05	-	2	A	R	T	-	-	-	-	MA01-O-C1
610639	Greenacres, Crewe	43	0.24	0.13	-	26	A	R	T	-	-	-	-	MA01-O-C1
610641	Greenacres, Crewe	35	0.12	0.06	-	12	A	R	T	-	-	-	-	MA01-O-C1
610642	Haslemere Way Crewe	35	0.11	0.06	-	12	A	R	T	-	-	-	-	MA01-O-C1
610644	Cranborne Road, Crewe	43	0.24	0.13	-	12	A	R	T	-	-	-	-	MA01-O-C1
610645	Cranborne Road, Crewe	35	0.1	0.05	-	4	A	R	T	-	-	-	-	MA01-O-C1

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Assessment location		Impact criteria				Significance criteria							Significant effect	
Reference	Area represented	Ground-borne sound level dB L _{pASmax}	VDV m/s ^{1.75} Daytime (07:00-23:00)	VDV m/s ^{1.75} Night-time (23:00-07:00)	% increase or decrease in VDV	Number of impacts represented	Type of effect	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact		Mitigation effect
610648	Middlewich Street, Crewe	43	0.26	0.14	-	8	A	R	T	-	-	-	-	MA01-O-C1
610649	Middlewich Street and Ridgway Street, Crewe	37	0.13	0.07	-	4	A	R	T	-	-	-	-	MA01-O-C1
610650	Audley Street, Crewe	36	0.12	0.06	-	6	A	R	T	-	-	-	-	MA01-O-C1
610651	Middlewich Street, Crewe	36	0.13	0.07	-	4	A	R	T	-	-	-	-	MA01-O-C1
610652	Middlewich Street, Crewe	36	0.13	0.07	-	17	A	R	T	-	-	-	-	MA01-O-C1
610653	Middlewich Street, Crewe	38	0.15	0.08	-	5	A	R	T	-	-	-	-	MA01-O-C1
610654	Middlewich Street and Audley Street, Crewe	43	0.26	0.14	-	4	A	R	T	-	-	-	-	MA01-O-C1
610656	Henry Street, Crewe	36	0.12	0.06	-	3	A	R	T	-	-	-	-	MA01-O-C1
610657	Sheppard CIs, Crewe and Wallis Street, Crewe	43	0.25	0.13	-	8	A	R	T	-	-	-	-	MA01-O-C1
610658	Brierley St, Crewe	43	0.26	0.13	-	21	A	R	T	-	-	-	-	MA01-O-C1
610659	Brierley St, Crewe	41	0.2	0.1	-	6	A	R	T	-	-	-	-	MA01-O-C1
610660	Earle Street, Crewe	43	0.25	0.13	-	4	A	R	T	-	-	-	-	MA01-O-C1
610661	Earle Street, Crewe	43	0.25	0.13	-	1	A	R	T	-	-	-	-	MA01-O-C1
610662	Basford Rd, Crewe	39	0.17	0.09	-	2	A	R	T	-	-	-	-	MA01-O-C1

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Assessment location		Impact criteria				Significance criteria								Significant effect
Reference	Area represented	Ground-borne sound level dB L _{pASmax}	VDV m/s ^{1.75} Daytime (07:00-23:00)	VDV m/s ^{1.75} Night-time (23:00-07:00)	% increase or decrease in VDV	Number of impacts represented	Type of effect	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation effect	
610667	Chuff Chuff Building (Mixed-use commercial), Middlewich Street, Crewe	37	0.14	0.07	-	1	A	V3,G 2	T	-	-	-	-	MA01-O-N3
610671	Brierley Street, Crewe	42	0.23	0.12	-	1	A	R	T	-	-	-	-	MA01-O-C1
610676	Broad Street, Crewe	35	0.11	0.06	-	14	A	R	T	-	-	-	-	MA01-O-C1
610677	Cross Way, Crewe	32	0.08	0.04	-	8	NA	R	T	-	-	-	-	

Airborne sound: direct impacts and effects

- 2.1.7 The direct effects from the operation of all new, amended or altered roads or railway lines, which are identified as part of the AP1 revised scheme are presented in Table 4 for residential receptors. All of the changes to assessment results compared to the main ES are as a result of the tunnel realignment and extension (AP1-001-001) except where indicated by footnotes. There are no changes to the airborne noise effects at non-residential receptors compared to the main ES as a result of the AP1 revised scheme. Volume 5, Appendix: SV-001-00000 of the main ES, with the additional information in Table 3, provides an explanation of the information in Table 4.
- 2.1.8 The results should be considered in conjunction with the information contained in the main ES and the SES1 and AP1 ES Volume 5, Sound, noise and vibration Map Book: Map Series SV-02.

Table 3: Explanatory notes for operational airborne sound assessment results

Symbol	Explanation
	Where the significant effect column is marked, then a significant effect is identified at the referenced group of dwellings, or individual residential or non-residential receptor.
	Yellow denotes a minor impact at a residential building. A minor impact is identified where the 'SES1 scheme/AP1 revised scheme only (year 15 traffic)' is greater than LOAEL, and either the change is ≥ 3 dB and < 5 dB, or where a high baseline is identified during the corresponding period the change is ≥ 1 dB and < 3 dB.
	Orange denotes a moderate impact at a residential building. A moderate impact is identified where the 'SES1 scheme/AP1 revised scheme only (year 15 traffic)' is greater than LOAEL, and either the change is ≥ 5 dB and < 10 dB, or where a high baseline is identified during the corresponding period the change is of ≥ 3 dB and < 5 dB.
	Red denotes a major impact at a residential building. A major impact is identified where the 'SES1 scheme/AP1 revised scheme only (year 15 traffic)' is greater than LOAEL, and either the change is ≥ 10 dB, or where a high baseline is identified during the corresponding period the change is of ≥ 5 dB.
	Green denotes a beneficial impact at a residential building. A beneficial impact is identified where the relevant baseline value is greater than LOAEL and the change is of > 3 dB.
*	Day – $L_{pAeq,07:00 - 23:00}$
**	Night – $L_{pAeq,23:00 - 07:00}$
***	<p>Max – L_{pAFmax}. In the 'SES1 scheme/AP1 revised scheme only' column where two train noise level values are presented. The first value represents the highest maximum noise level from HS2 services. The second value is provided where there are additional services (Northern Powerhouse Rail) operating on the AP revised scheme and where maximum noise levels from additional services are anticipated to be higher than from HS2 services.</p> <p>In the 'Without SES1 scheme/AP1 revised scheme' column, the value is the arithmetic average $L_{pAFmax,5min}$ as presented in the corresponding baseline technical appendix.</p> <p>For further information refer to the main ES Volume 5, Appendix: SV-001-00000.</p>
****	Where the SES1 scheme/AP1 revised scheme modifies an existing source, i.e. road or railway realignments, the <i>SES1 scheme AP1 revised scheme only</i> and (<i>Opening year baseline + Year 15 traffic</i>) levels in the table include the sound from the modified source.

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Symbol	Explanation
A	Sound levels from the SES1 scheme/AP1 revised scheme exceed Lowest Observed Adverse Effect Level (LOAEL): the significance criteria set out in the main ES Volume 5, Appendix: SV-001-00000, Annex A are considered when establishing significant effects.
B	For non-residential receptors further detail about the type of effect is set out in the text of the main ES Volume 5, Appendix: SV-001-00000.
CD	Committed Development. The 'Area represented' column contains information about the potential number of impacts included in the development.
A1 – A4	Type of receptor (airborne sound) - (A1) large and small auditoria; concert halls, sound recording and broadcast studios and theatres, (A2) places of meeting for religious worship, courts, cinemas, lecture theatres, museums and small auditoria or halls, (A3) schools, colleges, hospitals, hotels and libraries, (A4) offices and amenity spaces.
H	High existing ambient sound level. Defined as >65dB L _{Aeq, day} and or >55dB L _{Aeq, night} .
L	Low existing ambient sound level. Defined as <42dB L _{Aeq, day} and or <32dB L _{Aeq, night} .
LD	Landscape receptor.
NA	Sound levels from the SES1 scheme/AP1 revised scheme do not exceed Lowest Observed Adverse Effect Level (LOAEL), therefore generally no adverse effect.
NI	The receptor is predicted to qualify for mitigation, which shall be provided to the specification defined in the Noise Insulation (Railways and other Guided Rail Systems) Regulations 1996 ⁴ .
R	Residential receptor.
RM	Residential mooring.
S	Sound levels from the SES1 scheme/AP1 revised scheme exceed Significant Observed Adverse Effect Level (SOAEL): noise insulation therefore provided.
T	Type of receptor: Typical.
+	The use and sensitivity of this non-residential receptor or land use is very sensitive to noise and has been included in the detailed assessment (presented in Volume 2 of the SES1 and AP1 ES) where there is a change less than 3dB. In each case specific information is presented in an associated footnote.
#	A change of 3dB or greater has been identified; however, the assessment methodology only defines an impact where the absolute sound level from the SES1 scheme AP1 revised scheme is greater or equal to 50dB L _{pAeq,07:00-23:00} during the daytime or 40dB L _{pAeq,23:00-07:00} at night. At the receptor denoted the absolute level condition is not met and therefore no impact is identified.
~	When considered under the significance criteria set out in the main ES Volume 5, Appendix: SV-001-00000 Annex A, these adverse effects are not considered to be significant on a community basis.
\$	The impact methodology for non-residential receptors includes a screening criterion for A1 building use of 50dB L _{pAeq,07:00-23:00} and 50dB L _{pAeq,23:00-07:00} , A2 building use of 50dB L _{pAeq,07:00-23:00} , A3 building use of 50dB L _{pAeq,07:00-23:00} , and 45dB L _{pAeq,23:00-07:00} and for A4 building use 55dB L _{pAeq,07:00-23:00} . At the receptor denoted, the screening criteria is met but a change of 3dB or greater has not been identified and therefore no impact is identified. Further information is provided in the main ES Volume 5, Appendix: SV-001-00000.
<>	The quantitative impact methodology has identified an impact at this receptor which, based upon further qualitative receptor information, (see assessment text) does not give rise to a significant effect.

⁴ *The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996*. Her Majesty's Stationery Office, London.

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Table 4: MA01 Operational airborne sound, noise impacts and significant effects: residential receptors (AP1 revised scheme)

Assessment location		Impact criteria										Significance criteria								
Reference	Area represented	AP1 revised scheme only (year 15)			Without AP1 revised scheme (opening year baseline)			With AP1 revised scheme (opening year baseline + year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique features	Combined impact	Mitigation effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
610104	Bowland Croft, Crewe	55	53	68/--	63	61	63	57	53	-6	-7	A	7	R	T	H	-	-	-	MA01-O-C2
610113	Haweswater Avenue, Crewe	53	50	72/--	63	61	64	53	50	-9	-11	A	5	R	T	H	-	-	-	MA01-O-C2
610115	Buttermere Drive, Crewe	53	50	71/--	63	61	64	54	50	-9	-11	A	7	R	T	H	-	-	-	MA01-O-C2
610125	Aysgarth Avenue, Crewe	54	51	71/--	63	62	65	54	51	-9	-11	A	9	R	T	H	-	-	-	MA01-O-C2

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Assessment location		Impact criteria										Significance criteria								
Reference	Area represented	AP1 revised scheme only (year 15)			Without AP1 revised scheme (opening year baseline)			With AP1 revised scheme (opening year baseline + year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique features	Combined impact	Mitigation effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
610162	Park Hall Farm, Wimboldsley, Middlewich and committed development (Mapbook ref.: MA01/145) ⁵	59	51	74/--	47	45	47	59	51	12	7	A	1	CD-R	T	-	-	-	-	~ ⁶
610342	Bowland Croft, Crewe	54	53	71/--	65	63	66	56	54	-9	-10	A	7	R	T	H	-	-	-	MA01-O-C2
610343	Wharfdale Avenue, Crewe	45	42	64/--	51	48	50	48	43	-3	-4	A	13	R	T	-	-	-	-	MA01-O-C2
610344	Haweswater Avenue, Crewe	53	50	72/--	63	61	64	53	50	-9	-11	A	8	R	T	H	-	-	-	MA01-O-C2
610345	Wharfdale Avenue, Crewe	52	49	70/--	60	58	61	52	49	-8	-9	A	7	R	T	H	-	-	-	MA01-O-C2

⁵ Volume 5, Planning Data/Committed Development Map Book: Map series CT-13.

⁶ Changes to assessment results compared to the main ES are as a result of the provision of landscape earthworks adjacent to Coppenhall Moss north embankment (AP1-001-007).

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Assessment location		Impact criteria										Significance criteria									
Reference	Area represented	AP1 revised scheme only (year 15)			Without AP1 revised scheme (opening year baseline)			With AP1 revised scheme (opening year baseline + year 15 traffic) ****			Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique features	Combined impact	Mitigation effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **										
610346	Haweswater Avenue, Crewe	47	43	65/--	52	49	52	48	44	-4	-6	A	16	R	T	-	-	-	-	MA01-O-C2	
610347	Buttermere Drive, Crewe	53	50	72/--	63	61	64	54	50	-9	-11	A	7	R	T	H	-	-	-	MA01-O-C2	
610348	Bleasdale Road, Crewe	52	49	69/--	59	57	60	52	49	-7	-8	A	7	R	T	H	-	-	-	MA01-O-C2	
610349	Aysgarth Avenue, Crewe	53	50	71/--	63	61	64	54	50	-9	-11	A	9	R	T	H	-	-	-	MA01-O-C2	
610351	Haweswater Avenue, Crewe	46	42	65/--	51	48	51	47	43	-3	-5	A	11	R	T	-	-	-	-	MA01-O-C2	
610385	Perry Fields, Crewe	49	44	71/--	52	50	53	49	45	-3	-5	A	20	R	T	-	-	-	-	MA01-O-C2	
610745	Aysgarth Avenue, Crewe	47	43	64/--	51	48	51	48	43	-3	-5	A	11	R	T	-	-	-	-	MA01-O-C2	

Airborne sound levels used by other topics

- 2.1.9 There is no change in the airborne sound levels used by other topics compared to the main ES or, where relevant, the AP1 ES.

2.2 Wimboldsley to Lostock Gralam (MA02)

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Effects arising during operation

Introduction

- 2.2.1 The assessment is reported first for ground-borne sound and vibration and then for airborne sound. Under each of these headings, the results of the quantitative identification of impacts, effects and significant effects are presented. The significant effects and the evidence used to support these conclusions are presented in the SES1 and AP1 ES Volume 2, Community Area report: Wimboldsley to Lostock Gralam (MA02).

Avoidance and mitigation measures

- 2.2.2 The avoidance and mitigation measures are set out in the main ES Volume 2, Community Area report: Wimboldsley to Lostock Gralam (MA02).

Quantitative identification of impacts and effects

Ground-borne sound and vibration

- 2.2.3 The SES1 changes do not change the likely significant ground-borne sound and vibration effects identified in the main ES.

Airborne sound: direct impacts and effects

- 2.2.4 The direct effects from the operation of the SES1 scheme, as well as any new, amended or altered roads or railway lines identified as part of the SES1 scheme, are presented in Table 5 for residential receptors. There are no changes to the airborne noise effects at non-residential receptors compared to the main ES as a result of the SES1 scheme. Volume 5, Appendix: SV-001-00000 of the main ES, with the additional information in Table 3, provides an explanation of the information in Table 5.
- 2.2.5 The principal SES1 change responsible for changes in operational airborne noise effects at the specific assessment locations reported in the following table is SES1 baseline changes. The results should be considered in conjunction with the information contained in the main ES and the SES1 and AP1 ES Volume 5, Sound, noise and vibration Map Book: Map Series SV-02.

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Table 5: MA02 Operational airborne sound, noise impacts and significant effects: residential receptors (SES1 scheme)

Assessment location		Impact criteria										Significance criteria								
Reference	Area represented	SES1 scheme only (year 15)			Without SES1 scheme (opening year baseline)			With SES1 scheme (opening year baseline + year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique features	Combined impact	Mitigation effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
610220	Coalpit Lane, Stanthorne	52	44	72/--	56	50	55	58	52	2	2	A	2	R	T	-	-	-	-	7
610224	Earl's Cottage, Birch Lane, Stanthorne	48	41	65/--	54	47	52	55	48	1	1	A	1	R	T	-	-	-	-	7
610226	Birch Lane, Stanthorne	49	42	65/--	48	41	46	51	44	4	3	A	6	R	T	-	-	-	-	~7
610230	Birch Lane, Stanthorne	52	44	67/--	50	44	49	53	45	3	2	A	8	R	T	-	-	-	-	~7
610408	Birch Lane, Stanthorne	53	46	68/--	55	49	54	56	49	0	0	A	7	R	T	-	-	-	-	7

⁷ Likely significant effect removed at Stanthorne (as a result of the SES1 baseline changes).

Airborne sound levels used by other topics

- 2.2.6 There is no change in the airborne sound levels used by other topics compared to the main ES or, where relevant, the AP1 ES.

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Effects arising during operation

- 2.2.7 There are no changes in the ground-borne noise and vibration or airborne noise effects compared to the main ES as a result of the AP1 revised scheme.

2.3 Pickmere to Agden and Hulseheath (MA03)

Supplementary Environmental Statement

Effects arising during operation

Introduction

- 2.3.1 The assessment is reported first for ground-borne sound and vibration and then for airborne sound. Under each of these headings, the results of the quantitative identification of impacts, effects and significant effects are presented. The significant effects and the evidence used to support these conclusions are presented in the SES1 and AP1 ES Volume 2, Community Area report: Pickmere to Agden and Hulseheath (MA03).

Avoidance and mitigation measures

- 2.3.2 The avoidance and mitigation measures are set out in the main ES Volume 2, Community Area report: Pickmere to Agden and Hulseheath (MA03).

Quantitative identification of impacts and effects

Ground-borne sound and vibration

- 2.3.3 The SES1 changes do not change the likely significant ground-borne sound and vibration effects identified in the main ES.

Airborne sound: direct impacts and effects

- 2.3.4 The direct effects from the operation of the SES1 scheme, as well as any new, amended or altered roads or railway lines identified as part of the SES1 scheme, are presented in Table 6 for residential receptors. There are no changes to the airborne noise effects at non-residential receptors compared to the main ES as a result of the SES1 scheme. Volume 5,

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Appendix: SV-001-00000 of the main ES, with the additional information in Table 3, provides an explanation of the information in Table 5.

- 2.3.5 The principal SES1 changes responsible for the change in operational airborne noise effects at the specific assessment locations reported in the following tables are the SES1 baseline changes and the removal of the HS2 WCML connection (SES1-004-001) and are identified in the associated footnotes. The results should be considered in conjunction with the information contained in the main ES and the SES1 and AP1 ES Volume 5, Sound, noise and vibration Map Book: Map Series SV-02.

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Table 6: MA03 Operational airborne sound, noise impacts and significant effects: residential receptors (SES1 scheme)

Assessment location		Impact criteria										Significance criteria								
Reference	Area represented	SES1 scheme only (year 15)			Without SES1 scheme (opening year baseline)			With SES1 scheme (opening year baseline + year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique features	Combined impact	Mitigation effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612615	Pickmere Lane, Pickmere	46	40	60/--	46	40	45	49	43	3	3	A	16	R	T	-	-	-	-	MA03-O-C5 ⁸
612616	Tanyard Farm, Pickmere Lane, Pickmere	48	42	61/--	49	44	49	52	46	3	3	A	1	R	T	-	-	-	-	MA03-O-C5 ⁸
612618	Roses Farm, Pickmere Lane, Pickmere	56	50	70/--	52	48	51	57	52	5	4	A	1	R	T	-	-	-	-	MA03-O-C5 ⁸
612619	Dunholme Farm, Pickmere Lane, Pickmere	52	47	65/--	52	48	51	55	50	3	2	A	1	R	T	-	-	-	-	MA03-O-C5 ⁸
612622	Pickmere Lane, Pickmere	53	47	66/--	52	48	51	55	51	3	3	A	7	R	T	-	-	-	-	MA03-O-C5 ⁸
612623	Pickmere Lane, Pickmere	53	48	67/--	53	48	53	56	51	4	3	A	4	R	T	-	-	-	-	MA03-O-C5 ⁸

⁸ New significant effect at Pickmere (as a result of the SES1 baseline changes).

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Assessment location		Impact criteria										Significance criteria								
Reference	Area represented	SES1 scheme only (year 15)			Without SES1 scheme (opening year baseline)			With SES1 scheme (opening year baseline + year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique features	Combined impact	Mitigation effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612624	Pickmere Lane, Pickmere	52	47	67/--	50	45	50	55	49	5	5	A	5	R	T	-	-	-	-	MA03-O-C5 ⁸
612625	Pickmere Hall Farm, Pickmere Lane, Pickmere	49	43	63/--	46	41	46	51	45	4	4	A	1	R	T	-	-	-	-	MA03-O-C5 ⁸
612628	Pickmere Lane, Pickmere	60	55	75/--	58	53	58	62	57	4	4	S	2	R	T	-	-	-	NI	MA03-O-C5 ⁸
612629	Churches Farm, School Lane, Pickmere	54	49	70/--	43	37	42	55	49	12	12	A	1	R	T	-	-	-	-	MA03-O-C5 ⁸
612633	Pickmere Lane, Pickmere	61	56	78/--	50	45	50	62	56	12	11	S	3	R	T	-	-	-	NI	MA03-O-C5 ⁸
612656	Winterbottom Farm, Winterbottom Lane, Mere	56	51	75/--	50	45	50	57	51	7	7	A	1	R	T	-	-	-	-	~ ⁹

⁹ Effect removed at Winterbottom (as a result of the removal of the HS2 WCML connection (SES1-004-001)).

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Assessment location		Impact criteria										Significance criteria								
Reference	Area represented	SES1 scheme only (year 15)			Without SES1 scheme (opening year baseline)			With SES1 scheme (opening year baseline + year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique features	Combined impact	Mitigation effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612657	Winterbottom Lane, Mere	53	48	72/--	51	46	51	55	49	4	3	A	4	R	T	-	-	-	-	~ ⁹
612700	Chapel Lane, Mere	51	46	65/--	51	46	51	54	49	3	3	A	5	R	T	-	-	-	-	MA03-O-C4 ¹⁰
612706	Chapel Lane, Mere	54	49	71/--	51	46	51	56	51	5	5	A	2	R	T	-	-	-	-	MA03-O-C4 ¹⁰
612712	Broom Manor, Peacock Lane, High Legh	60	55	79/--	51	46	51	61	56	10	10	S	1	R	T	-	-	-	NI	MA03-O-C4 ¹⁰
612730	Moss House Farm, Thowler Lane, Millington	59	54	77/--	51	46	51	60	55	9	9	A	1	R	T	-	-	-	-	MA03-O-C4 ¹⁰
612732	Runnymede, Thowler Lane, Millington	58	52	72/--	51	46	51	58	53	7	7	A	1	R	T	-	-	-	-	MA03-O-C4 ¹⁰

¹⁰ Different likely significant effect at Hulseheath (as a result of removal of the HS2 WCML connection (SES1-004-001)).

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Assessment location		Impact criteria										Significance criteria								
Reference	Area represented	SES1 scheme only (year 15)			Without SES1 scheme (opening year baseline)			With SES1 scheme (opening year baseline + year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique features	Combined impact	Mitigation effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612736	Five Acres, Peacock Lane, High Legh	50	45	67/--	51	46	51	52	48	1	2	A	1	R	T	-	-	-	-	10
612745	Little Moss Farm, Peacock Lane, High Legh	47	41	61/--	51	45	50	50	44	-1	-1	A	1	R	T	-	-	-	-	10
612747	Moss Farm, Peacock Lane, High Legh	42	37	56/--	47	41	46	47	42	0	0	NA	1	R	T	-	-	-	-	10
612751	Thowler Lane, Millington	52	47	68/--	51	46	51	56	51	5	5	A	5	R	T	-	-	-	-	MA03-O-C4 ¹⁰
612766	Thowler Lane, Millington	46	41	62/--	55	49	54	58	52	3	3	A	3	R	T	-	-	-	-	MA03-O-C4 ¹⁰
612796	Agden Lane, High Legh	43	38	54/--	58	53	58	61	56	3	3	NA	1	R	T	-	-	-	-	# ¹¹

¹¹ Property no longer qualifies for noise insulation (as a result of the removal of the HS2 WCML connection (SES1-004-001)).

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Assessment location		Impact criteria										Significance criteria								
Reference	Area represented	SES1 scheme only (year 15)			Without SES1 scheme (opening year baseline)			With SES1 scheme (opening year baseline + year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique features	Combined impact	Mitigation effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612861	Brook Cottage, Pickmere Lane, Pickmere	57	52	73/--	60	55	60	63	58	3	2	A	1	R	T	H	-	-	-	MA03-O-C5 ⁸

Airborne sound levels used by other topics

- 2.3.6 There is no change in the airborne sound levels used by other topics compared to the main ES or, where relevant, the AP1 ES.

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Effects arising during operation

- 2.3.7 There are no changes in the ground-borne noise and vibration or airborne noise effects compared to the main ES as a result of the AP1 revised scheme.

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