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HS2

High Speed Rail (Crewe – Manchester) Environmental Statement

Volume 5: Appendix SV-003-0MA03

Sound, noise and vibration

MA03: Pickmere to Agden and Hulseheath

Operational sound, noise and vibration report

M269

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M269

Department for Transport

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Contents

Tables

1 Introduction

1.1.1 This report is an appendix to the sound, noise and vibration assessment relating to the Pickmere to Agden and Hulseheath area (MA03). This appendix presents detailed operational sound, noise and vibration levels.

1.1.2 This appendix should be read in conjunction with:

- Volume 2, Community Area reports;
- Volume 3, Route-wide effects;
- Volume 4, Off-route effects; and
- Volume 5, Appendices.

1.1.3 The sound, noise and vibration appendices comprise three sections. The first of these is an introduction to relevant policy and assessment methodology (see Volume 5, Appendix SV-001-00000); this relates to the sound, noise and vibration assessment for all areas.

1.1.4 In addition to this report for the Pickmere to Agden and Hulseheath area, a baseline and construction sound, noise and vibration report is set out (see Volume 5, Appendix SV-002-0MA03). This includes details of regional and local policy guidance and engagement.

1.1.5 The outcomes of the sound, noise and vibration assessments are summarised in the Volume 2, Community Area reports, including commentary regarding any likely significant effects identified in the assessment.

1.1.6 Maps referred to throughout the sound, noise and vibration appendices are contained in the Volume 2, MA03 Map Book and Volume 5, Sound, noise and vibration Map Book.

2 Scope, assumptions and limitations

2.1 Methodology

2.1.1 The methodology used for the assessment of airborne sound, ground-borne sound and vibration impacts and the determination of significant effects is defined in the Environmental Impact Assessment Scope and Methodology Report (SMR) (see Volume 5, Appendix CT-001-00001).

2.2 Assumptions

2.2.1 Route-wide assumptions are outlined in Volume 1, Section 8, and are further detailed in Volume 5, Appendix SV-001-00000. Local assumptions that apply to the assessment of operational sound, noise and vibration within this area are set out in Volume 2, Community Area report: Pickmere to Agden and Hulseheath (MA03), Section 13.

2.3 Limitations

2.3.1 The route-wide limitations and the approach adopted to ensure that they will not compromise the robust assessment of sound, noise and vibration are presented in Volume 5, Appendix SV-001-00000 and Volume 2, Community Area report: Pickmere to Agden and Hulseheath (MA03), Section 13.

3 Operational

3.1 Evaluation of impacts and effects

3.1.1 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 Proposed Scheme.

3.1.2 Indirect effects arising from permanent changes in traffic patterns on the existing road and rail networks as a consequence of the Proposed Scheme are also reported in this appendix, where they would occur within the study area as defined in Volume 5, Appendix SV-001-00000.

3.1.3 Route-wide impacts, effects and significant effects associated with noise or vibration from the operation of the Proposed Scheme are reported in Volume 3, Route-wide effects.

3.1.4 Off-route effects of noise or vibration arising from the operation of the Proposed Scheme, including those likely to arise from permanent changes in traffic patterns on roads or railways outside of the study area for direct effects are reported in Volume 4, Off-route effects.

3.1.5 In undertaking the assessment of sound, noise and vibration, consistent with Environmental Impact Assessment (EIA) Directive[1] and planning practice and guidance on noise[2] a differentiation between impacts, effects, adverse effects and significant effects is made. Further information is provided in Volume 5, Appendix SV-001-00000.

3.1.6 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 on Volume 5, Sound, noise and vibration Map Book, Map Series SV-02.

3.1.7 Baseline sound level data have been collected at locations representative of the airborne sound-sensitive receptors and presented in Volume 5, Appendix SV-002-0MA03, Table 1.

[1] European Commission, *Environmental Impact Assessment – EIA.* Available online at: Environmental Impact Assessment - EIA - Environment - European Commission (europa.eu).

[2] Ministry of Housing Communities & Local Government (2019), *National Planning Policy Framework*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf.

3.2 Effects arising during operation

Introduction

3.2.1 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 Volume 2, Community Area report: Pickmere to Agden and Hulseheath (MA03), Section 13.

Avoidance and mitigation measures

3.2.2 These are set out in Volume 2, Community Area report: Pickmere to Agden and Hulseheath (MA03), Section 13.

Quantitative identification of impacts and effects

Ground-borne sound and vibration

3.2.3 Assessment locations defined for the quantitative assessment of impacts are shown on Volume 5, Sound, noise and vibration Map Book, Map Series SV-02. SV-02 also displays ground-borne noise and vibration impacts and any resultant significant effects.

3.2.4 For each assessment location, the assessment results for residential and non-residential receptors are presented in Table 2. Explanation of the information in Table 2 is provided in Volume 5, Appendix SV-001-00000, with the following additional notes in Table 1.

Table 1: Explanatory notes for 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/libraries.
NA	Type of effect - Generally no adverse effect.
A	Ground-borne sound or vibration levels from the Proposed Scheme exceed Lowest Observed Adverse Effect Level (LOAEL): the significance criteria set out in Volume 5: Appendix SV-001-00000, Annex A, Section 1.3 are considered when establishing significant effects.
S	Ground-borne sound or vibration levels from the Proposed Scheme exceed Significant Observed Adverse Effect Level (SOAEL).
VDV	Vibration Dose Value.

Symbol	Explanation
~	When considered under the significance criteria set out in Volume 5: Appendix SV-001-00000, Annex A, Section 1.3, 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 gives 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.

Table 2: Operational ground-borne sound and vibration levels, noise and vibration impacts and effects for residential and non-residential receptors

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	
612645	Heyrose Lane, Over Tabley	-	0.10	0.06	-	2	NA	R	T	-	-	-	-	
612677	Mere Court Hotel, Warrington Road, Knutsford	-	0.09	0.05	-	1	NA	G4/V 2	T	-	-	-	-	
612712	Broom Manor, Peacock Lane, High Legh	-	0.05	0.03	-	1	NA	R	T	-	-	-	-	
612736	Five Acres, Peacock Lane, High Legh	-	0.09	0.05	-	1	NA	R	T	-	-	-	-	
612779	Middle Moss Farm, Agden Lane, Agden	-	0.08	0.05	-	1	NA	R	T	-	-	-	-	
612796	Agden Lane, High Legh	-	0.10	0.06	-	1	NA	R	T	-	-	-	-	

Ground-borne sound and vibration impact summary

3.2.5 The operational ground-borne noise and vibration impacts identified in Table 2 are summarised in Table 3 and Table 4.

Table 3: Summary of operational ground-borne noise impacts

Property type	Number of ground-borne noise impacts			
	Low	Medium	High	Very high
Residential properties	0	0	0	0
Non-residential properties				0

Table 4: Summary of operational ground-borne vibration impacts

Property type	Number of ground-borne vibration impacts			
	Minor	Moderate	Major	Risk of building damage
Residential properties	0	0	0	0
Non-residential properties			0	0

Airborne sound: direct impacts and effects

3.2.6 The direct effects from the operation of the Proposed Scheme as well as any new, amended or altered roads or railway lines, which are identified as part of the Proposed Scheme, are presented in Table 6 for residential receptors and Table 7 for non-residential receptors.

3.2.7 The assessment information, impact criteria and significance criteria for the assessment of the incorporated mitigation case at residential and non-residential receptors are presented in Table 6 and Table 7 respectively. The results should be considered in conjunction with the information contained in Volume 5, Sound, noise and vibration Map Book, Map Series SV-02.

3.2.8 Explanation of the information in Table 6 and Table 7 is provided in Volume 5, Appendix SV-001-00000, with the following additional notes in Table 5.

Table 5: Explanatory notes for operational 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 "Proposed Scheme only (year 15 traffic)" is greater than LOAEL, and either the change is ≥3dB – <5dB, or where a high baseline is identified during the corresponding period the change is ≥1dB – <3dB.
	Orange denotes a moderate impact at a residential building. A moderate impact is identified where the "Proposed Scheme only (year 15 traffic)" is greater than LOAEL, and either the change is ≥5dB – <10dB, or where a high baseline is identified during the corresponding period the change is of ≥3dB – <5dB.
	Red denotes a major impact at a residential building. A major impact is identified where the "Proposed Scheme only (year 15 traffic)" is greater than LOAEL, and either the change is ≥10dB, or where a high baseline is identified during the corresponding period the change is of ≥5dB.
	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 >3dB.

Symbol	Explanation
*	Day - $L_{pAeq,07:00 - 23:00}$.
**	Night - $L_{pAeq,23:00 - 07:00}$.
***	Max - L_{pAFmax}. In the 'Proposed 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 HS2 Scheme and where maximum noise levels from additional services are anticipated to be higher than from HS2 services. In the 'Without Proposed Scheme' column, the value is the arithmetic average $L_{pAFmax,5min}$ as presented in the corresponding baseline technical appendix. For further information refer to Volume 5: Appendix SV-001-00000.
****	Where the Proposed Scheme modifies an existing source, i.e. road or railway realignments, the *Proposed Scheme only* and *(Opening year baseline + Year 15 traffic)* levels in the table include the sound from the modified source.
A	Sound levels from the Proposed Scheme exceed LOAEL: the significance criteria set out in Appendix SV-001-00000, Annex A, Section 1.3 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 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 & 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 Proposed Scheme do not exceed 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[3].
R	Residential receptor.
RM	Residential mooring.
S	Sound levels from the Proposed Scheme exceed 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) 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 Proposed 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 Annex A, Section 1.3 Volume 5: Appendix SV-001-00000, these adverse effects are not considered to be significant on a community basis.

[3] *The Noise Insulation (Railway and Other Guided Transport Systems) Regulations 1996*. Her Majesty's Stationery Office, London.

Symbol	Explanation
$	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 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 gives rise to a significant effect.

Table 6: Operational airborne sound, noise impacts and significant effects: residential receptors

Assessment location		Impact criteria									Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612610	Smoker Hill Cottage, Chester Road, Plumley	61	56	76/--	44	39	44	61	56	17	17	S	1	R	T	-	-	-	NI	~
612611	Chester Road, Tabley	49	43	63/--	59	54	59	59	54	0	0	A	6	R	T	-	-	-	-	
612613	Providence Farm, Pickmere Lane, Pickmere	59	54	75/--	52	49	55	60	55	8	6	A	1	R	T	-	-	-	-	~
612614	Garden Lane, Tabley	52	46	66/--	46	41	46	53	47	7	7	A	1	R	T	-	-	-	-	~
612616	Tanyard Farm, Pickmere Lane, Pickmere	48	43	62/--	54	49	54	56	50	1	1	A	1	R	T	-	-	-	-	
612617	Clayhouse Farm, Flittogate Lane, Tabley	49	44	64/--	51	46	51	53	48	2	2	A	1	R	T	-	-	-	-	

Assessment location		Impact criteria										Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612618	Roses Farm, Pickmere Lane, Pickmere	57	51	71/--	52	48	51	58	53	6	5	A	1	R	T	-	-	-	-	~
612619	Dunholme Farm, Pickmere Lane, Pickmere	53	47	67/--	52	48	51	56	51	4	3	A	1	R	T	-	-	-	-	~
612621	Flittogate Lane, Tabley	48	42	62/--	55	49	54	55	50	1	1	A	3	R	T	-	-	-	-	
612622	Pickmere Lane, Pickmere	53	48	67/--	52	48	51	56	51	4	3	A	7	R	T	-	-	-	-	~
612623	Pickmere Lane, Pickmere	54	48	68/--	58	53	58	60	55	1	1	A	4	R	T	-	-	-	-	
612624	Pickmere Lane, Pickmere	53	48	68/--	56	50	55	58	52	2	2	A	5	R	T	-	-	-	-	
612625	Pickmere Hall Farm, Pickmere Lane, Pickmere	49	44	64/--	48	42	47	52	46	4	4	A	1	R	T	-	-	-	-	~
612628	Pickmere Lane, Pickmere	60	55	75/--	64	59	64	65	60	2	1	S	2	R	T	H	-	-	NI	~

Assessment location		Impact criteria									Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612629	Churches Farm, School Lane, Pickmere	56	50	72/--	45	40	45	56	50	11	11	A	1	R	T	-	-	-	-	~
612632	Frog Lane, Pickmere	51	46	67/--	52	49	52	54	50	2	1	A	2	R	T	-	-	-	-	
612633	Pickmere Lane, Pickmere	63	57	79/--	55	50	55	63	58	9	8	S	3	R	T	-	-	-	NI	~
612635	Pickmere Lane, Pickmere	53	48	67/--	55	50	55	58	52	2	2	A	4	R	T	-	-	-	-	
612638	Budworth Road, Tabley	64	58	79/--	49	45	50	64	58	15	13	S	5	R	T	-	-	-	NI	MA03-O-C2
612639	Budworth Road, Tabley	57	52	72/--	58	53	58	60	55	2	2	A	2	R	T	-	-	-	-	
612640	Pickmere Lane, Pickmere	49	44	63/--	61	56	61	61	56	0	0	A	1	R	T	H	-	-	-	
612645	Heyrose Lane, Over Tabley	69	63	88/--	47	42	47	69	63	22	21	S	2	R	T	-	-	-	NI	MA03-O-C1
612646	Old Hall Lane, Over Tabley	55	49	69/--	52	47	52	56	51	5	4	A	3	R	T	-	-	-	-	MA03-O-C1

Assessment location		Impact criteria										Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612647	Heyrose Lane, Over Tabley	60	55	75/--	46	41	46	60	55	14	13	S	3	R	T	-	-	-	NI[4]	MA03-O-C1
612649	Old Hall Lane, Over Tabley	49	44	63/--	55	52	55	56	53	1	1	A	2	R	T	-	-	-	-	
612652	Old Hall Lane, Over Tabley	45	40	61/--	59	53	57	59	53	0	0	A	8	R	T	-	-	-	-	
612653	The Shooting Box, Old Hall Lane, Over Tabley	63	57	80/--	58	50	55	64	57	6	7	S	1	R	T	-	-	-	NI	~
612654	Hollowood Farm, Old Hall Lane, Over Tabley	63	58	79/--	59	54	59	63	58	5	4	S	1	R	T	-	-	-	NI	~
612655	Bentleyhurst Farm, Mere Hall Estate, Mere	51	45	69/--	55	44	49	56	47	1	3	A	1	R	T	-	-	-	-	~

[4] Only one dwelling estimated to qualify for noise insulation at this location. For more information see the Volume 2, Community Area report: Pickmere to Agden and Hulseheath (MA03), Section 13.

Assessment location		Impact criteria										Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612656	Winterbottom Farm, Winterbottom Lane, Mere	58	52	77/--	49	44	49	58	52	9	8	A	1	R	T	-	-	-	-	MA03-O-C3
612657	Winterbottom Lane, Mere	55	49	73/--	51	46	51	56	50	5	4	A	4	R	T	-	-	-	-	MA03-O-C3
612658	Winterbottom Lane, Mere	50	44	67/--	50	45	50	53	47	2	2	A	3	R	T	-	-	-	-	
612659	Mere Hall Estate, Mere	44	38	60/--	58	53	58	58	53	0	0	A	3	R	T	-	-	-	-	
612661	Mere Heyes, Winterbottom Lane, Mere	44	38	61/--	47	42	47	48	43	1	1	A	1	R	T	-	-	-	-	
612662	Winterbottom Lane, Mere	55	49	74/--	52	49	52	57	52	5	3	A	2	R	T	-	-	-	-	~
612663	Hoo Green Lane, Mere	53	47	73/--	52	49	52	55	51	3	2	A	6	R	T	-	-	-	-	~
612665	Warrington Road, Mere	58	53	68/--	65	60	65	65	60	0	0	A	3	R	T	H	-	-	-	

Assessment location		Impact criteria									Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612669	Bucklow Hill Lane, Mere	41	35	57/--	52	47	52	52	47	0	0	NA	2	R	T	-	-	-	-	
612670	Bowden View Lane, Mere	49	43	63/--	47	42	47	50	45	3	3	A	8	R	T	-	-	-	-	~
612671	Park Farm, Ditchfield Lane, High Legh	38	32	55/--	54	53	51	54	53	0	0	NA	1	R	T	-	-	-	-	
612674	Warrington Road, Mere	66	61	69/--	66	61	66	66	61	0	0	S	1	R	T	H	-	-	NI	
612682	Wrenshot Lane, High Legh	60	55	65/--	67	62	67	67	62	0	0	S	2	R	T	H	-	-	NI	
612687	Wrenshot House, Wrenshot Lane, High Legh	53	47	71/--	51	49	51	55	51	4	2	A	1	R	T	-	-	-	-	~
612688	Chapel Lane, Bucklow Hill	40	34	55/--	60	55	60	60	55	0	0	NA	32	R	T	H	-	-	-	

Assessment location		Impact criteria										Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612692	Wrenshot Cottage, Wrenshot Lane, High Legh	47	41	64/--	51	49	51	52	50	1	1	A	1	R	T	-	-	-	-	
612698	Woodside Farm, Wrenshot Lane, High Legh	46	40	64/--	51	49	51	52	49	1	0	A	1	R	T	-	-	-	-	
612700	Chapel Lane, Mere	50	45	65/--	51	46	51	53	48	2	2	A	5	R	T	-	-	-	-	
612704	Wrenshot Lane, High Legh	40	35	59/--	51	49	51	52	49	1	0	A	1	R	T	-	-	-	-	
612706	Chapel Lane, Mere	55	50	70/--	51	46	51	56	51	5	5	A	2	R	T	-	-	-	-	MA03-O-C4
612712	Broom Manor, Peacock Lane, High Legh	60	55	77/--	51	46	51	60	55	9	9	S	1	R	T	-	-	-	NI	MA03-O-C4
612732	Runnymede, Thowler Lane, Millington	55	50	72/--	51	46	51	56	51	5	5	A	1	R	T	-	-	-	-	MA03-O-C4

Assessment location		Impact criteria										Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612736	Five Acres, Peacock Lane, High Legh	58	52	79/--	51	46	51	59	53	8	7	S	1	R	T	-	-	-	NI	MA03-O-C4
612745	Little Moss Farm, Peacock Lane, High Legh	51	45	69/--	47	42	47	52	47	6	5	A	1	R	T	-	-	-	-	MA03-O-C4
612747	Moss Farm, Peacock Lane, High Legh	46	40	65/--	46	41	46	49	44	3	3	A	1	R	T	-	-	-	-	MA03-O-C4
612751	Thowler Lane, Millington	53	48	69/--	51	46	51	55	50	4	4	A	5	R	T	-	-	-	-	MA03-O-C4
612757	Moss Lane, High Legh	42	36	59/--	54	48	53	54	48	0	0	A	3	R	T	-	-	-	-	
612779	Middle Moss Farm, Agden Lane, Agden	58	51	80/--	58	59	64	59	55	1	-4	S	1	R	T	H	-	-	NI	
612780	Froghall Lane, High Legh	43	37	59/--	50	46	51	51	46	1	0	A	2	R	T	-	-	-	-	

Assessment location		Impact criteria										Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612783	Boothbank Cottage, Boothbank Lane, Agden	44	39	61/--	56	57	62	50	50	-6	-7	A	1	R	T	H	-	-	-	
612796	Agden Lane, High Legh	64	57	85/--	63	65	70	64	60	<1	-4	S	1	R	T	H	-	-	NI	
612805	Froghall Lane, High Legh	40	34	56/--	68	63	68	68	63	0	0	NA	4	R	T	H	-	-	-	
612808	Roundstone House, Boothbank Lane, Agden	40	35	60/--	53	48	53	53	49	0	0	A	1	R	T	-	-	-	-	
612820	Agden Lane, Lymm	41	35	59/--	64	61	66	63	60	0	0	A	2	R	T	H	-	-	-	
612829	Hawthorn Cottage, Froghall Lane, Lymm	37	31	54/--	56	52	57	56	52	0	0	NA	1	R	T	-	-	-	-	
612834	Agden Lane, Lymm	52	46	67/--	51	46	51	54	49	3	3	A	7	R	T	-	-	-	-	~

Assessment location		Impact criteria									Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612839[5]	Spode Green Lane, Little Bollington	42	37	51/--	56	51	56	56	51	0	0	NA	3	R	T	-	-	-	-	
612842[5]	Spode Green Lane, Little Bollington	41	36	49/--	54	49	54	54	49	0	0	NA	4	R	T	-	-	-	-	
612847[5]	Spode Green Lane, Little Bollington	39	34	48/--	52	47	52	52	47	0	0	NA	3	R	T	-	-	-	-	
612861	Brook Cottage, Pickmere Lane, Pickmere	59	53	73/--	66	61	66	67	62	1	1	A	1	R	T	H	-	-	-	~
612887	Froghall Lane, High Legh	38	33	54/--	53	48	53	53	48	0	0	NA	100	R	T	-	-	-	-	

[5] For this location see Volume 5, Sound, noise and vibration Map Book: Map SV-02-319.

Assessment location		Impact criteria									Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612891	Brookside Cottage, Lymm Road, Little Bollington	48	41	67/--	71	66	71	71	66	0	0	A	2	R	T	H	-	-	-	
613037	Moss Lane, High Legh	52	45	70/--	52	50	55	54	50	3	1	A	1	R	T	-	-	-	-	~
613050	Hoo Green Lane, Mere	52	46	69/--	53	48	53	55	49	2	2	A	8	R	T	-	-	-	-	
613052	Warrington Road, Mere	49	43	69/--	58	53	58	59	54	1	1	A	4	R	T	-	-	-	-	
613074	Warrington Road, Mere	48	42	64/--	47	42	47	50	44	2	2	A	1	R	T	-	-	-	-	
613075	Old Hall Lane, Over Tabley	53	48	67/--	52	47	52	56	50	4	3	A	4	R	T	-	-	-	-	MA03-O-C1
613076	Agden Lane, High Legh	50	44	64/--	57	58	63	53	52	-4	-6	A	1	R	T	H	-	-	-	
613077	Agden Lane, High Legh	55	50	74/--	65	66	71	57	55	-7	-11	A	1	R	T	H	-	-	-	

Assessment location		Impact criteria									Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
613211	Agden Hall Farm, Agden Lane, Lymm and committed development (Map Book ref: MA03/050)	48	42	61/--	52	48	53	53	48	1	0	A	14	CD-R	T	-	-	-	-	
617504	Agden Brow, Lymm	44	37	65/--	64	58	63	64	58	0	0	A	17	R	T	H	-	-	-	
617505	Agden Brow, Lymm	42	36	63/--	49	44	49	50	44	1	0	A	5	R	T	-	-	-	-	
617508	Hillside, Agden Brow	47	41	69/--	60	55	60	60	54	0	0	A	3	R	T	H	-	-	-	
617509	Agden Brow, Lymm	55	49	78/--	66	61	66	66	61	0	0	S	2	R	T	H	-	-	NI	
617512	Lymm Road, Little Bollington	52	45	73/--	63	57	62	63	58	0	0	A	1	R	T	H	-	-	-	
617513	Lymm Road, Little Bollington	44	37	64/--	63	57	62	63	57	0	0	A	1	R	T	H	-	-	-	

Assessment location		Impact criteria									Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
617519	Woolstencroft Farm, Spring Lane, Lymm	46	40	65/--	44	38	43	48	42	4	4	A	1	R	T	-	-	-	-	~
618241	Agden Brow, Lymm	51	45	72/--	52	47	52	54	48	2	2	A	3	R	T	-	-	-	-	
618242	Agden Brow, Lymm	51	45	73/--	59	53	58	59	54	1	0	A	1	R	T	-	-	-	-	

Table 7: Operational airborne sound, noise impacts and significant effects: non-residential receptors

Assessment location		Impact criteria									Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612626	Style Matters (Lower Sensitivity Office), Pickmere, Knutsford	54	48	70/--	49	44	49	55	50	6	6	B	1	A4	T	-	-	-	-	
612643	Heyrose Golf Club (Wedding Venue), Budworth Road, Knutsford	56	50	71/--	45	40	45	56	50	11	10	B	1	A2	T	-	-	-	-	MA03-O-N2
612660	The Hay Barn (Wedding Venue), Mere Hall Estate, Knutsford	42	36	59/--	51	46	51	51	46	0	0	B	1	A2	T	-	-	-	-	
612664	Knutsford (Mere) Hotel, Warrington Road, Knutsford	49	43	66/--	65	60	65	65	60	0	0	B	1	A3	T	H	-	-	-	
612677	Mere Court Hotel, Warrington Road, Knutsford	61	55	80/--	49	44	49	61	55	12	11	B	1	A3	T	-	-	-	-	MA03-O-N3

Assessment location		Impact criteria									Significance criteria								Significant effect
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed 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	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
612681	Tabley Brook Kennels and Cattery (Lower Sensitivity Office), Budworth Road, Tabley	62	56	78/--	51	46	51	62	56	11	10	B	1	A4	T	-	-	-	-	MA03-O-N1
612694	High Legh Park Golf Club (Wedding Venue), Warrington Road, High Legh	37	32	56/--	55	48	58	55	48	0	0	B	1	A2	T	-	-	-	-	
613005	Chain & Conveyor (Offices), Winterbottom Lane, Knutsford	55	49	73/--	49	44	49	56	50	7	6	B	1	A4	T	-	-	-	-	<>

Direct impact – summary

3.2.9 The operational airborne noise impacts identified in Table 6 and Table 7 are summarised in Table 8.

Table 8: Summary of operational airborne sound impacts

Receptor type	Numbers of impacts (Number of impacts excluding those in committed developments)				
	Above LOAEL	Above SOAEL	Impacts		
			Minor	Moderate	Major
Residential properties	321 (307)	27 (27)	47 (47)	24 (24)	12 (12)
Non-residential properties	N/A	N/A			3
Schools	N/A	N/A			0
Quiet areas	N/A	N/A			0

Airborne sound: indirect impacts and effects

3.2.10 The transport assessment presented in Volume 5, Appendices TR-001, TR-002, TR-003 and TR-005, has been used to identify those roads or railways within this study area where the alignment remains as at present, but a change in flow or composition is identified which is greater than the screening criteria defined in Volume 5, Appendix SV-001-00000.

3.2.11 No roads or railways which exceed the criteria defined in Volume 5, Appendix SV-001-00000 have been identified in this study area. The assessment of operational noise and vibration indicates that significant indirect effects on residential receptors are unlikely to occur in this area.

Airborne sound levels used in other assessments

3.2.12 The operational sound results contained in this document have been used by other disciplines, namely agriculture, historic environment, landscape and visual, communities and socio economics, in their assessments. This includes the information in Table 6 and Table 7. Locations of interest to these other disciplines which may not appear in Table 6 and Table 7 are presented in Table 9.

Table 9: Operational airborne sound levels for use in cross-discipline assessments

Assessment location		Impact criteria										Discipline			
Reference	Area represented	Proposed Scheme only (year 15)			Without Proposed Scheme (opening year baseline)			With Proposed Scheme (opening year baseline + year 15 traffic) ****		Change		Agriculture	Ecology	Historic environment	Landscape and visual
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **				
612892	Hollowood Farm (Livestock), Old Hall Lane, Over Tabley (MA03/17)	66	60	84/--	60	55	60	66	60	6	6	Y	-	-	-
612893	Winterbottom Farm (Livestock), Winterbottom Lane, Mere (MA03/20)	60	54	80/--	52	47	52	60	54	8	8	Y	-	-	-

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