LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA13 | Calvert, Steeple Claydon, Twyford and Chetwode

Operational assessment (SV-004-013)

Sound, noise and vibration

November 2013

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Department for Transport

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Appendix SV-004-013

Environmental topic:	Sound, noise and vibration	SV
Appendix name:	Operation assessment	004
Community forum area:	Calvert, Steeple Claydon, Twyford &Chetwode	013

Contents

List of tables

1 Introduction

1.1 Structure of the sound, noise and vibration appendices

1.1.1 The sound, noise and vibration appendices comprise four sections. The first of these details the methodology used (Appendix SV-001-000) and relates to the sound, noise and vibration assessment for all community forum areas (CFA).

1.1.2 For the Calvert, Steeple Claydon, Twyford &Chetwode community forum area (CFA13), the other three sections are as follows:

- baseline sound, noise and vibration (Appendix SV-002-013);
- construction sound, noise and vibration (Appendix SV-003-013); and
- operational sound, noise and vibration (Appendix SV-004-013) (this appendix).

1.1.3 The outcomes of this assessment are summarised in Volume 2: CFA13 Report, Chapter 11 Sound, Noise and Vibration.

1.1.4 Maps referred to throughout the sound, noise and vibration appendices are contained in the Volume 5 sound, noise and vibration map book.

1.1.5 This appendix presents the likely noise and vibration impacts, effects and significant effects arising from the operation of the Proposed Scheme for the Calvert, Steeple Claydon, Twyford &Chetwode area on:

- people, primarily where they live ('residential receptors') in terms a) individual dwellings and b) on a wider community basis, including any shared community spaces; and
- community facilities such as schools, hospitals, places of worship, and also commercial properties such as offices and hotels, collectively described as 'non-residential receptors' and 'quiet areas'.

1.1.6 The assessment of likely impacts, effects and significant effects from operational noise and vibration on agricultural, community, ecological or heritage receptors and the assessment of tranquillity are presented in the following documents within Volume 5:

- Agriculture, forestry and soils — Appendix AG-001-013
- Community — Appendix CM-001-013
- Ecology — Appendix EC-005-002
- Heritage — Appendix CH-003-013
- Landscape and Visual — Appendix LV-001-013

1.2 Evaluation of impacts and effects

1.2.1 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.

1.2.2 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-001-000.

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

1.2.4 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.

1.2.5 In undertaking the assessment of sound, noise and vibration, consistent with EIA Regulations and emerging National Planning Practice Guidance[1] a differentiation between impacts effects, adverse effects and significant effects is made. Further information is provided in Volume 5: Appendix SV001-000.

1.2.6 The assessment of impacts has been undertaken at assessment locations that are representative of a number of dwellings or other sensitive receptors. The Assessment Locations employed in this assessment are presented on map series Sv-02 in the CFA06 Volume 5 sound, noise and vibration map book.

[1] National Planning Practice Guidance – Noise http://planningguidance.planningportal.gov.uk ; refer to the table summarising noise exposure hierarchy

2 Scope, assumptions and limitations

2.1 Regional and local policy guidance

2.1.1 The policy framework for sound, noise and vibration is set out in Volume 1 and in Appendix SV-001-000. As part of the engagement with local authorities through the Planning Forum Sub Group (Acoustics) information regarding any specific local planning guidance in respect of noise and vibration has been requested. Whilst no information has been received for this study area via the Planning Forum Sub Group (Acoustics) the following local policy guidance on noise and vibration has been identified:

- Aylesbury Vale District Local Plan - Jan 2004; and
- Cherwell Local Plan – 1996.

2.1.2 This guidance has been considered as part of formulating the detailed application of the impact and significance criteria set out in Volume 5: Appendix SV-001-000.

2.2 Engagement

2.2.1 Details of engagement on a route-wide basis with the local and county authorities' Environmental Health Practitioners via the Planning Forum Sub Group - Acoustics, is set out in Volume 1, Section 8.

2.2.2 Engagement with communities has been via the Community Forums, as set out in Volume 1. In respect of sound, noise and vibration the following discussions have taken place:

- general discussions in respect of local issues, including possible ways to avoid and mitigate the potential impacts of noise or vibration
- September / October 2012; a specific presentation about sound, noise and vibration with discussion afterwards with one of the project team specialists;
- November / December 2012; specific request for the Community Forum to propose baseline sound monitoring locations;
- January / February 2013; feedback to the Community Forum on any proposed baseline monitoring locations; and
- verbal / written response to questions on sound, noise and vibration.

2.3 Methodology

2.3.1 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 Scope and Methodology Report (SMR) (Volume 5: Appendix CT-001-000/1), is clarified in a number of areas by the SMR addendum (Volume 5: Appendix CT-001-000/2). Further information is contained in Volume 5: Appendix SV-001-000.

2.4 Assumptions

2.4.1 Route-wide assumptions are outlined in Volume 1, Section 8, and are further detailed in Volume 5: Appendix SV-001-000. Local assumptions that apply to the assessment of operational sound noise and vibration within this CFA are set out in Volume 2: Report 13 and below.

Calvert Infrastructure Maintenance Depot

2.4.2 The infrastructure maintenance depot (IMD) at Calvert will be a facility used primarily for the storage and preparation of the vehicles that are used for the inspection and maintenance of the railway infrastructure. The infrastructure maintenance depot is shown on map series SV-02 in the CFA13 Volume 5 sound, noise and vibration map book.

2.4.3 The facility will consist of a series of sidings and preparation areas for track machines. These vehicles will be prepared during the daytime ready for use during engineering hours. The maintenance vehicles will of the modular multi-purpose vehicle (MPV) style of railway vehicle that allows the same vehicles to be used for performing multiple tasks. Depending on the nature of the work planned, the equipment fitted to the MPV can be changed using a forklift truck and prepared for the night's work. A small number of other maintenance trains such as tampers will also be stabled at the IMD. More specialist maintenance trains such as rail grinders are likely to be contract hired in when required.

2.4.4 Preparation works could include cleaning of the vehicle and testing the systems. Once the vehicles have been prepared, they will be held in the sidings until the start of engineering hours. When engineering hours have begun, the maintenance vehicles will move out onto the railway to begin the nights work. This will typically occur between 00:00 and 01:00. Once the maintenance vehicles have left the IMD, there will be very little activity within the IMD until the return of the maintenance trains, which will typically be between 04:00 and 05:00 in time for the end of engineering hours.

2.4.5 In addition, it is expected that there may be the need for some deliveries of materials for use in the maintenance activities that are carried out from the IMD. Some will arrive by road. There is also the provision to transport materials by rail. These will be brought into the IMD via the East-West Rail Link and into the holding sidings to the south east of the main IMD. There will be no provision for bulk storage of materials; therefore, materials for use in HS2 maintenance such as ballast, sleepers and rail will be kept inside the rail wagons until needed on HS2, at which point they will be taken out as part of a maintenance train.

2.5 Local limitations

2.5.1 In this area, there are a number of locations where the land or property owners did not permit baseline sound level monitoring to be undertaken at their premises. However, sufficient information has been obtained to undertake the assessment. Further information is provided in Volume 5: Appendix SV-002-013.

3 Environmental baseline

3.1 Existing baseline

3.1.1 Baseline sound level data has been collected at locations representative of the airborne sound-sensitive receptors. The existing and future baseline airborne sound levels derived from these measurements are included within Table 3. Details of the baseline data collection and the methodology are given in Volume 5: Appendix SV-001-000 and specifically for this study area in Volume 5: Appendix SV-002-013.

3.1.2 The majority of receptors adjacent to the line of the route are not currently subject to appreciable vibration and therefore vibration at all receptors has been assessed using the absolute vibration criteria as described in Volume 5: Appendix SV-001-000.

3.2 Future baseline

3.2.1 The assessment is based upon the predicted change in sound levels that result from the Proposed Scheme. The assessment initially considered a reasonable worst case (that would overestimate the change in levels) by assuming that sound levels would not change from the existing baseline year of 2012/2013. Where significant effects were identified on this basis, the effects have been assessed using the baseline year of 2026 to coincide with the proposed start of passenger services. The future baseline is for the sound environment that would exist in 2026 without the Proposed Scheme.

4 Effects arising during operation

4.1 Introduction

4.1.1 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 and effects are presented. This is followed by the identification of significant effects and the evidence used to support these conclusions.

4.1.2 The structure of this assessment report is:

- Avoidance and mitigation measures
- Quantitative identification of impact and effects
  - Ground-borne sound and vibration
    - Residential
    - Non-residential
  - Airborne sound
    - Residential
    - Non-residential
- Assessment of impacts and effects
  - Residential receptors: direct effects – dwellings
  - Residential receptors: direct effects – communities
  - Residential receptors: indirect effects
  - Non-residential receptors: direct effects
  - Non-residential receptors: indirect effects
  - Cumulative effects from the proposed scheme and other committed development.

4.2 Avoidance and mitigation measures

4.2.1 These are set out in Volume 2: Report 13.

4.3 Quantitative identification of impacts and effects

Ground-borne sound and vibration

4.3.1 Assessment locations defined for the quantitative assessment of impacts are shown on map series SV-02 in the CFA13 Volume 5 sound, noise and vibration map book.

4.3.2 For each Assessment Location, the assessment results for residential and non-residential receptors are presented in Table 1. Explanation of the information in Table 1 is provided in Appendix SV-001-000, with the following additional notes.

B	For non-residential receptors further detail about the type of effect is set out in the text of Volume 5: Appendix SV-001-000.
NA	Type of effect - Generally no adverse effect
A	Type of effect - Adverse effect
S	Type of effect - Significant adverse effect
VDV	Vibration Dose Value
~	The forecast adverse effects are not considered to be significant on a community basis (further information on methodology is provided in Volume 5: Appendix SV-001-000).
^	The impact methodology has identified a potential significant effect at this receptor which based upon further qualitative information is not considered to be a likely significant effect. Please refer the end of this Appendix for further information.
	Where the significant effect column is highlighted in pink, then a significant effect is identified at the referenced residential community area, or individual receptor.
	Yellow denotes a low ground-borne noise impact or a minor ground-borne vibration impact
	Orange denotes a medium ground-borne noise impact or a moderate ground-borne vibration impact
	Red denotes a high ground-borne noise impact or a major ground-borne vibration impact
	Dark red denotes a very high ground-borne noise impact

Table 1: Ground-borne sound and vibration levels, noise and vibration impacts and effects

Assessment location		Impact criteria				Significance criteria								
ID	Area represented	Ground-borne sound level dB Lp_{ASmax}	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	Significant effect
274142	Chetwode, Buckingham	-	0.21	0.11	-	2	A	R	T	-	-	Y	-	~
275251	Chetwode, Buckingham	-	0.15	0.08	-	1	NA	R	T	-	-	-	-	
286608	Brackley Lane, Calvert	-	0.13	0.07	-	2	NA	R	T	-	-	-	-	
286616	Brackley Lane, Calvert	-	0.12	0.06	-	1	NA	R	T	-	-	-	-	
286631	Brackley Lane, Calvert	-	0.12	0.06	-	2	NA	R	T	-	-	-	-	

Impact summary

4.3.3 The operational ground-borne noise and vibration impacts identified in Table 1 are summarised in Table 2.

Table 2: Summary of operational ground-borne noise and vibration impacts

	Number of ground-borne sound impacts			
	Low	Medium	High	Very High
Residential properties	0	0	0	0
Non-residential properties	0			0
	Number of ground-borne vibration impacts			
	Minor	Moderate	Major	Risk of building damage
Residential properties	2	0	0	0

Airborne sound: direct impacts and effects

4.3.4 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 scheme, are presented in Table 3.

4.3.5 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 3. The results should be considered in conjunction with the information contained in map series Sv-02 in the CFA13 Volume 5 sound, noise and vibration map book.

4.3.6 Explanation of the Table 3 information is provided in Volume 5: Appendix SV001-000, with the following additional notes.

	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 change is of 3-5 dB
	Orange denotes a moderate impact at a residential building – a change is of 5-10 dB
	Red denotes a major impact at a residential building – a change is of >10 dB
*	Day - $L_{pAeq,07:00-23:00}$
**	Night - $L_{pAeq,23:00-07:00}$
***	Max - L_{pAFmax} In the Proposed Scheme only column, two values are presented. The first is the value for the HS2 mitigated train and the second is the value for the TSI compliant train. For further information refer to Volume 5: Appendix SV-001-000.
****	Where the Proposed Scheme modifies an existing source, i.e. road or railway realignments, the *Proposed Scheme only* level in the table includes the sound from the modified source. In this situation the *Do something (Opening year baseline + Year 15 traffic)* level has been corrected so as to not double count the sound associated with the road or railway on its new and existing alignment.
A	Adverse effect
B	For non-residential receptors further detail about the type of effect is set out in the text of Appendix SV-001-000.

CD	Committed Development. The value in brackets in the number of impacts represented column is the value with the committed development.
G	(G1)Theatres, large auditoria and concert halls, (G2) Sound recording and broadcast studios, (G3) Places of meeting for religious worship, courts, cinemas, lecture theatres, museums and small auditoria or halls, (G4) Schools, colleges, hospitals, hotels and libraries, and (G5) Offices and general commercial premises
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	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
R	Residential
RM	Residential mooring
S	Significant adverse effect
U	Unacceptable adverse effect
#	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 50 dB $L_{pAeq,\ 23:00-07:00}$ during the daytime or 40 dB $L_{pAeq,\ 07:00-23:00}$ at night. At the receptor denoted the absolute level condition is not met and therefore no impact is identified.
~	The forecast adverse effects are not considered to be significant on a community basis (further information on methodology is provided in Volume 5: Appendix SV-001-000).
$	A change of 3dB or greater has been identified however, the impact methodology for non-residential receptors includes a screening criteria for G3 building use of 50 dB $L_{pAeq,07:00-23:00,}$ for G4 building use 55 dB $L_{pAeq,07:00-23:00}$ and 45 dB $L_{pAeq,23:00-07:00}$, for G5 building use 55 dB $L_{pAeq,07:00-23:00}$. At the receptor denoted the screening criteria is not met and therefore no impact is identified. Further information is provided in Volume 5: Appendix SV-001-000.
^	The impact methodology has either identified an impact at a receptor which based upon further qualitative information does not gives rise to a significant effect. Further information is provided at the end of this Appendix.

Table 3: Operational airborne sound level, noise impacts and effects

Assessment Location		Impact criteria										Significance criteria								
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
274086	Godington, Bicester	46	37	61/64	44	41	44	48	43	4	1	NA	1	R	T	-	-	-	-	#
274142	Chetwode, Buckingham	69	60	84/87	43	31	35	69	60	26	29	S	2	R	T	L	Y	Y	NI	OSV13-C03 OSV13-D01
274201	Newton Purcell, Buckingham	41	31	58/61	50	42	49	51	42	0	0	NA	1	R	T	-	-	-	-	
274255	Newton Purcell, Buckingham	41	32	55/58	50	42	49	51	42	1	0	NA	1	R	T	-	-	-	-	
274265	Newton Purcell, Buckingham	38	28	49/52	51	43	49	51	43	0	0	NA	1	R	T	-	-	-	-	
274535	Chetwode, Buckingham	47	38	60/63	45	35	44	49	40	4	5	NA	3	R	T	-	-	-	-	#
274609	Chetwode, Buckingham	59	50	71/74	52	38	43	60	50	8	12	A	8	R	T	-	-	-	-	OSV13-C03
274745	Chetwode, Buckingham	54	45	67/70	42	36	41	54	45	12	9	A	1	R	T	L	Y	-	-	OSV13-C03
274787	Godington, Bicester	49	39	63/66	44	41	44	50	44	6	2	NA	1	R	T	-	-	-	-	#
274854	Godington, Bicester	50	41	65/68	43	36	43	51	42	8	6	A	2	R	T	-	-	-	-	~
275094	School End, Chetwode	49	40	61/64	42	36	41	50	41	8	5	A	5	R	T	L	Y	-	-	OSV13-C03
275155	Chetwode, Buckingham	49	40	60/63	42	36	41	50	41	8	5	A	2	R	T	L	Y	-	-	OSV13-C03
275187	Chetwode, Buckingham	59	50	72/75	42	33	41	59	50	17	17	A	1	R	T	L	Y	-	-	OSV13-C03
275245	Newton Purcell, Buckingham	52	43	67/70	47	38	47	53	44	6	6	A	1	R	T	-	-	-	-	OSV13-C03
275251	Chetwode, Buckingham	65	55	79/82	45	35	44	65	55	19	20	S	1	R	T	-	-	-	NI	OSV13-C03 OSV13-D02
277651	Chetwode, Buckingham	52	42	65/68	52	38	43	55	44	3	5	A	1	R	T	-	-	-	-	OSV13-C03
277682	Barton Hartshorn, Buckingham	47	38	60/63	47	40	42	50	42	3	2	NA	8	R	T	-	-	-	-	#
277726	Barton Hartshorn, Buckingham	49	40	62/65	47	40	42	51	43	4	3	A	8	R	T	-	-	-	-	~

Assessment Location		Impact criteria										Significance criteria								
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
277745	Barton Hartshorn, Buckingham	50	41	62/65	47	40	42	52	43	5	4	A	2	R	T	-	-	-	-	~
277995	Barton Hartshorn, Buckingham	56	47	68/71	47	40	42	56	47	9	7	A	1	R	T	-	-	-	-	~
279462	Barton Hartshorn, Buckingham	47	38	62/65	47	40	42	50	42	3	2	NA	2	R	T	-	-	-	-	#
283758	Cotswolds Way, Calvert	37	29	50/53	46	41	48	46	41	1	0	NA	24	R	T	-	-	-	-	
284026	Kiln Close, Calvert	39	30	52/55	46	41	48	47	41	1	0	NA	27	R	T	-	-	-	-	
284303	Tudors Close, Calvert	40	31	55/58	46	41	48	47	41	1	0	NA	21	R	T	-	-	-	-	
284336	Cotswolds Way, Calvert	42	32	54/57	46	41	48	47	41	1	1	NA	34	R	T	-	-	-	-	
284438	Kiln Close, Calvert	40	31	51/55	46	41	48	47	41	1	0	NA	26	R	T	-	-	-	-	
284601	Sandstone Close, Calvert	47	38	60/63	52	42	56	53	43	1	1	NA	7	R	T	-	-	-	-	
284685	Sandstone Close, Calvert	45	36	59/62	46	41	48	48	42	3	1	NA	6	R	T	-	-	-	-	#
284834	Sandy Road, Calvert	46	37	57/61	52	42	56	53	43	1	1	NA	29	R	T	-	-	-	-	
285186	Sandy Road, Calvert	49	39	59/64	52	42	56	54	44	2	2	NA	8	R	T	-	-	-	-	
285268	Brindles Close, Calvert	45	36	56/59	46	33	41	48	37	2	5	NA	21	R	T	-	-	-	-	#
285332	Rustics Close, Calvert	44	35	55/58	46	33	41	48	37	2	4	NA	24	R	T	-	-	-	-	#
285447	Cotswolds Way, Calvert	48	38	58/61	59	45	55	59	46	0	1	NA	19	R	T	-	-	-	-	
285464	Brickhill Way, Calvert	50	40	60/64	55	37	44	56	42	1	5	A	4	R	T	-	-	-	-	OSV13-C01
285533	Cotswolds Way, Calvert	48	39	58/62	46	33	41	50	39	4	7	NA	16	R	T	-	-	-	-	#
285709	Heathers Close, Calvert	46	37	58/61	52	42	56	53	43	1	1	NA	16	R	T	-	-	-	-	
285731	Cotswolds Way, Calvert	52	43	63/66	55	37	44	56	43	2	6	A	3	R	T	-	-	-	-	OSV13-C01
285737	Cotswolds Way, Calvert	51	42	63/66	55	45	53	56	47	2	2	A	14	R	T	-	-	-	-	
286395	Charndon, Bicester	37	28	52/55	46	41	48	46	41	0	0	NA	1	R	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria								
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
286439	School Hill, Charndon	42	33	52/56	50	42	52	50	43	1	0	NA	14	R	T	-	-	-	-	
286466	Werner Terrace, Calvert	50	41	61/64	63	52	59	63	52	0	0	A	7	R	T	-	-	-	-	
286506	Werner Terrace, Calvert	53	45	64/67	63	52	59	63	53	0	1	A	14	R	T	-	-	-	-	
286585	Brackley Lane, Calvert	51	42	63/66	55	45	53	56	47	2	2	A	11	R	T	-	-	-	-	
286608	Brackley Lane, Calvert	56	47	69/72	48	40	49	56	47	8	7	A	2	R	T	-	-	-	-	OSV13-C01
286616	Brackley Lane, Calvert	56	47	68/71	48	40	49	56	47	7	7	A	1	R	T	-	-	-	-	OSV13-C01
286631	Brackley Lane, Calvert	53	44	66/69	48	40	49	54	45	6	5	A	2	R	T	-	-	-	-	OSV13-C01
286799	Calvert Road, Steeple Claydon	46	38	58/61	46	39	51	49	41	3	2	NA	3	R	T	-	-	-	-	#
286928	Sandy Road, Calvert	51	42	62/66	52	42	56	54	45	2	3	A	5	R	T	-	-	-	-	OSV13-C01
286954	Brickhill Way, Calvert	50	41	61/65	52	42	56	54	44	2	3	A	10	R	T	-	-	-	-	OSV13-C01
287292	Church Street, Twyford	49	39	68/71	49	43	50	52	45	3	2	NA	1	R	T	-	-	-	-	#
287430	Mill Lane, Twyford	53	44	66/69	47	34	40	54	44	7	10	A	2	R	T	-	-	-	-	~
287480	Preston Bissett, Buckingham	48	39	63/66	47	34	40	51	40	4	6	NA	7	R	T	-	-	-	-	#
287554	Portway Road, Twyford	43	34	55/58	45	43	53	47	44	2	0	NA	43	R	T	-	-	-	-	
287936	Portway Road, Twyford	45	36	57/60	45	43	53	48	44	3	1	NA	24	R	T	-	-	-	-	#
287959	School Lane, Twyford	49	39	59/63	48	41	44	51	43	3	2	NA	6	R	T	-	-	-	-	#
288014	School Lane, Twyford	47	38	59/62	50	44	48	51	45	2	1	NA	6	R	T	-	-	-	-	
288053	Main Street, Twyford	45	36	56/59	45	43	53	48	44	3	1	NA	4	R	T	-	-	-	-	#
288099	Portway Road, Twyford	43	34	55/58	45	43	53	47	44	2	0	NA	12	R	T	-	-	-	-	
288112	Bicester Road, Twyford	43	34	61/64	48	39	45	49	40	1	1	NA	18	R	T	-	-	-	-	
288290	Mill Lane, Twyford	47	38	66/69	50	38	41	52	41	2	3	NA	14	R	T	-	-	-	-	#

Assessment Location		Impact criteria										Significance criteria								
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
288323	Church Street, Twyford	46	37	57/61	50	44	48	51	45	2	1	NA	6	R	T	-	-	-	-	
288381	Grange Close, Twyford	48	39	59/63	48	39	47	51	42	3	3	NA	8	R	T	-	-	-	-	#
288401	Grange Close, Twyford	51	42	68/71	46	37	39	52	43	6	6	A	4	R	T	-	-	-	-	OSV13-C02
288448	Church Street, Twyford	53	44	70/73	50	40	49	55	45	4	5	A	2	R	T	-	-	-	-	OSV13-C02
288469	Main Street, Twyford	47	38	64/67	50	38	41	52	41	2	3	NA	4	R	T	-	-	-	-	#
288518	Church Street, Twyford	47	38	59/63	47	42	45	50	43	3	1	NA	8	R	T	-	-	-	-	#
288528	Church Street, Twyford	51	42	68/71	51	45	48	54	47	3	2	A	3	R	T	-	-	-	-	OSV13-C02
288619	Bicester Road, Twyford	43	34	61/64	48	39	45	49	40	1	1	NA	30	R	T	-	-	-	-	
288684	Preston Bissett, Buckingham	55	46	67/70	47	34	40	56	46	9	12	A	2	R	T	-	-	-	-	~
288715	Preston Bissett, Buckingham	39	30	50/53	47	34	40	48	36	1	1	NA	3	R	T	-	-	-	-	
288944	Twyford, Buckingham	52	43	67/70	47	38	45	53	44	6	6	A	1	R	T	-	-	-	-	~
288993	Twyford Road, Twyford	60	50	73/76	47	38	45	60	51	13	13	A	1	R	T	-	-	-	-	~
289009	Twyford Road, Twyford	57	48	72/75	47	38	45	58	48	10	11	A	1	R	T	-	-	-	-	~
289024	Portway Road, Twyford	49	40	66/69	45	43	53	50	45	5	1	A	7	R	T	-	-	-	-	#
289065	Preston Bissett, Buckingham	55	46	67/70	47	38	45	56	46	8	9	A	2	R	T	-	-	-	-	~
289279	West Street, Steeple Claydon	45	36	58/61	47	38	45	49	40	2	2	NA	1	R	T	-	-	-	-	
289311	Calvert Road, Steeple Claydon	45	36	58/61	55	46	51	55	47	0	0	NA	5	R	T	-	-	-	-	
289346	Redland Close, Steeple Claydon	47	40	51/54	46	39	51	47	40	1	1	A	2	R	T	-	-	-	-	
289621	West Street, Steeple Claydon	44	36	55/58	50	43	50	51	43	1	1	NA	1	R	T	-	-	-	-	
289659	West Street, Steeple Claydon	50	41	63/66	48	37	48	52	42	4	5	A	1	R	T	-	-	-	-	~
549410	Redland Close, Steeple	39	32	45/48	49	42	55	49	42	0	0	NA	73	R	T	-	-	-	-	

Assessment Location		Impact criteria									Significance criteria								
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
	Claydon																			
549411	Cobbetts Mount, Steeple Claydon	38	31	43/46	46	39	55	46	39	0	0	NA	42	R	T	-	-	-	-	
549412	West Street, Steeple Claydon	37	30	45/48	49	42	55	49	42	0	0	NA	41	R	T	-	-	-	-	
700423	Calvert Road, Steeple Claydon	33	26	39/43	46	39	51	46	39	0	0	NA	1	R	T	-	-	-	-	
700426	Queen Catherine Road, Steeple Claydon	33	27	38/41	58	51	75	58	51	0	0	NA	2	R	T	-	-	-	-	
700427	Vicarage Lane, Steeple Claydon	34	28	40/43	46	39	55	46	39	0	0	NA	1	R	T	-	-	-	-	
710608	School End, Chetwode	29	22	41/44	46	39	55	46	39	0	0	NA	3	R	T	-	-	-	-	
700429	West Street, Steeple Claydon	43	34	53/56	50	43	50	50	43	1	0	NA	1	R	T	-	-	-	-	
700430	Portway Road, Twyford	46	37	59/62	45	43	53	48	44	4	1	NA	2	R	T	-	-	-	-	#
700431	Chetwode, Buckingham	40	31	51/54	45	35	44	46	37	1	1	NA	2	R	T	-	-	-	-	
710608	Chetwode, Buckingham	47	38	61/64	42	36	41	48	40	6	4	NA	1	R	T	L	-	-	-	#
711004	Committed Development CFA13/4	76	67	91/94	42	33	41	76	67	34	33	U	1	CD	T	L	Y	-	NI	OSV13-C03 OSV13-D03
275094	St. Mary's and St. Nicholas (Church)	49	40	61/64	42	36	41	50	41	8	5	B	1	G3	T	L	-	-	-	$
277726	Manor Farm, , Barton Hartshorn (General Commercial)	49	40	62/65	47	40	42	51	43	4	3	B	1	G5	T	-	-	-	-	$
279462	St James's Church (Church)	47	38	62/65	47	40	42	50	42	3	2	B	1	G3	T	-	-	-	-	$
284303	Tudors Close, Calvert, (General Commercial)	40	31	55/58	46	41	48	47	41	1	0	B	1	G5	T	-	-	-	-	

Assessment Location		Impact criteria									Significance criteria								
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
287292	Twyford C Of E First School, Church Street (School)	49	39	68/71	49	43	50	52	45	3	2	B	1	G4	T	-	-	-	-	$
288099	Main Street, Twyford, (Shopping)	43	34	55/58	45	43	53	47	44	2	0	B	1	G5	T	-	-	-	-	
288099	Crown Inn, The Square, Twyford, (Inn)	43	34	55/58	45	43	53	47	44	2	0	B	1	G5	T	-	-	-	-	
288099	United Reformed Church, Twyford (Church)	43	34	55/58	45	43	53	47	44	2	0	B	1	G3	T	-	-	-	-	
288099	Portway Road, Twyford, (Hall)	43	34	55/58	45	43	53	47	44	2	0	B	1	G3	T	-	-	-	-	
288421	St Mary's Church Twyford (Church)	51	42	66/70	42	32	35	52	42	9	11	B	1	G3	T	L	-	-	-	OSV13-N01
288993	Three Bridge Mills, Twyford Road, (General Commercial)	60	50	73/76	47	38	45	60	51	13	13	B	3	G5	T	-	-	-	-	^
289024	Meadow View, Portway Road, Twyford, (Office)	49	40	66/69	45	43	53	50	45	5	1	B	2	G5	T	-	-	-	-	$
289606	West Street, Steeple Claydon (Nature reserve)	50	42	59/63	55	51	61	55	51	0	0	B	1	G4	T	-	-	-	-	$
549412	West Street, Steeple Claydon, (Shopping)	37	30	45/48	49	42	55	49	42	0	0	B	1	G5	T	-	-	-	-	
549412	West Street, Steeple Claydon, (Shopping)	37	30	45/48	49	42	55	49	42	0	0	B	1	G5	T	-	-	-	-	
549412	Steeple Claydon Methodist Church (Church)	37	30	45/48	49	42	55	49	42	0	0	B	1	G3	T	-	-	-	-	
710607	Holy Trinity , Chetwode (Church)	47	37	67/70	44	41	44	49	43	4	1	B	1	G3	T	-	-	-	-	$

Assessment Location		Impact criteria									Significance criteria								
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	Significant effect
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
710608	St. Mary's and St. Nicholas (Church),	49	40	61/64	42	36	41	50	41	8	5	B	1	G3	T	L	-	-	-	$

Direct impact - Summary

4.3.7 The operational airborne noise impacts identified in Table 1 are summarised in Table 2.

Table 4: Summary of operational airborne noise impacts

Receptor	Number of impacts		
	Minor	Moderate	Major
Residential properties	26	44	12
Non-residential properties	0	0	4
Quiet areas	None	None	None

4.4 Assessment of impacts and effects

Residential receptors: direct effects - individual buildings

4.4.2 Taking account of the avoidance and mitigation measures incorporated into the Proposed Scheme, the assessment has identified approximately four residential dwellings, close to the Proposed Scheme, where noise would exceed the daytime trigger threshold set in the Regulations. It is therefore estimated that these buildings are likely to qualify for noise insulation under the Regulations. These dwellings are indicated on Volume 5: Map Book - Sound, noise and vibration, Map series SV-02:

- Rosehill Barns and Rosehill Farm, Chetwode receptor reference 274142 (marked as OSV13-D01 in Table 3);
- The Hermitage, Chetwode receptor reference 275251 (marked as OSV13-D02 in Table 3); and
- proposed residential property in committed development ref. CFA13/4 (refer to Volume 2 Section 2) to be located closest to the route, receptor reference 711004 (marked as OSV13-D03 in Table 3).

4.4.3 The mitigation measures including noise insulation will reduce noise inside all dwellings such that it will not reach a level where it would significantly affect residents.

Residential receptors: direct effects –communities

4.4.4 The mitigation measures in this area will avoid airborne noise adverse effects on the majority of receptors, and at the following communities:

- Charndon;
- Steeple Claydon;
- Twyford (except as identified in Table 5);
- Calvert Green;
- Preston Bissett;
- Godington; and

- Bishops Hartshorne.

4.4.5 Taking account of the envisaged mitigation, Map Series SV-02 (Volume 5 Map book) shows the long term 40dB[2] night-time sound level contour from the operation of trains on the Proposed Scheme. The extent of the 40dB night-time sound level contour is equivalent to, or slightly larger than, the 50dB daytime contour[3]. In general, below these levels adverse effects are not expected.

4.4.6 Above 40dB during the night and 50dB during the day the effect of noise is dependent on the baseline sound levels in that area and the change in sound level (magnitude of effect) brought about by the Proposed Scheme. The airborne noise impacts and effects forecast for the operation of the scheme are presented on Map Series SV-02 (Volume 5 Map Book).

4.4.7 The changes in noise levels are likely to affect the acoustic character of the area such that there is a perceived change in the quality of life and are considered to be significant when assessed on a community basis[4] taking account of the local context.

4.4.8 The existing baseline environment in the community of Chetwode is very quiet, being substantially less than 50 dB daytime and / or 40 dB night-time in some areas of the village. The existing environment is characterised by little or no appreciable man-made sound sources. Such environments are rare in this part of England and hence it is considered a unique feature. Taking account of the forecast operational noise levels, an effect is identified on the unique feature of an existing environment characterised by little or no man made sources.

4.4.9 In Chetwode two residential properties are subject to ground-borne vibration impacts as a result of the Proposed Scheme. Given the low magnitude of the impact and the number of buildings affected, the effect is not considered to be significant.

4.4.10 Approximately 20 isolated properties within the area have been identified as being subject to an observed adverse noise effect; these effects are likely to be considered as an effect on the acoustic character of the area such that there is a perceived change in the quality of life. However, as the affected properties are spatially remote from larger defined residential areas, are subject to smaller magnitudes of noise effect, or are small in number, the effects are not considered to be significant.

4.4.11 In this study area, the direct adverse effects on the areas of the residential communities identified in

[2] Defined as the equivalent continuous sound level from 23:00 to 07:00 or $L_{pAeq,night}$)

[3] With the train flows described in the assumptions section of this CFA Report, the daytime sound level (defined as the equivalent continuous sound level from 07:00 to 23:00 or $L_{pAeq,day}$) from the Proposed Scheme would be approximately 10dB higher than the night-time sound level. The 40dB contour therefore indicates the distance from the Proposed Scheme at which the daytime sound level would be 50dB.

[4] Further information is contained in Volume 1.

4.4.12 Table 5 are considered to be significant.

Table 5: Direct adverse effects on residential communities and shared open areas that are considered significant on a community basis

Significant effect number (see Map series SV-02, Table 1 and 3)	Source of significant effect	Time of day	Location and details
OSV13-C01	Airborne noise increase from new train services	Daytime and night-time	Calvert. Approximately 30 dwellings in the vicinity of Cotswolds Way, Brackley Lane, Sandy Road and Brickhill Way, and their associated shared community open spaces. Forecast increases in sound from the railway are likely to cause a moderate adverse effect on the acoustic character of the area around the closest approximately 35 properties. The effect on the acoustic character around the properties in this area that are located further from the railway would be a minor effect.
OSV13-C02	Airborne noise increase from new train services	Daytime and night-time	Twyford. Approximately 10 dwellings in the vicinity of Grange Close and Church Street closest to the route and their associated shared community open areas (local playing fields with clubhouse). Forecast increases in sound from the railway are likely to cause a moderate adverse effect on the acoustic character of the area around the closest approximately five properties. The effect on the acoustic character around the properties in this area that are located further from the railway would be a minor effect.
OSV13-C03	Airborne noise increase from new train services	Daytime and night-time	Chetwode. Approximately 25 dwellings in the vicinity of the road that runs through Chetwode and their associated shared community open areas. Forecast increases in sound from the railway are likely to cause a major adverse effect on the acoustic character of the area around the closest approximately five properties. The effect on the acoustic character around the properties in this area that are located further from the railway would generally be moderate.

Residential receptors: indirect effects

4.4.13 The transport assessment presented in Volume 5: Appendix TR-001-000, 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-001-000. No roads or railways which exceed the criteria defined in Volume 5: Appendix SV-001-000 have been identified in this study area.

4.4.14 The assessment of operational noise and vibration indicates that significant indirect effects on residential receptors are unlikely to occur in this area.

Non-residential receptors: direct effects

4.4.15 The assessment has identified airborne noise impacts at St. Mary's Church, Twyford and Three Bridge Mills, Twyford, represented by receptor references 288421 and 288993.

St. Mary's Church, Twyford

4.4.16 A major operational noise impact has been identified based upon the change in the airborne noise level outside this receptor, reference 288421. An assessment has been undertaken to determine if this impact would result in a likely significant effect at this non-residential receptor, using the significance criteria detailed in Volume 5: Appendix 001-000.

4.4.17 This receptor is located approximately 250m from the Proposed Scheme alignment. St. Mary's Church is a medieval church, circa 12th century. The walls are solid heavy masonry with a combination of tiled, slate and lead roof. Stained glass windows to east and west windows, ventilation is considered to be provided by opening of windows.

4.4.18 St. Mary's Church is identified, on a precautionary basis, as being subject to a significant adverse effect denoted by OSV13-N01 in Table 3 and drawing SV-02 (see CFA13 Volume 5 sound, noise and vibration map book). This may take the form of the activity disturbance to the people using the church.

Three Bridge Mills, Twyford

4.4.19 A major impact has been identified at this receptor based upon the change in the airborne noise level outside this receptor, reference 288993. An assessment has been undertaken to determine if this impact would result in a likely significant effect at this non-residential receptor, using the significance criteria detailed in Volume 5: Appendix 001-000.

4.4.20 Three Bridge Mills is a general commercial building offering light industrial, workshops, and short-term and long-term storage spaces. None of the building uses are particularly sensitive to noise. The building is a lightweight metal clad structure with opening glazed roof sections. Ventilation is assumed to be provided by opening the roof windows.

4.4.21 Considering the use of these facilities and the incident sound levels relative to the screening criterion. Sound levels within the building are not likely to result in activity disturbance and therefore, the impact at this non-residential receptor will not result in a significant observed adverse noise effect at this receptor.

Summary

4.4.22 The assessment of operational noise and vibration indicates that significant effects are likely on the non-residential receptor identified in Table 6.

4.4.23 The assessment of effects on non-residential receptors has been undertaken on a reasonable worst case basis taking account of public available information about each receptor.

Table 6: Likely significant noise or vibration effects on non-residential receptors arising from operation of the Proposed Scheme

Significant effect number (see Map series SV-02, Table 1 and 3)	Type of significant effect and source	Time of day	Location and details

Significant effect number (see Map series SV-02, Table 1 and 3)	Type of significant effect and source	Time of day	Location and details
OSV13-N01	Minor adverse effect on activities[5] inside the church due to the operation of train services.	Daytime	Church of the Assumption of the Blessed Virgin Mary, Twyford

Non-residential receptors: indirect effects

4.4.24 The transport assessment presented in Volume 5: Appendix TR-001-000, 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-001-000. No roads or railways which exceed the criteria defined in Volume 5: Appendix SV-001-000 have been identified in this study area.

4.4.25 The assessment of operational noise and vibration indicates that significant indirect effects are unlikely to occur on non-residential receptors in this area.

Cumulative effects

4.4.26 Details of properties being currently developed which were afforded planning approval before the safeguarding date are presented in Volume 5: Appendix CT004-000. Within this area, the operational sound, noise or vibration associated with these developments in conjunction with the operation of the Proposed Scheme do not result in any significant cumulative effects.

[5] Potential risk of activity disturbance, especially for activities that require good conditions for verbal communication if windows are open