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HIGH SPEED TWO

INFORMATION PAPER

E20: CONTROL OF AIRBORNE NOISE FROM ALTERED ROADS AND THE OPERATIONAL RAILWAY

This paper outlines the measures that will be put in place to control airborne noise from altered roads and the operational railway.

It will be of particular interest to those potentially affected by the Government's proposals for high speed rail.

This paper will be updated as required. If you have any queries about this paper or about how it might apply to you, please contact the HS2 Public Enquiries desk in the first instance.

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P3754 (1)

HOL/10024/0002

E20: CONTROL OF AIRBORNE NOISE FROM ALTERED ROADS AND THE OPERATIONAL RAILWAY

1. Introduction

1.1. High Speed Two (HS2) is the Government's proposal for a new, high speed north-south railway. The proposal is being taken forward in two phases: Phase One will connect London with Birmingham and the West Midlands and Phase Two will extend the route to Manchester, Leeds and beyond.

1.2. HS2 Ltd is the non-departmental public body responsible for developing and promoting these proposals. The company works to a Development Agreement made with the Secretary of State for Transport.

1.3. In November 2013, HS2 Ltd deposited a hybrid Bill[1] with Parliament to seek powers for the construction and operation of Phase One of HS2 (sometimes referred to as 'the Proposed Scheme'). The Bill is the culmination of nearly six years of work, including an Environmental Impact Assessment (EIA), the results of which were reported in an Environmental Statement (ES) submitted alongside the Bill. The Secretary of State has also published draft Environmental Minimum Requirements (EMRs), which set out the environmental and sustainability commitments that will be observed in the construction of the Proposed Scheme.

1.4. The Bill is being promoted through Parliament by the Secretary of State for Transport (the 'Promoter'). The Secretary of State will also appoint a body responsible for delivering the Proposed Scheme under the powers granted by the Bill.

1.5. This body is known as the 'nominated undertaker'. There may well be more than one nominated undertaker – for example, HS2 Ltd could become the nominated undertaker for the main railway works, while Network Rail could become the nominated undertaker for works to an existing station such as Euston. But whoever they are, all nominated undertakers will be bound by the obligations contained in the Bill and the policies established in the EMRs.

1.6. These information papers have been produced to explain the commitments made in the Bill and the EMRs and how they will be applied to the design and construction of the Proposed Scheme. They also provide information about the Proposed Scheme itself, the powers contained in the Bill and how particular decisions about the project have been reached.

[1] The High Speed Rail (London – West Midlands) Bill, hereafter 'the Bill'.

2. Overview

2.1. This Information Paper describes the application of the aims set out in the Noise Policy Statement for England for airborne noise from the Proposed Scheme and outlines the measures that will be put in place to control the effects of airborne noise that might otherwise arise from altered roads and the operational railway during the operation of the Proposed Scheme.

2.2. Airborne noise from altered roads and the operational railway could result in adverse impacts on people nearby.

3. Objectives

3.1. The nominated undertaker will take all reasonable steps to design and construct altered roads, and to design, construct, operate and maintain the operational railway so that the combined airborne noise from these sources, predicted in all reasonably foreseeable circumstances, does not exceed the lowest observed adverse effect levels set out in Table 1 of Appendix B.

3.2. Where it is not reasonably practicable to achieve this objective, the nominated undertaker will reduce airborne noise from the altered roads and the operational railway as far as is reasonably practicable.

3.3. Noise insulation will be offered with the aim that airborne noise from altered roads and the operational railway does not give rise to significant adverse effects on health and quality of life that would otherwise be expected when airborne noise exceeds the significant observed adverse effect levels set out in Table 1 of Appendix B. Eligibility for noise insulation is explained in Section 5 below.

3.4. Where possible, the nominated undertaker will also contribute to the improvement of health and quality of life through the control of airborne noise.

3.5. Effects on health and quality of life are primarily avoided and minimised through the control of airborne noise at residential dwellings. It is recognised that effects can also occur when people are engaged in noise sensitive activities away from their home. To deliver the Policy aims, reasonable steps will be taken to control airborne noise from altered roads and the operational railway to the levels set out in Table 2 of Appendix B for noise sensitive non-residential buildings and external amenity spaces (see Glossary).

3.6. For detail on the Airborne Noise Policy for altered roads and the operational railway adopted for HS2 Phase One see Appendix A.

4. Control Measures

4.1. The likely airborne noise impact from altered roads and the operational railway has been assessed and the findings reported in the Environmental Statement.

4.2. The following measures to control airborne noise from altered roads and the operational railway will be considered in the following order by the nominated undertaker:

- reduce noise generation at source;
- reduce noise propagation through the design, specification, construction and maintenance of noise fence barriers and/or landscape earthworks; and
- reduce the amount of noise entering eligible properties through the offer of noise insulation.

4.3. To ensure that the measures to control airborne noise are reasonable, the nominated undertaker will take account of the set of shared UK principles that underpin the Government's sustainable development strategy[2].

5. Provision of noise insulation

5.1. Noise insulation measures, including ventilation where required, will be offered for qualifying buildings as defined in the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 and the Noise Insulation Regulations 1975 (as amended 1988)[3,4,5]. Qualification for noise insulation under the Regulations will be identified and noise insulation offered at the time that the Proposed Scheme becomes operational.

5.2. In addition, following the general time-window of eligibility described in the Noise Insulation Regulations (Railways and Other Guided Transport Systems) 1996, where airborne noise from the use of new or additional railways authorised by the Bill, altered roads authorised by the Bill or the combined airborne noise from both, is predicted outside a permanent dwelling in all reasonably foreseeable circumstances to exceed the significant observed adverse effect levels set out in Table 1 of Appendix B, the nominated undertaker will offer noise insulation.

6. More information

6.1. More detail on the Bill and related documents can be found at: www.gov.uk/HS2

[2] TSO (The Stationery Office) (2005), Securing the future: delivering UK sustainable development strategy, London.
[3] Her Majesty's Stationery Office (1996), The Noise Insulation (Railways and Other Guided Transport Systems) Regulations, London.
[4] Her Majesty's Stationery Office (1975), The Noise Insulation Regulations, London.
[5] Her Majesty's Stationery Office (1988), The Noise Insulation (Amendment) Regulations, London.

Appendix A

HS2 Phase One Airborne Noise Policy for altered roads and the operational railway[6]

The Noise Policy Statement for England (2010)

1. The aims set out in the Noise Policy Statement for England (NPSE) apply to the design, construction and operation of HS2 Phase One.

> **Noise Policy Aims**
>
> **Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:**
>
> - **avoid significant adverse impacts on health and quality of life;**
> - **mitigate and minimise adverse impacts on health and quality of life; and**
> - **where possible, contribute to the improvement of health and quality of life.**

2. Government's guiding principles of sustainable development include: ensuring a strong, healthy and just society; using sound science responsibly; living within environmental limits; achieving a sustainable economy; and promoting good governance.

3. There is a need to integrate consideration of the economic and social benefit of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation.

4. The first two aims of the NPSE follow established concepts from toxicology that are applied to noise impacts, for example, by the World Health Organisation. They are:

   - NOEL – No Observed Effect Level - the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; and
   - LOAEL – Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.

5. The NPSE extends these to the concept of a significant observed adverse effect level.

   - SOAEL – Significant Observed Adverse Effect Level - The level above which significant adverse effects on health and quality of life occur.

6. The NPSE notes "It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently,

[6] Note: all sound levels reported in this Appendix are outdoor free-field levels unless otherwise stated

the SOAEL is likely to be different for different noise sources, for different receptors and at different times".

Planning Practice Guidance - Noise (2014)

7. Government's Planning Practice Guidance on noise (PPG) provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the NOEL and, as exposure increases, the LOAEL and SOAEL.

8. As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.

9. The LOAEL is described in PPG as the level above which "noise starts to cause small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life."

10. PPG identifies the SOAEL as the level above which "noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

HS2 Sustainability Policy (2013)

11. HS2's sustainability policy sets out HS2 Ltd's commitment to be an exemplar project. It states that HS2 "will promote high speed rail and balance community, environmental and economic issues". The key theme identified that relates to noise impact is "Environmental change: seek to avoid significant adverse effects on communities, business and the natural, historic and built environment. Minimise impacts where they occur and deliver enhancements as far as practicable to ensure there is no net loss to the natural environment". This reflects the Noise Policy Statement for England's three aims and the need to avoid HS2 Phase One's noise impact being treated in isolation.

LOAELs for operational airborne noise from altered roads and the operational railway

12. Outdoor sound levels of 50 dB $L_{pAeq,day}$ and 40 dB $L_{pAeq,night}$ are considered the LOAELs for operational airborne noise from altered roads and the operational railway.

13. In the WHO Night Noise Guidelines for Europe[7] a level of 40 dB L_{night} outdoors is said to be "equivalent to the LOAEL for night noise".

[7] World Health Organisation, Night Noise Guidelines for Europe 2009

14. For the daytime level, the information used to support the WHO Guidelines for Community Noise[8] indicate that daytime sound levels of less than 50 dB L_{pAeq} cause little or no serious annoyance in the community.

15. The WHO Guidelines for Community Noise also identify 60 dB L_{pAFMax} outside as the guideline value for sleep disturbance with windows open. For this reason, sound levels of 60 dB L_{pAFMax} at the façade is also considered the LOAEL for operational railway noise at night.

SOAELs for operational airborne noise from altered roads and the operational railway

16. Sound levels of 65 dB $L_{pAeq,day}$ and 55 dB $L_{pAeq,night}$ are considered the SOAELs for operational airborne noise from altered roads and the operational railway.

17. The daytime SOAEL is consistent with the daytime trigger level in the UK's Noise Insulation (Railways and Other Guided Transport Systems) Regulations[9]. The WHO Night Noise Guidelines for Europe sets the Interim Target at 55 dB $L_{pAeq,8hr}$ outside dwellings. This noise threshold has been taken to be the night-time SOAEL.

18. HS2 Ltd has considered research findings on adverse effects on nonrestorative sleep which indicate that adverse effects on sleep can be avoided if the maximum noise level inside the bedroom do not exceed 65 dB when more than 20 discreet events occur. For this reason, a sound level of 80 dB L_{pAFMax} at the façade when more than 20 train passbys occur and 85 dB L_{pAFMax} at the façade when 20 or fewer train passbys occur are considered the SOAELs for operational railway noise at night.

[8] World Health Organisation (1999) Guidelines for Community Noise. World Health Organisation, Geneva
[9] Statutory Instrument 1996 No. 428. The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996. HMSO.

Appendix B

Operational airborne noise impact and effect levels from altered roads and the operational railway[10]

Table 1 - Noise effect levels for permanent residential buildings

Time of day	Lowest Observed Adverse Effect Level (dB)	Significant Observed Adverse Effect Level (dB)
Day (0700 – 2300)	50 $L_{pAeq,\ 16hr}$	65 $L_{pAeq,\ 16hr}$
Night (2300 – 0700)	40 $L_{pAeq,\ 8hr}$	55 $L_{pAeq,\ 8hr}$
Night (2300 – 0700)	60 L_{pAFMax} (at the façade, from any nightly noise event)	80 L_{pAFMax} (at the façade, from more than 20 nightly train passbys), or 85 L_{pAFMax} (at the façade, from 20 or fewer nightly train passbys)

Table 2 - Noise impact levels for noise sensitive non-residential buildings and external amenity spaces

Examples	Day 0700-2300	Night 2300-0700
Large and small auditoria; concert halls; sound recording & broadcast studios; and theatres	60 dB L_{pAFMax} or 50 dB $L_{pAeq,\ 16hr}$	60 dB L_{pAFMax} or 50 dB $L_{pAeq,\ 8hr}$
Places of meeting for religious worship; courts; cinemas; lecture theatres; museums; and small auditoria or halls	50 dB $L_{pAeq,\ 16hr}$	n/a
Schools; colleges; hospitals; hotels; and libraries	50 dB $L_{pAeq,16hr}$	45 dB $L_{pAeq,8hr}$
Offices and external amenity spaces	55 dB $L_{pAeq,16hr}$	n/a

[10] Note: all sound levels reported in this Appendix are outdoor free-field levels unless otherwise stated

Appendix C

Glossary

At the façade – with reference to sound pressure measurement locations: a position 1m from the building.

Decibel (dB) - Between the quietest audible sound and the loudest tolerable sound there is a ten million to one ratio in sound pressure (measured in Pascal (Pa). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audible sound covers a range of approximately 0-140 dB.

External Amenity Spaces - As referred to in the Planning Practice Guidelines – Noise (2014), these are relatively quiet outdoor areas: for sole use by residents as part of the amenity of their dwelling; protected for sole use by a limited group of residents as part of the amenity of their dwelling; or protected as publicly accessible for residents as part of the amenity of their dwelling that are nearby.

dB(A) - The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.

$L_{pAeq,\,T}$ - An index used internationally to measure and assess environmental sound from sources such as roads and railways. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value.

$L_{pAeq,\,day}$ - Equivalent weekday sound pressure level between 07:00 and 23:00 hrs

$L_{pAeq,\,night}$ - Equivalent weekday sound pressure level between 23:00 and 07:00 hrs

L_{pAFmax} - The maximum A-weighted sound pressure level, where F indicates that the level is measured using a sound level meter's fast time weighting. It can be used to represent the "peak" noise level of an event such as a passing train. It is generally used when assessing the likelihood of night-time sleep disturbance.

Outdoor free-field – with reference to sound pressure measurement locations: a position more than 3.5m from all sound-reflecting surfaces other than the ground.

Permanent residential buildings – man-made structures that contain one or more dwelling units with a roof and walls standing more or less permanently in one place.

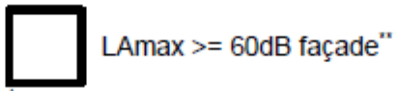
Interpreting the Noise Contour Maps

Baseline noise levels, predicted noise from HS2 (including altered roads) and predicted total noise are published for specified locations in the Environmental Statement and Supplementary Environmental Statements in tables.

In addition, noise contour maps are provided for railway noise in terms of L_{Aeq} and L_{Amax}.
On each map, the areas are shaded as follows:

- White shows the approximate area predicted to be below L_{Aeq} LOAEL;
- Grey shows the approximate area predicted approximately between L_{Aeq} LOAEL and SOAEL; and
- Pink shows the approximate area above L_{Aeq} SOAEL.

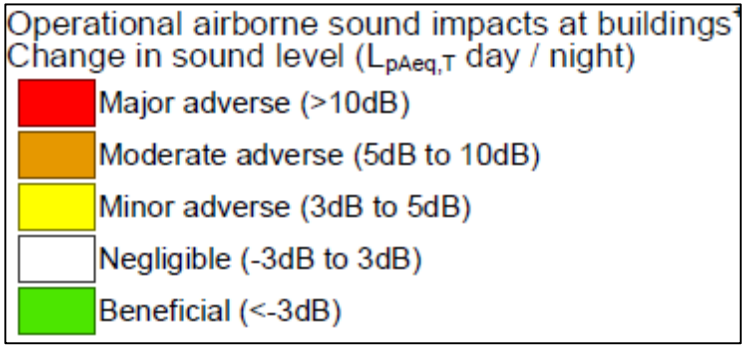
And L_{Amax} is shown as below:



The assessment is based on residential occupation of property.

In addition, individual residential properties are colour coded to show the noise change from the railway during operation. This information is used to develop mitigation (see HS2 Information Paper E20).

The colour code is as follows:



P3755

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

— Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]

South Harefield
Broadwater Lake
Harefield Moor Lake
Long Lake
Kroda Lake
Harefield No.2 Lake
Savay Lake
LONDON BOROUGH OF HILLINGDON
Harefield Moor
New Years Green
Dew's Farm
SOUTH BUCKS DISTRICT
Denham Green
Uxbridge Golf Course
Colne Valley Viaduct
OSV07-C01
OSV07-N02
OSV06-N01
1.4m
3m
For Continuation Refer to Map Number SV-02-011
For Continuation Refer to Map Number SV-02-009
CFA7/11
CFA6/21

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- [illegible] boundary

Engineering earthworks: Embankment; Cutting
Non engineering earthworks: Embankment; Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-010

Map Name: Operational Airborne Noise & Vibration Impacts & Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA7: Colne Valley

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: -AP05-P01

P3756 (1)

HOL/10024/0012

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	**Residential**	**Non-residential & quiet areas**
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
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Chalk Cliff
CFA7/14
Pynesfield Lake
West Hyde
THREE RIVERS DISTRICT
Horse Shoe Bay
LONDON BOROUGH OF HILLINGDON
Broadwater Lake
Chiltern Tunnel South Portal
Colne Valley Viaduct
CHILTERN DISTRICT
SOUTH BUCKS DISTRICT
Denham Park Farm
Denham Green
OSV07-C03
OSV07-N01
OSV07-C02
5-14m
7-15m
3m
1.4m
31+000
30+000
29+000
28+000
For Continuation Refer to Map Number SV-02-012
For Continuation Refer to Map Number SV-02-010
DENHAM WAY (NORTH ORBITAL ROAD)
OLD UXBRIDGE ROAD
TILEHOUSE LANE
HALLINGS LANE
HANGAR ROAD
WOODHOUSE DRIVE
DENHAM LANE
NORTH ORBITAL ROAD

Legend - General features

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0 100 200 300 400 Metres

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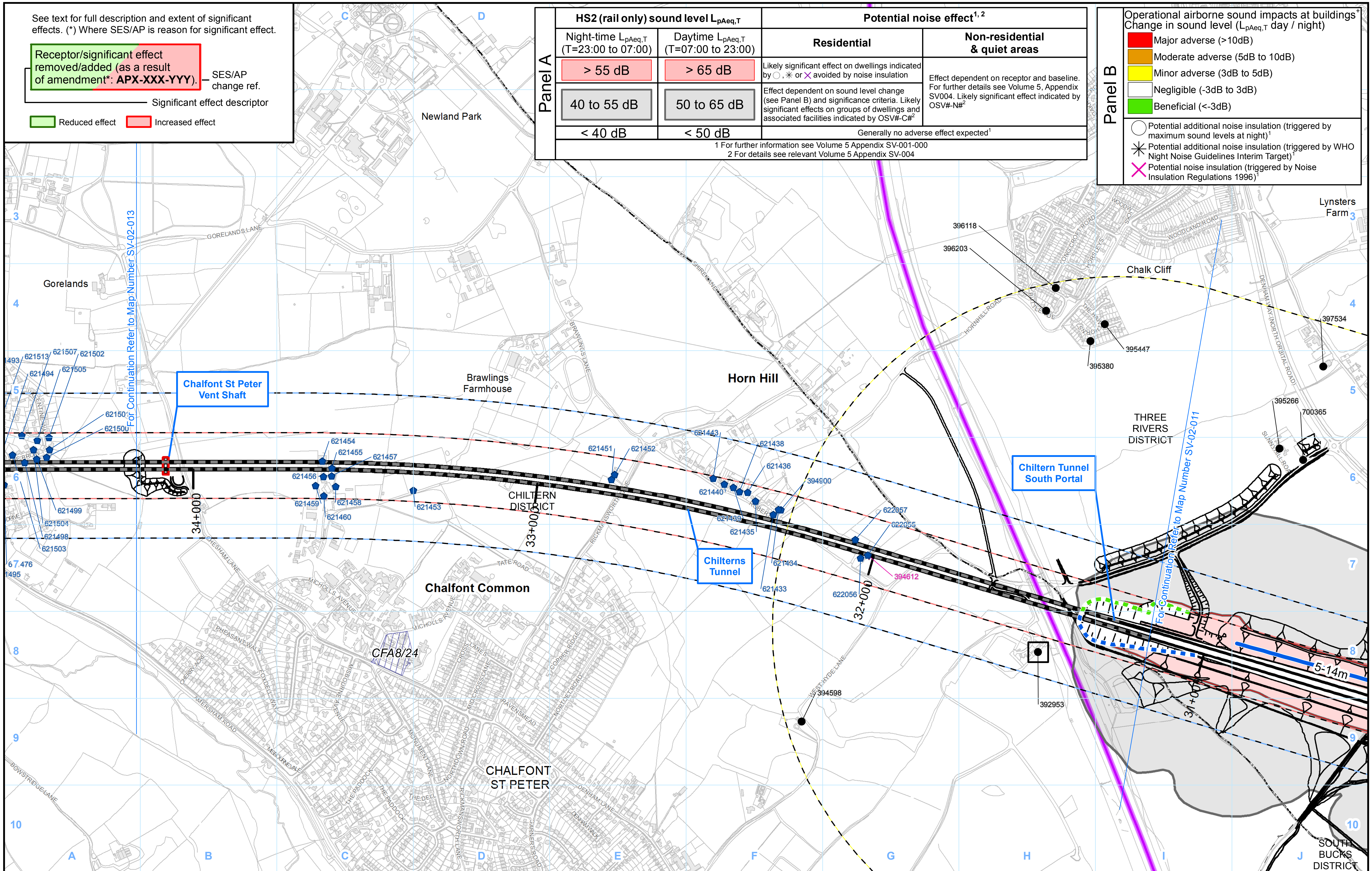
P3756 (2)

HOL/10024/0013



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1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

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- Minor ground-borne noise or vibration impact*

Map Number: SV-02-012

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA8: The Chalfonts & Amersham

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

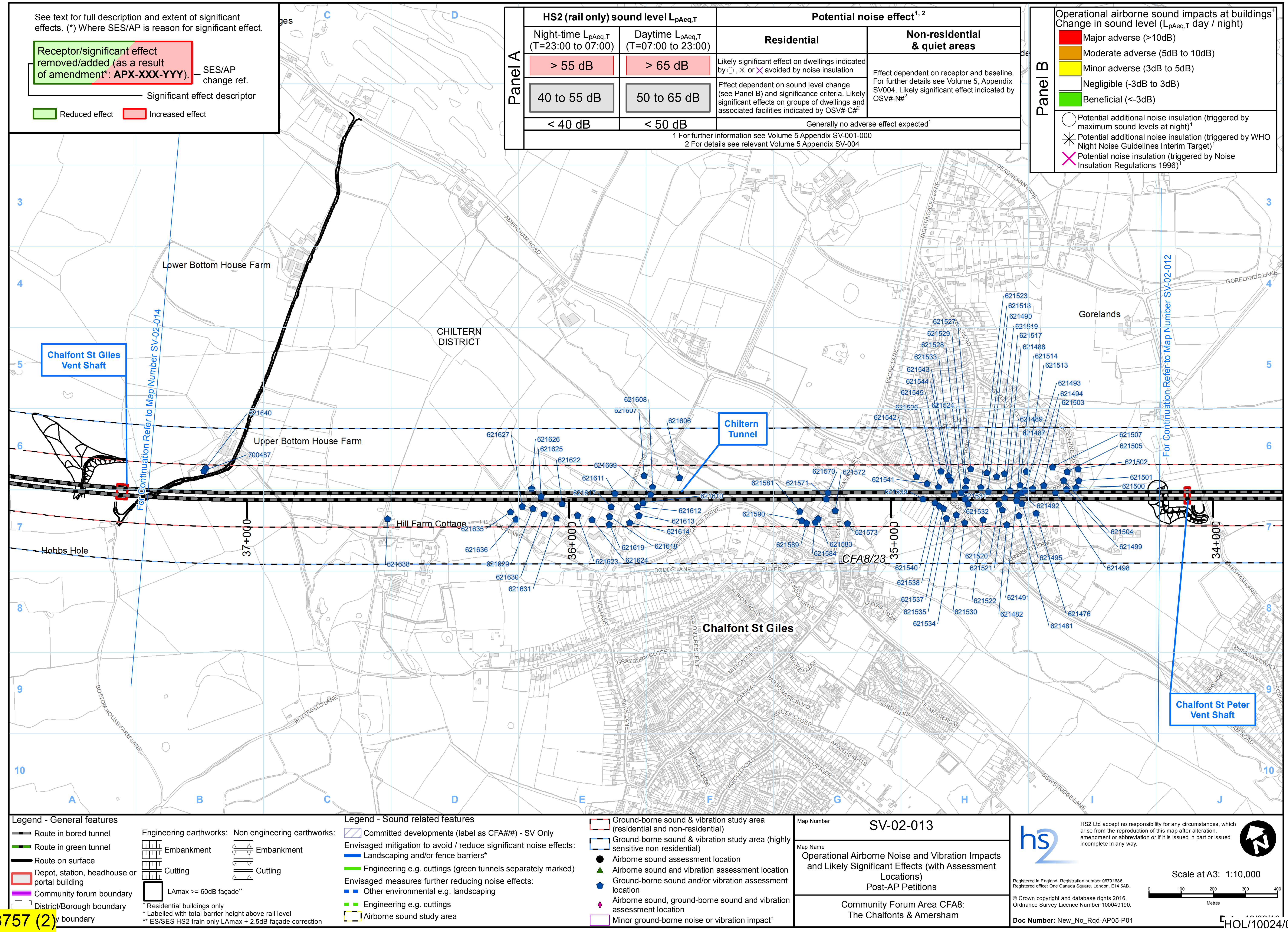
Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: New_No_Rqd-AP05-P01

P3757 (1)

HOL/10024/0014



P3757 (2)

HOL/10024/0015

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

— Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	**Residential**	**Non-residential & quiet areas**
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]

Amersham Old Town
Bury End
CFA8/22
Amersham Vent Shaft
Gore Hill
Quarrendon Farm
Lower Bottom House Farm
CHILTERN DISTRICT
Keeper's Cottage
Chalfont St Giles Vent Shaft
Upper Bottom House Farm
Hobbs Hole
The Chilterns Crematorium
Chiltern Tunnel
Rushymead Farm
Brentford Grange Farm
For Continuation Refer to Map Number SV-02-015
For Continuation Refer to Map Number SV-02-013
40+000
39+000
38+000
37+000
621640
700487

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- [illegible] boundary

Engineering earthworks: Embankment; Cutting
Non engineering earthworks: Embankment; Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-014

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA8: The Chalfonts & Amersham

Registered in England. Registration number 06791686.
Registered office: One Canada Square, London, E14 5AB.

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: New_No_Rqd-AP05-P01

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

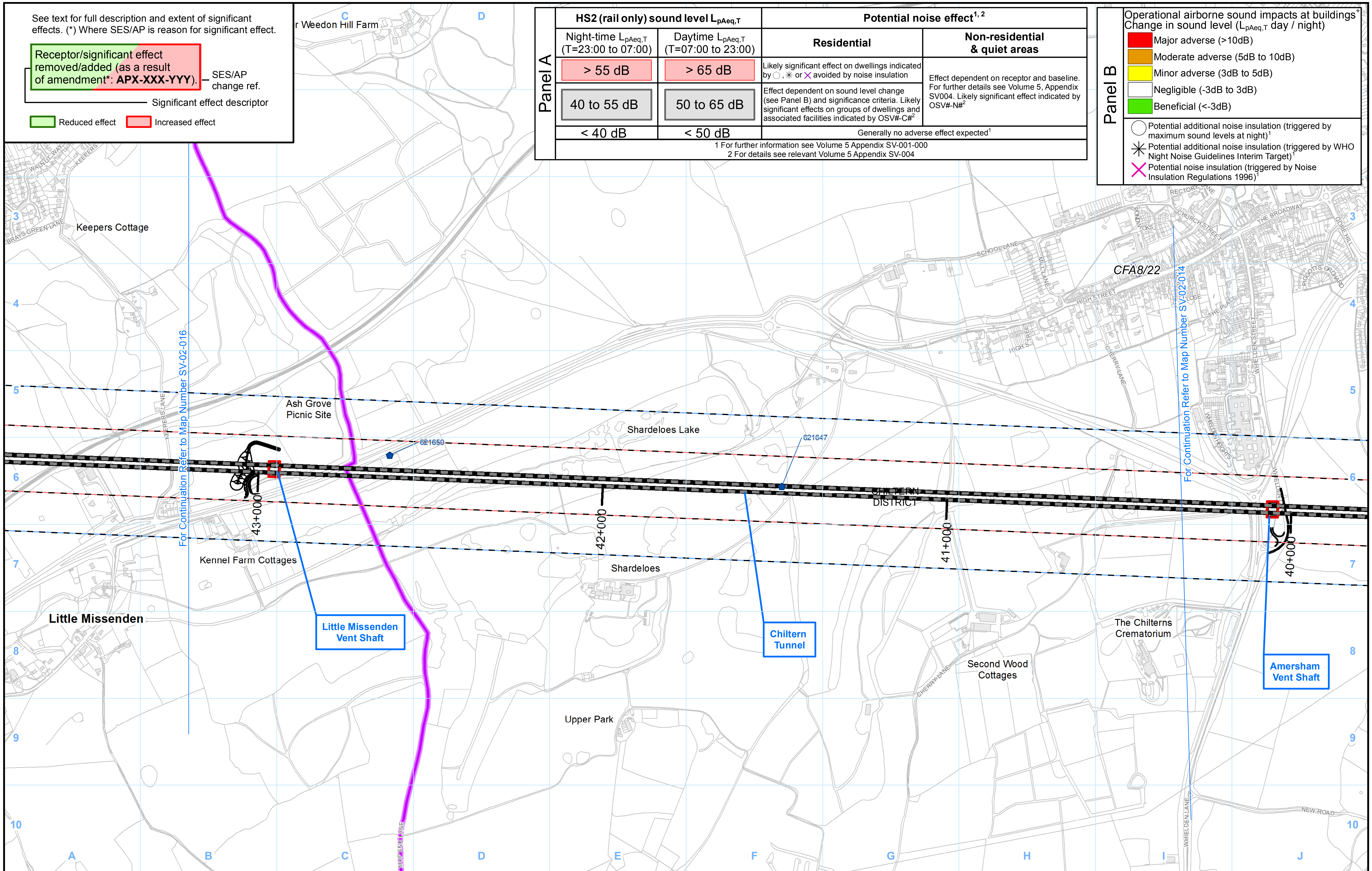
Panel A	HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
	Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
	> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
	40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
	< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings[*]
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)
- ○ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks: Embankment, Cutting
Non engineering earthworks: Embankment, Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only
- Envisaged mitigation to avoid / reduce significant noise effects:
  - Landscaping and/or fence barriers*
  - Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged measures further reducing noise effects:
  - Other environmental e.g. landscaping
  - Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact*

Map Number: SV-02-015

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA8: The Chalfonts & Amersham

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Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: New_No_Rqd-AP05-P01

P3757 (4)

HOL/10024/0017

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	**Residential**	**Non-residential & quiet areas**
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]

Significant effect OSV09-C01 removed (as a result of amendment **AP4-009-001**)

For Continuation Refer to Map Number SV-02-017
For Continuation Refer to Map Number SV-02-015

Middle Grove Farm Cottages
Wheatsheaf Cottage
Hyde End
Hyde Heath
Keepers Cottage
South Heath
CHILTERN DISTRICT
Mantle's Wood
Ash Grove Picnic Site
Keeper's Wood
Hedgemoor
Chapel Farm
Farthings Wood
Mantle's Farm Cottages
Kennel Farm Cottages
Broome Farm
Chiltern Tunnel
Little Missenden Vent Shaft
Rookwood Cottage
Pike Hill
Little Missenden

377405 6704 376681 374531 374552 721039 721036 721038 721037 721035 721034 376359 622063 622061

46+000 45+000 44+000 43+000

HYDE HEATH ROAD | BROWNS ROAD | WOOD LANE | CHESHAM ROAD | BULBATERS LANE | BRAYS LANE | BRAYS MEADOW | BRAYS CLOSE | BRAYS GREEN LANE | WALNUT WAY | KEEPERS LANE | HYDE LANE | TAYLORS LANE | PENFOLD LANE

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- [illegible] boundary

Engineering earthworks: Embankment, Cutting
Non engineering earthworks: Embankment, Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-016

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA9: Central Chilterns

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Registered in England. Registration number 06791686.
Registered office: One Canada Square, London, E14 5AB.

Doc Number: New_No_Rqd-AP05-P01

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]

Significant effect OSV09-C02 removed (as a result of **AP4-009-001**)

For Continuation Refer to Map Number SV-02-018

For Continuation Refer to Map Number SV-02-016

Hunt's Green
Hunt's Green Farm
Hammondshall Farm
AYLESBURY VALE DISTRICT
Cottage Farm
Mapridge Cottage
Field End Cottage
CHILTERN DISTRICT
South Heath
Hyde End
Sibley's Coppice
Frith Hill Farm
Chapel Farm
Frith-hill
Rookwood Cottage
Chiltern Tunnel
Chiltern Tunnel North Portal
6m
49+000
48+000
47+000
46+000

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- [illegible] boundary

Engineering earthworks: Embankment, Cutting
Non engineering earthworks: Embankment, Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only
- Envisaged mitigation to avoid / reduce significant noise effects:
  - Landscaping and/or fence barriers*
  - Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged measures further reducing noise effects:
  - Other environmental e.g. landscaping
  - Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-017

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA9: Central Chilterns

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: New_No_Rqd-AP05-P01

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

— Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	**Residential**	**Non-residential & quiet areas**
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]

Kingsash
Strawberryhill Cottage
Strawberryhill Farm
CHILTERN DISTRICT
Hunt's Green
Hunt's Green Farm
OSV10-C02
Hartley Farm
AYLESBURY VALE DISTRICT
Jones Hill Wood
Durham Farm
OSV10-C01
Upper Wendover Dean Farm
Wendover Dean Farm
Cottage Farm
Wendover Dean
Lower Little London Farm
Russell Farm
Dutchlands Farm Cottages
Dutchlands Farm
Mapridge Cottage
Tammondshall Farm
LONDON ROAD
AYLESBURY ROAD
KING'S LANE
COBBLERSHILL LANE
For Continuation Refer to Map Number SV-02-019
For Continuation Refer to Map Number SV-02-017
51+000
50+000
49+000
3m
3-8m
8-11m
3-10m
1:4m
6m

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- [illegible] boundary

Engineering earthworks: Embankment; Cutting
Non engineering earthworks: Embankment; Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA##) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area

- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-018

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA10: Dunsmore, Wendover & Halton

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: New_No_Rqd-AP05-P01

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]

Significant effect OSV10-N01 removed (as a result of **SES4-010-001**)

Significant effect OSV10-C03 removed (as a result of **SES4-010-001**)

WENDOVER
AYLESBURY VALE DISTRICT
CHILTERN DISTRICT
WYCOMBE DISTRICT
Bacombe Hill
Wendover Green Tunnel
Grove Farm
Boswells Farm
Road Barn Farm
Hornbeam Cottage
Hartley Farm
Coneycroft Farm
Smalldene Farm
Bacombe Warren
Lower Little London Farm
Upper Wendover Dean Farm
Kingsash
CFA10/6
CFA10/1
OSV10-C02
For Continuation Refer to Map Number SV-02-020
For Continuation Refer to Map Number SV-02-018

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- [illegible] boundary

Engineering earthworks: Embankment; Cutting
Non engineering earthworks: Embankment; Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-019

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA10: Dunsmore, Wendover & Halton

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: C250-ARP-EV-MAP-000-020028-AP05-P01

P3759 (2)

HOL/10024/0021

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

— Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	**Residential**	**Non-residential & quiet areas**
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

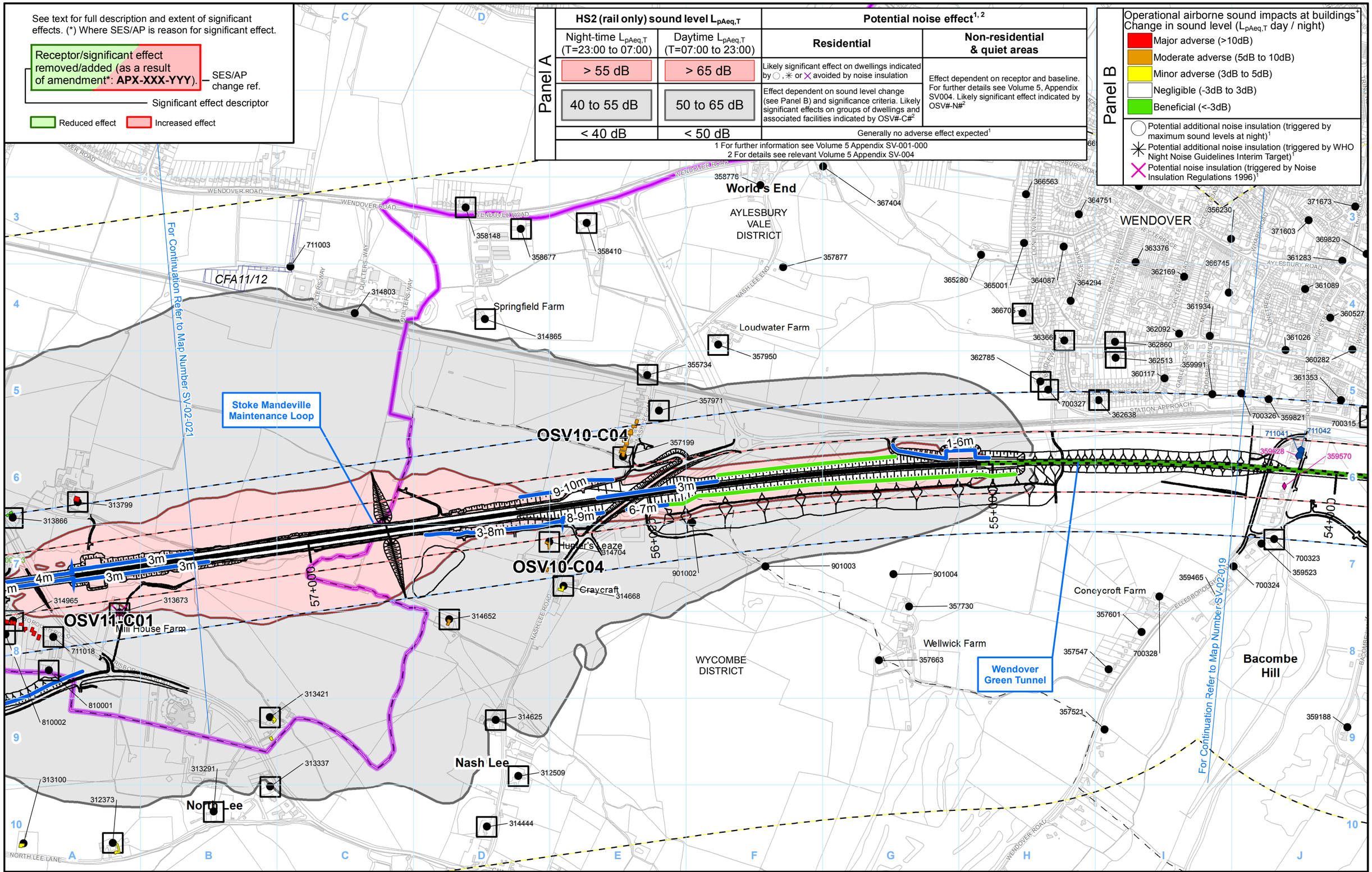
1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- [illegible] boundary

Engineering earthworks: Embankment; Cutting
Non engineering earthworks: Embankment; Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area

- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-020

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA10: Dunsmore, Wendover & Halton

Scale at A3: 1:10,000

Registered in England. Registration number 06791686.
Registered office: One Canada Square, London, E14 5AB.

Doc Number: C250-ARP-EV-MAP-000-020029-AP05-P01

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

Significant effect OSV11-N01 removed (as a result of amendment **AP2-011-002**)

Significant effect OSV11-C03 removed (as a result of amendment **AP2-011-002**)

Realignment of Princes Risborough to Aylesbury Line

A4010 Stoke Mandeville Bypass Overbridge

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]

OSV11-C04 | OSV11-C03 | OSV11-C02 | OSV11-N02 | OSV11-C01

CFA11/13 | CFA11/14 | CFA11/12

AYLESBURY | AYLESBURY VALE DISTRICT | Stoke Mandeville | WYCOMBE DISTRICT | Bishopstone | North Lee | Moat Farm | Standalls Farm Cottage | Springfield Farm | Marsh Crossing | Willowcroft | Mill House Farm

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- [illegible] boundary

Engineering earthworks: Embankment; Cutting
Non engineering earthworks: Embankment; Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only
- Envisaged mitigation to avoid / reduce significant noise effects:
  - Landscaping and/or fence barriers*
  - Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged measures further reducing noise effects:
  - Other environmental e.g. landscaping
  - Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-021

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA11: Stoke Mandeville & Aylesbury

Scale at A3: 1:10,000

Metres: 0 100 200 300 400

Registered in England. Registration number 06791686.
Registered office: One Canada Square, London, E14 5AB.

Doc Number: New_No_Rqd-AP05-P01

P3760 (1)

HOL/10024/0023

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]

AYLESBURY
AYLESBURY VALE DISTRICT
Walton Court
CFA11/6
OSV11-C1
CFA11/13
A418 Oxford Road Overbridge
The Oaks
Hartwell Cottage
Park Hill
Park Lodge
Glebe House
Lower Hartwell
Lower Hartwell Farm
Whaddon Hill Farm
Calley Farm
Sedrup Farm
Sedrup
Barnet's Close
Hothouse Piece
Upper Hartwell
CFA11/11
3m
4m
5m
63+000
62+000
61+000
For Continuation Refer to Map Number SV-02-023
For Continuation Refer to Map Number SV-02-021

Significant effect OS11-C05 removed (as a result of **SES3-011-003**)

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- [illegible] boundary

Engineering earthworks: Embankment; Cutting
Non engineering earthworks: Embankment; Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-022

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA11: Stoke Mandeville and Aylesbury

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: New_No_Rqd-AP05-P01

P3760 (2)

HOL/10024/0024

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

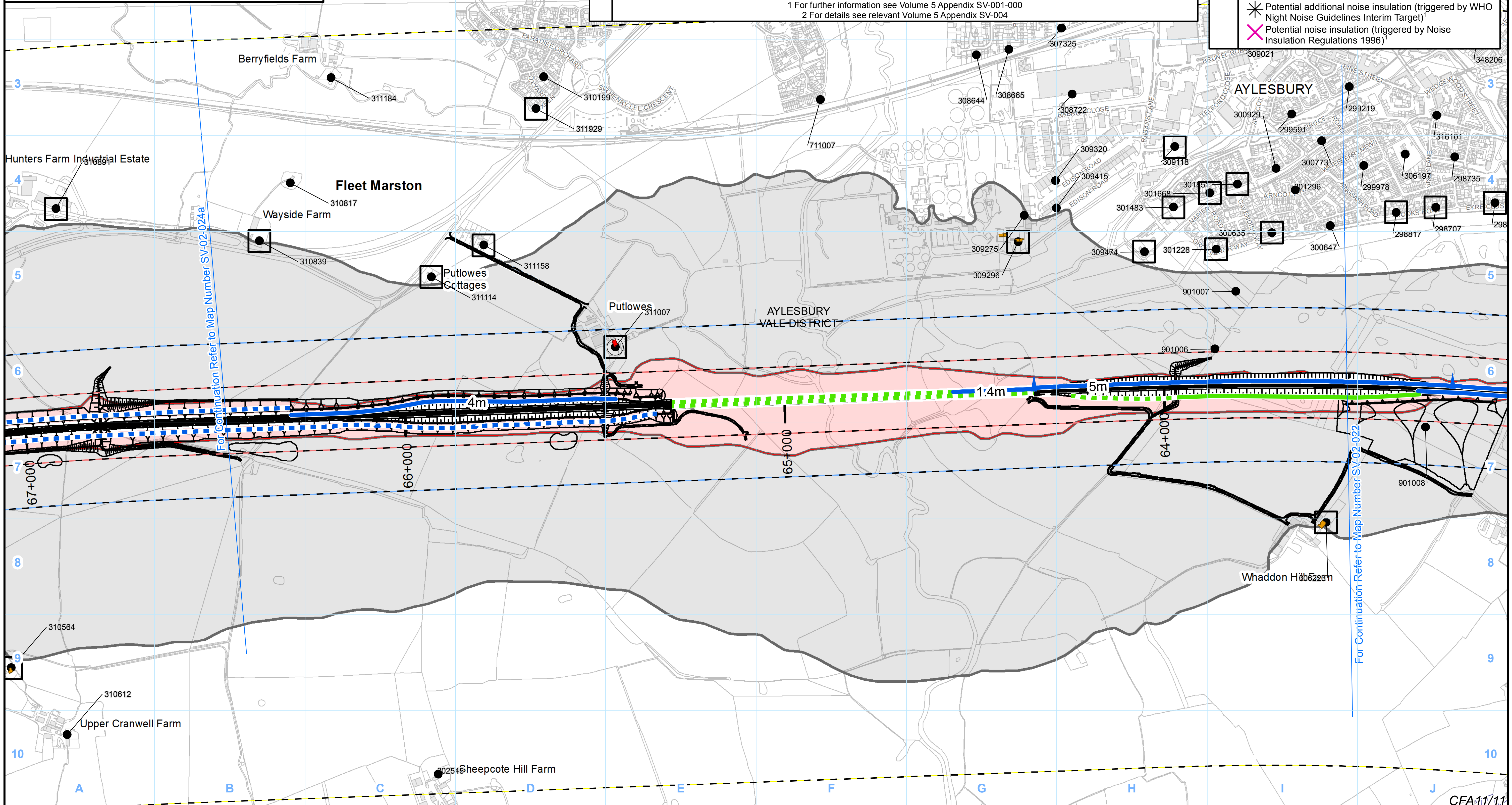
Panel A	HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
	Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
	> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
	40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
	< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings[*]
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)
- Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks: Embankment, Cutting

Non engineering earthworks: Embankment, Cutting

LAmax >= 60dB façade[**]

[*] Residential buildings only
[*] Labelled with total barrier height above rail level
[**] ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers[*]
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact[*]

Map Number: SV-02-023

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA11: Stoke Mandeville & Aylesbury

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: New_No_Rqd-AP05-P01

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

— Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	**Residential**	**Non-residential & quiet areas**
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]

Lower Blackgrove Farm 310792
310474
310687
AYLESBURY VALE DISTRICT
Hunters Farm Industrial Estate
310891
310944
Fleet Marston
310817
Wayside Farm 310839
311184
311114
Waddesdon Sewage Treatment Works
3m
700346
Wayside Farm
310700
Cranwell Farm
310373
700349
Glebe Farm
700348
The Lodge
310538
Lower Cranwell
310564
Upper Cranwell Farm 310612
CFA12/8
Waddesdon
For Continuation Refer to Map Number SV-02-025
For Continuation Refer to Map Number SV-02-023
68+000
69+000
67+000
66+000

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- [illegible] boundary

Engineering earthworks: Embankment; Cutting
Non engineering earthworks: Embankment; Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area

- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-024a

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA11: Stoke Mandeville & Aylesbury

Registered in England. Registration number 06791686.
Registered office: One Canada Square, London, E14 5AB.

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: New_No_Rqd-AP05-P01

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

— Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	**Residential**	**Non-residential & quiet areas**
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]

Lower Blackgrove Farm
310792
310474
310687
AYLESBURY VALE DISTRICT
Hunters Farm Industrial Estate
310891
Fleet Marston
310817
310944
Wayside Farm
310839
311184
311114
Waddesdon Sewage Treatment Works
3m
700346
Wayside Farm
310373
Cranwell Farm
310700
700349
Glebe Farm
294049
700348
The Lodge
Lower Cranwell
310538
310564
294165
290161
294777
294430
CFA12/8
295222
295181
295086
293784
293796
Waddesdon
294499
294910
293650
292062
292369
293570
293489
292667
291754
291885
293964
293404
Upper Cranwell Farm
310612
For Continuation Refer to Map Number SV-02-025
For Continuation Refer to Map Number SV-02-023
69+000
68+000
67+000
66+000

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- [illegible] boundary

Engineering earthworks: Embankment; Cutting
Non engineering earthworks: Embankment; Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-024b

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA12: Waddesdon & Quainton

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Registered in England. Registration number 06791686.
Registered office: One Canada Square, London, E14 5AB.

Doc Number: New_No_Rqd-AP05-P01

P3761 (1)

HOL/10024/0027

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

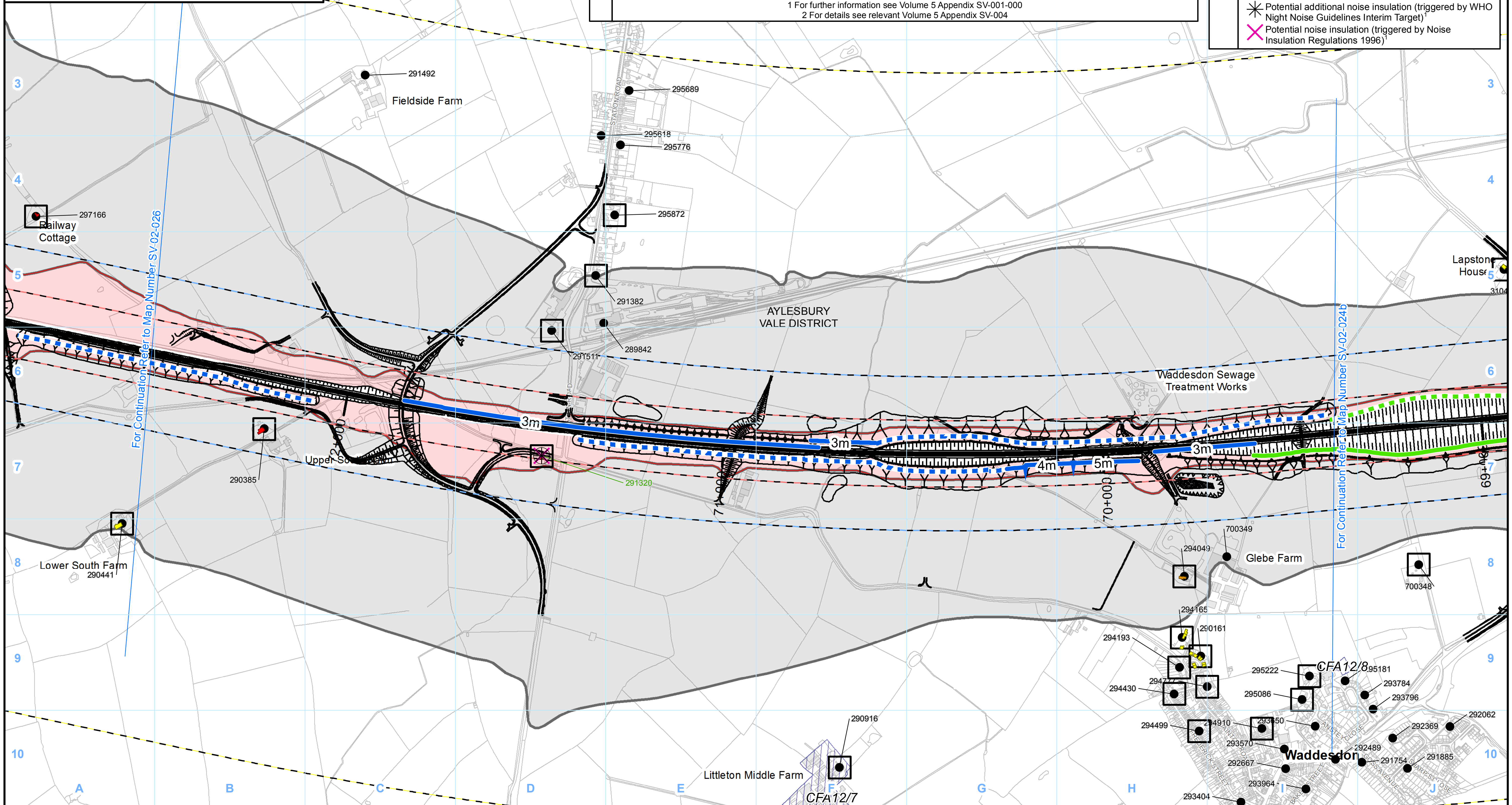
Panel A	HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
	Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
	> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
	40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effect on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
	< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings[+]
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)
- ○ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]



Legend - General features
- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks: Embankment, Cutting
Non engineering earthworks: Embankment, Cutting

LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features
- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area

- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-025

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA12: Waddesdon & Quainton

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Scale at A3: 1:10,000

Doc Number: New_No_Rqd-AP05-P01

P3761 (2)

HOL/10024/0028

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	**Residential**	**Non-residential & quiet areas**
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

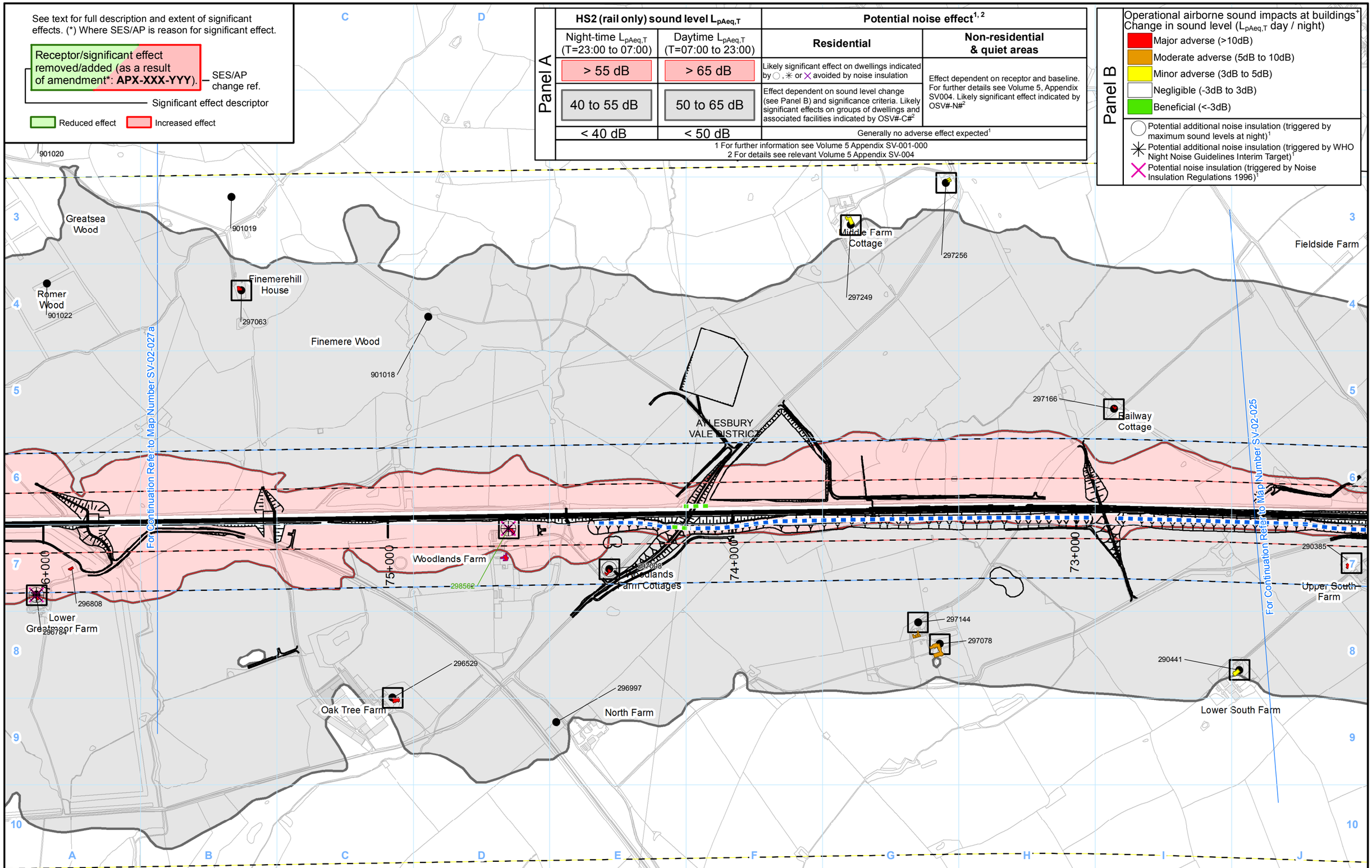
1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- [illegible] boundary

Engineering earthworks: Embankment; Cutting
Non engineering earthworks: Embankment; Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-026

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA12: Waddesdon & Quainton

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: New_No_Rqd-AP05-P01

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	**Residential**	**Non-residential & quiet areas**
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

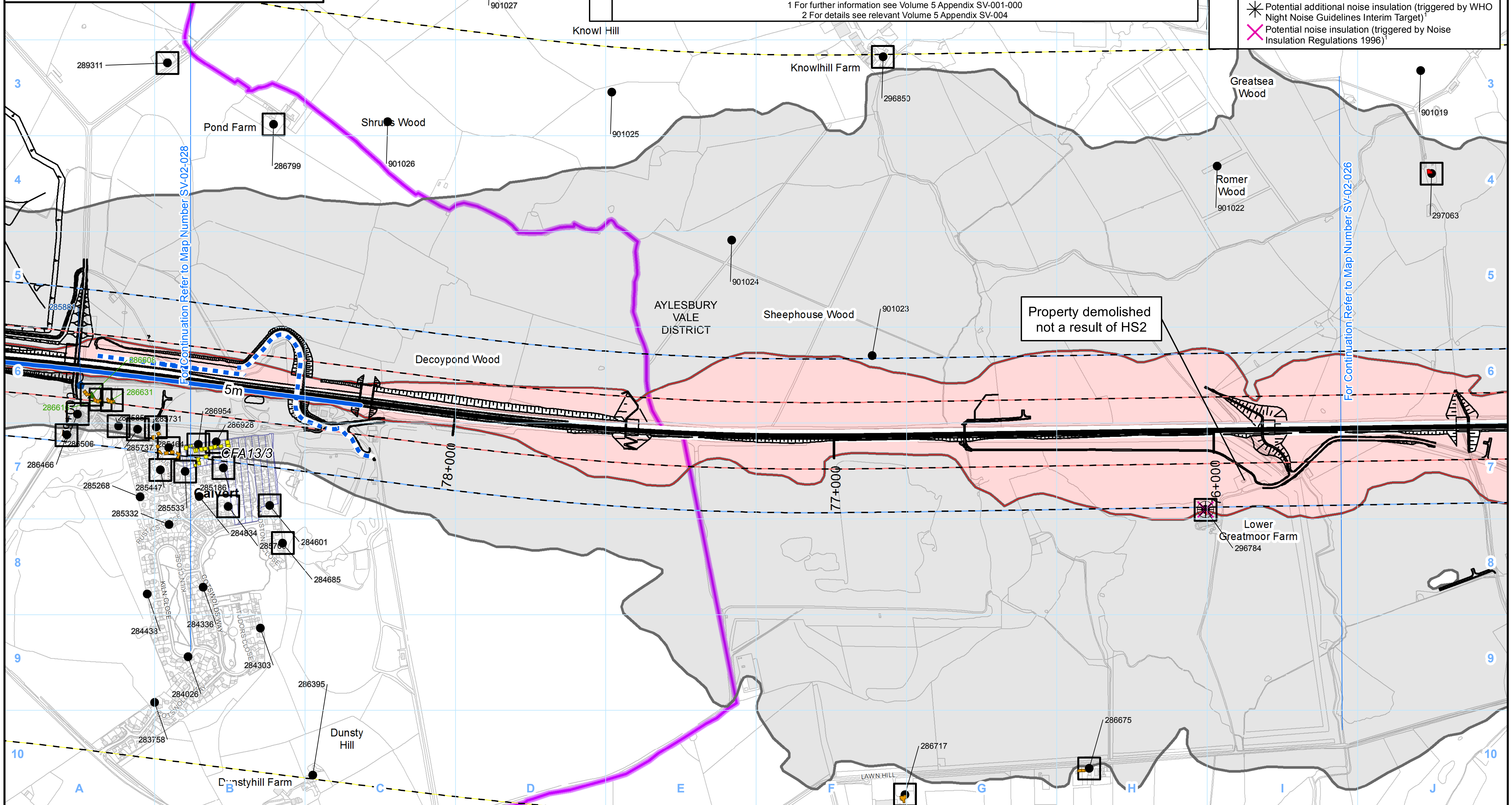
1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings* Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

○ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks: Embankment, Cutting

Non engineering earthworks: Embankment, Cutting

LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:

- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:

- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact*

Map Number: SV-02-027a

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA12: Waddesdon & Quainton

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Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: New_No_Rqd-AP05-P01

P3761 (4)

HOL/10024/0030

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	**Residential**	**Non-residential & quiet areas**
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]

Knowl Hill
Knowlhill Farm
Pond Farm
Shrubs Wood
Greatsea Wood
Romer Wood
Sheephouse Wood
Decoypond Wood
AYLESBURY VALE DISTRICT
Property demolished not a result of HS2
OSV13-C01
CFA13/3
Calvert
78+000
77+000
76+000
Lower Greatmoor Farm
Dunsty Hill
Dunstyhill Farm
For Continuation Refer to Map Number SV-02-028
For Continuation Refer to Map Number SV-02-026

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- ...y boundary

Engineering earthworks: Embankment, Cutting
Non engineering earthworks: Embankment, Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area

- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-027b

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA13: Calvert, Steeple Claydon, Twyford and Chetwode

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: New_No_Rqd-AP05-P01

P3762 (1)

HOL/10024/0031

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

Panel A

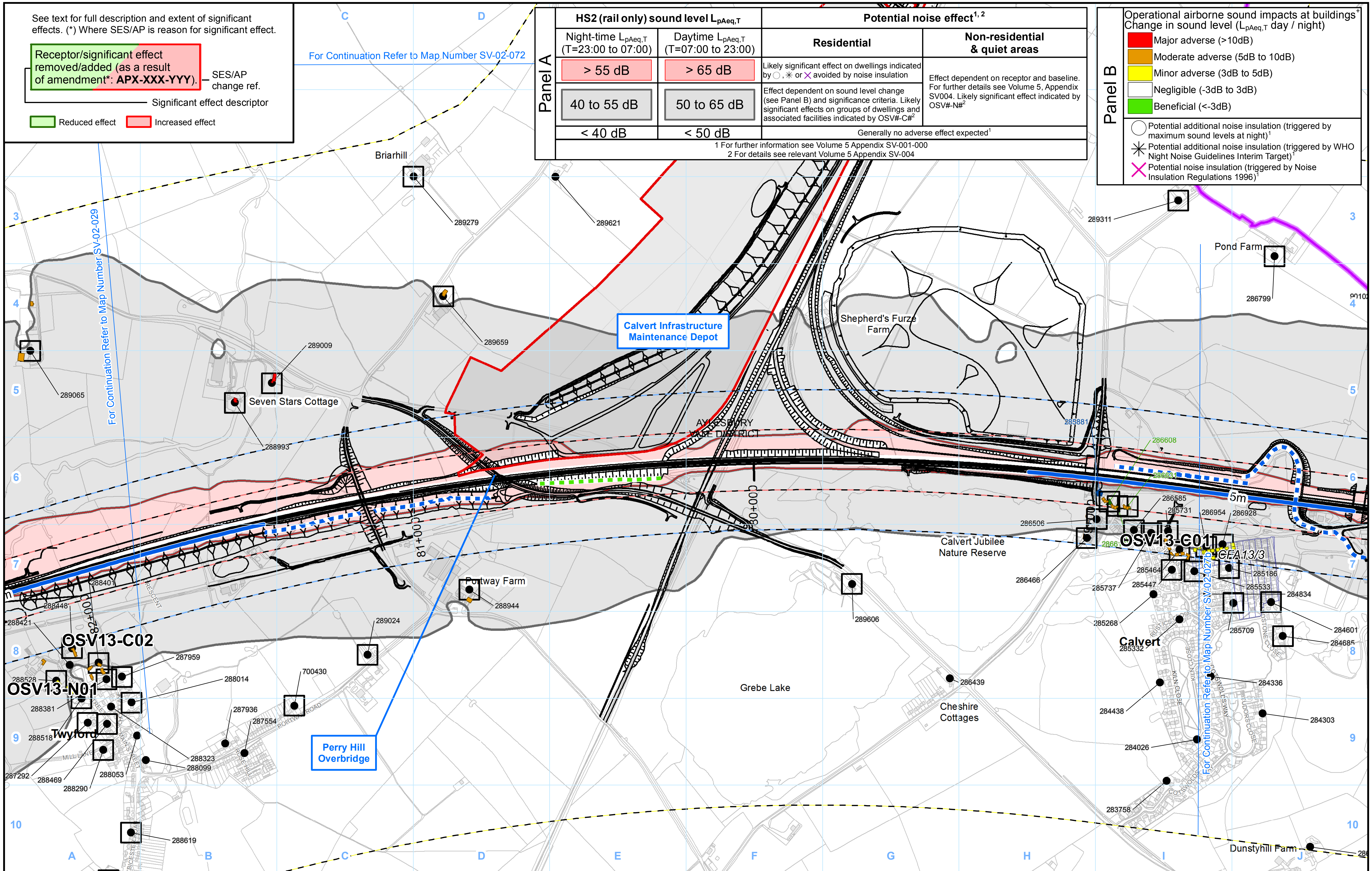
HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings* Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)
- ○ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks: Embankment, Cutting

Non engineering earthworks: Embankment, Cutting

LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:

- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:

- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact*

Map Number: SV-02-028

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA13: Calvert, Steeple Claydon, Twyford and Chetwode

Scale at A3: 1:10,000

Doc Number: New_No_Rqd-AP05-P01

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

Panel A

HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	**Residential**	**Non-residential & quiet areas**
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ◯, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings+
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- ◯ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]

For Continuation Refer to Map Number SV-02-030
For Continuation Refer to Map Number SV-02-028

Cowley Farm
288715
Casemore Farm Cottage
287480
289065
288993
288684
AYLESBURY VALE DISTRICT
Rosehill Farm
274142
6-7m
3m
1.4m
4m
5m
85+000
84+000
83+000
82+000
288448
288421
OSV13-C02
288401
287959
OSV13-N01
288528
288323
288014
Twyford
288518
287936
287292
288469
287554
288290
288053
288099
287430
Twyford Mill
CHERWELL DISTRICT
Godington
274854
Moat Farm
710607
274787
274086
288619
288112

Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- [illegible] boundary

Engineering earthworks: Embankment, Cutting
Non engineering earthworks: Embankment, Cutting
LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA##) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact+

Map Number: SV-02-029

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA13: Calvert, Steeple Claydon, Twyford & Chetwode

Scale at A3: 1:10,000

0 100 200 300 400 Metres

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Doc Number: C250-ARP-EV-MAP-000-020030-AP05-P01

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect — Increased effect

Panel A

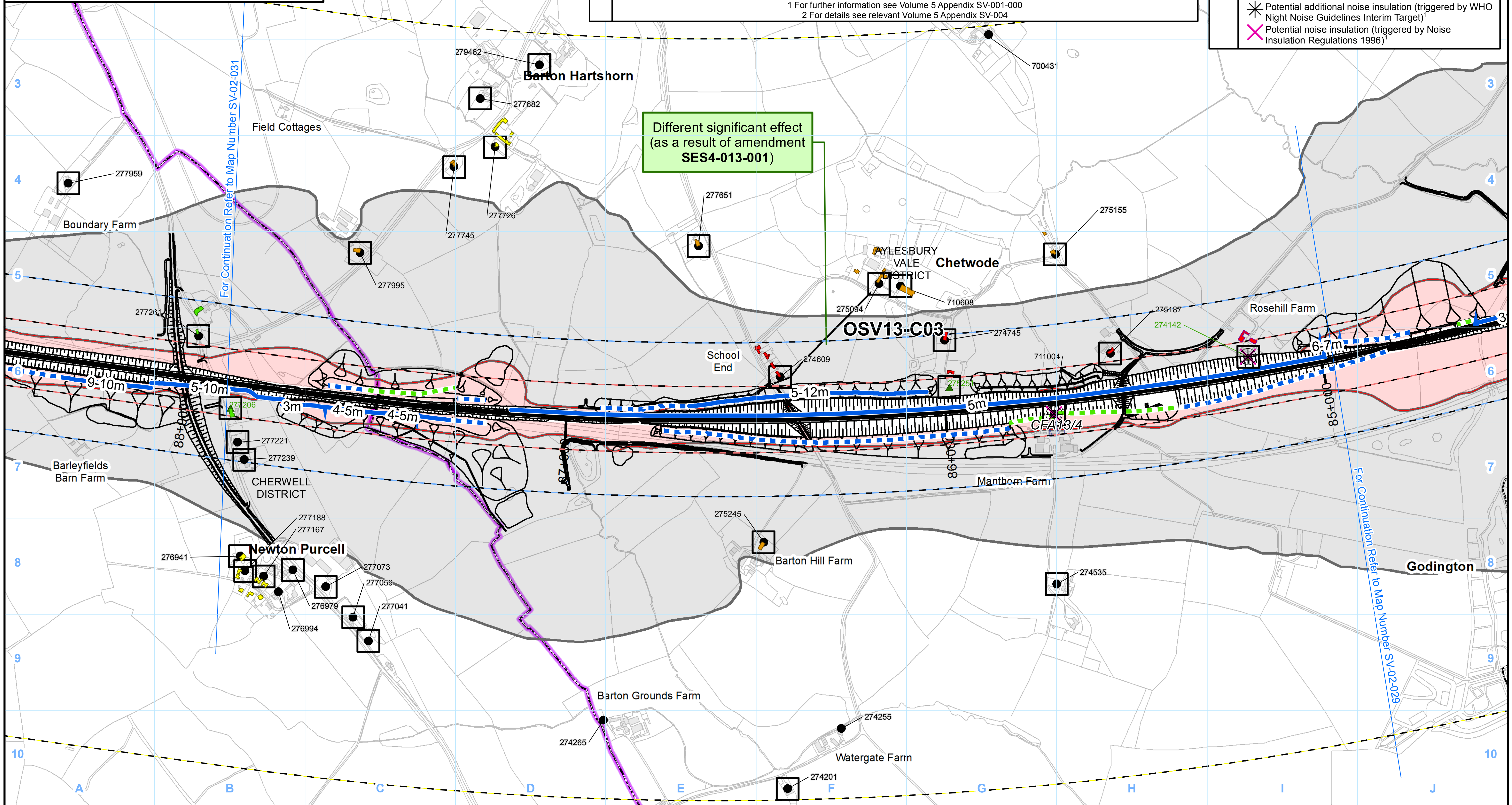
HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	Residential	Non-residential & quiet areas
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings[+]
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)
- ○ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks: Embankment; Cutting

Non engineering earthworks: Embankment; Cutting

LAmax >= 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:

- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:

- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area
- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact[+]

Map Number: SV-02-030

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA13: Calvert, Steeple Claydon, Twyford & Chetwode

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Doc Number: C250-ARP-EV-MAP-000-020031-AP05-P01

See text for full description and extent of significant effects. (*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment*: **APX-XXX-YYY**). — SES/AP change ref.

Significant effect descriptor

Reduced effect | Increased effect

Panel A

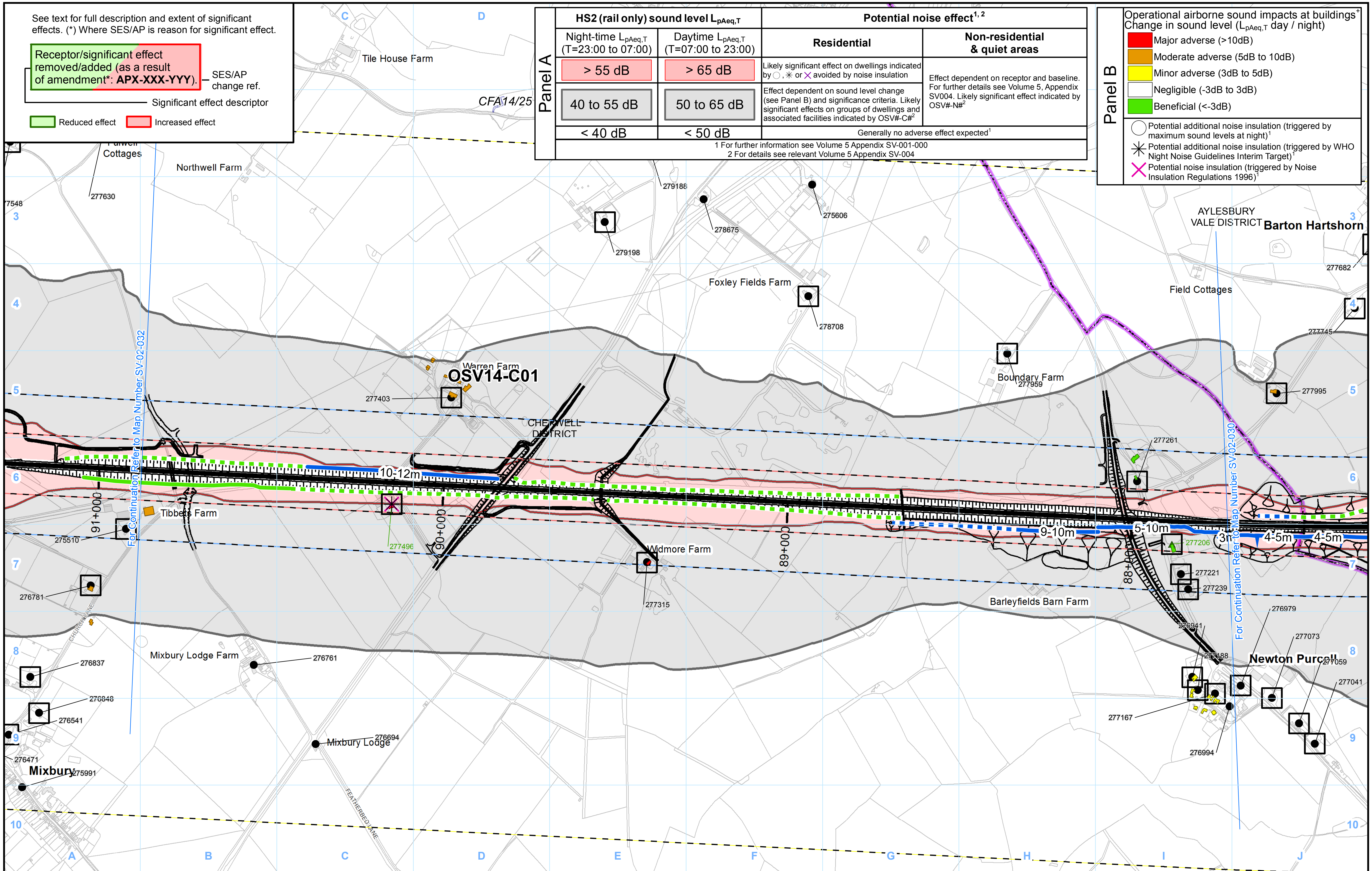
HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect[1, 2]	
Night-time $L_{pAeq,T}$ (T=23:00 to 07:00)	Daytime $L_{pAeq,T}$ (T=07:00 to 23:00)	**Residential**	**Non-residential & quiet areas**
> 55 dB	> 65 dB	Likely significant effect on dwellings indicated by ○, ✳ or ✕ avoided by noise insulation	Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N#[2]
40 to 55 dB	50 to 65 dB	Effect dependent on sound level change (see Panel B) and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C#[2]	
< 40 dB	< 50 dB	Generally no adverse effect expected[1]	

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-004

Panel B

Operational airborne sound impacts at buildings[+]
Change in sound level ($L_{pAeq,T}$ day / night)

- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)
- ○ Potential additional noise insulation (triggered by maximum sound levels at night)[1]
- ✳ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)[1]
- ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)[1]



Legend - General features

- Route in bored tunnel
- Route in green tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- District/Borough boundary
- County boundary

Engineering earthworks: Embankment; Cutting

Non engineering earthworks: Embankment; Cutting

LAmax >= 60dB façade**

* Residential buildings only
+ Labelled with total barrier height above rail level
** ES/SES HS2 train only LAmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments (label as CFA#/#) - SV Only

Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
- Engineering e.g. cuttings (green tunnels separately marked)

Envisaged measures further reducing noise effects:
- Other environmental e.g. landscaping
- Engineering e.g. cuttings
- Airborne sound study area

- Ground-borne sound & vibration study area (residential and non-residential)
- Ground-borne sound & vibration study area (highly sensitive non-residential)
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Minor ground-borne noise or vibration impact*

Map Number: SV-02-031

Map Name: Operational Airborne Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) Post-AP Petitions

Community Forum Area CFA14: Newton Purcell to Brackley

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Noise – HS2 Noise Policy

Absolute effect threshold levels have been set for airborne noise:

- Lowest Observable Adverse Effect Levels (LOAELs); and
- Significant Observable Adverse Effect Levels (SOAELs).

They are route wide criteria that can be found in HS2 Information Paper E20 Appendix B. These have been set both in terms of night and day energy averages (L_{Aeqs}) and maximum (L_{Amax}).

HS2 Information Paper (IP) E20 sets out the policy approach:

> *'The nominated undertaker will take all reasonable steps to design and construct altered roads and to design, construct, operate and maintain the operational railway, so that the combined airborne noise from these sources, predicted in all reasonably foreseeable circumstances, does not exceed the lowest observed adverse effect level set out in Table 1 of Appendix B.'*

- Appendix B has L_{Amax} and L_{Aeq} thresholds so both are taken into account in order to comply with this objective.

This approach is consistent with national policy on the Noise Policy Statement of England (NPSE) 2010.

Noise – What does LOAEL and SOAEL mean in practice ?

Classification	Example Outcomes	Action – see Noise Policy Statement for England 2010
Below LOAEL 'not adverse'	The noise may be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life	No specific measures required
Between LOAEL and SOAEL 'adverse'	The noise can be heard and causes small changes in behaviour and/or attitude e.g. turning up the volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life	Mitigate and reduce to a minimum
Above SOAEL 'significantly adverse'	The noise can be heard and causes a material change in behaviour and/or attitude e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed for most of the time because of noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in the acoustic character of the area.	Avoid

Source: Planning Practice Guidance – Noise

Discussion of noise in House of Lords Select Committee hearing, 6 July 2016

The Promoter's witness, Rupert Thornely-Taylor, considers the role of L_{Amax} plays in design mitigation, see in particular transcript paragraphs 34-37 and paragraph 42-43 below.

34. MR THORNELY-TAYLOR: It's set out in information paper E20 and given that 60dB LAmax at night is one of the tests that tells you if you're above the lowest observed adverse effect level. The consequence is, in policy terms, HS2 will take all practicable steps to mitigate and minimise noise above that level. So, in fact, what the petitioner is asking for is what HS2 will be doing, and more, because it won't be limited to 200 metres from the line.

35. MR MOULD QC (DfT): Just to make that point good, if we put up please, P1641, this is the information paper which deals with the Secretary of State's design policies in relation to airborne noise from altered roads and the operational railway. If we go to the third page of this exhibit, 1641(3), we see the stated objectives and 3.1 and 3.2 are the relevant ones and I'll read those out because they're rather important:

36. 'The nominated undertaker will take all reasonable steps to design and construct altered roads and to design, construct, operate and maintain the operational railway, so that the combined airborne noise from these sources, predicted in all reasonably foreseeable circumstances, does not exceed the lowest observed adverse effect level set out in table 1 of appendix B'. I think we can say straight away that one of the levels set out in table 1 of appendix B is LAmax night time, 60dB.

37. MR THORNELY-TAYLOR: Yes, and its designation is very important; it's the lowest observed adverse effect, that means, beyond it, there is no observed effect, and it's right on the boarders of there being no effect of the noise at all. It's not a health risk threshold. Health risks from noise have only been found in LAeq terms, up in the sixties, whereas, we're talking about night time LAeq in the 40s, so we're well below health risks. It is simply that the World Health Organisation guidelines say that at an internal level of 45 maximum, roughly equivalent to 60 outside, with a partially open window. If there are more than 10-15 events above that level per night, there may be some effect. It is not a health risk threshold.

Discussion of noise in House of Lords Select Committee hearing, 6 July 2016

42. MR MOULD QC (DfT): And then 3.2 tells us that where it's not reasonably practicable to achieve this objective, so in this case, to run the railway in every case, at a level which is below 60 LAmax night time, then the nominated undertaker will reduce the airborne noise from the altered roads and the operation of the railway, so far as is reasonably practicable?

43. MR THORNELY-TAYLOR: That is right.

Mr. Thornely-Taylor also considers petitioners' concerns about health impact of noise.

See also Mr. Thornely-Taylor's presentation to Select Committee on 'Sound, Noise and Vibration', where he identifies mitigation measures including train design, noise barrier, installation of porous tunnel portal etc. :

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/534028/Sound__Noise___Vibration.pdf