

## EXHIBIT LIST

Page 1 of 42

No	Exhibit Name	Page
1	<a href="#">P8161 Wendover Further Noise Mitigation</a>	2 - 42

# Wendover further noise mitigation



## 1 Executive Summary

- 1.1.1 HS2 Ltd has now completed an assessment of a further package of noise mitigation measures which will address the specific concerns raised in the Wendover area by petitioners.
- 1.1.2 The locations identified of specific concern were St Mary's Church and the Wendover House School. The Church is used for music concerts as well as for ecclesiastical purposes and a likely significant operational noise effect was identified in the Environmental Statement because of its use as a concert venue.
- 1.1.3 An option to mitigate noise impacts in this south Wendover area and on the Church and School in particular was to extend the Wendover green tunnel included in the Proposed Scheme a further 700m towards the Small Dean viaduct. Whilst this would address noise effects it would be a large structure, at or above existing ground level and very intrusive in the Chilterns Area of Outstanding Natural Beauty (AONB) landscape. It would not be possible to adequately mitigate its visual appearance as there is insufficient space to landscape over the structure.
- 1.1.4 Instead, a less intrusive package of measures has been identified which would remove the likely significant noise effect on the Church, would reduce the likely noise impact on the school and would offer an opportunity to improve the existing general noise environment along the southern and northern edges of Wendover and to reduce effects on the AONB. The package comprises of:
- An increased-height noise fence barrier located from the southern portal of the Wendover green tunnel and extending to the Small Dean viaduct along the eastern side of the railway. A noise fence barrier of 6m above rail level has been assessed. This is an increase of up to 3m compared with the noise fence barrier identified in the ES;
  - Support for the provision of a noise fence barrier adjacent to the A413, on the north east side of the road at a height of 2m above the local ground level for a length of 1.7km northwards from the junction with London Road;
  - Support for the provision of a noise fence barrier adjacent to London Road, on the north east side of the road at a height of 2m above the local ground

level for a length of 500m from the junction with A413, adjacent to St. Mary's Church and Wendover House School;

- An additional noise fence barrier located from the northern portal of the Wendover green tunnel and extending to the access track leading to the portal buildings, approximately 300m in length, along the eastern side of the railway. A noise fence barrier of 6m above rail level has been assessed;
- An additional noise fence barrier around the western side of the southern portal. A barrier with a height of 4m above local ground level approximately 200m in length has been assessed;
- Potential improvements to further insulate St. Mary's Church façade, subject to the relevant approvals for a grade II\* listed building, to improve receptor insulation, potentially including improvements to the doors, windows, belfry and, if practicable, the roof. With this mitigation in place, the internal noise levels as a result of the operation of the Proposed Scheme and vehicles on neighbouring roads, could be controlled to maintain musical performance; and
- The offer of noise mitigation to Wendover House School which could include improvements to the sound insulation provided by the doors and windows of the accommodation building. Such mitigation would reduce the internal noise levels as a result of the operation of the Proposed Scheme and from vehicles on neighbouring roads.

1.1.5 The trackside noise fence mitigation along the eastern side of the railway for the Proposed Scheme, in addition to improvements to the modelling of LAMax<sup>1</sup> around tunnel portals would provide a similar outcome to that achieved with a tunnelled option, in that the forecast sound levels at the Church would no longer be likely to cause a significant effect. Secondly, LAMax at the School caused by HS2 trains is predicted to be reduced to a level only 1 dB above the residential LOAEL for LAMax of 60dB. Finally, all properties in Wendover are forecast to experience levels from HS2 trains at or below the same threshold, with the exception of about 10 dwellings in the South Street and Church Lane area and about 10 dwellings in Bacombe Lane.

---

<sup>1</sup> The improvements made do not change the calculation methodology used to predict LAMax, which is as stated in main ES Appendix SV-001-000 Annex D2. Refinements have been made to the computer model input data, specifically splitting the track into segment lengths which are shorter than were considered in the main ES for this area. Due to the way that the LAMax routines are implemented by the software, smaller segmentation is considered to provide a more precise representation of the likely maximum noise levels.

For the main ES longer track segments were chosen in locations where a simple geographic relationship between the track, barrier and receptor occurred which provided a conservative (worse case) estimate of the forecast LAMax values. However the introduction of the further mitigation at Wendover requires re-segmentation of the route.

- 1.1.6 With the trackside noise mitigation in place, at outdoor locations in the Church yard or School grounds, the noise levels with the Proposed Scheme would be comparable with those experienced at present in these areas and materially quieter, by more than 15 dB, than when vehicles pass on London Road. Sound from the operation of the Proposed Scheme trains, whilst audible outdoors, would consequently be unlikely to disrupt conversation, school or church activities any more than current local noise events do.
- 1.1.7 The inclusion of further noise mitigation at Bacombe Lane is forecast to reduce airborne sound levels such that the operational airborne noise impacts at dwellings on Bacombe Lane become 4 minor impacts. The residual effects would not be significant when assessed on a community basis, so the community significant effect at Bacombe Lane reported in the ES would be removed.
- 1.1.8 Further road traffic noise mitigation on the A413 is forecast to result in reduced noise levels and significantly benefit properties close to the A413 in the main urban area of Wendover.
- 1.1.9 HS2 Ltd will also continue to work with the Church and School to agree suitable noise attenuation at these receptors.
- 1.1.10 Since this Report was first issued, HS2 Ltd has reviewed the noise tables in Appendix 1 and made various corrections to accurately reflect the up-to-date assessment. Results for receptors in Bacombe Lane have also been added to these tables. HS2 Ltd has also produced an updated noise contour plan which is provided in Appendix 1. In addition to this, a description of the improvement in modelling for the assessment of LAMax which has influenced the results reported in Appendix 1 has also been included. There have also been various minor changes to the text for clarity.

## 2 Introduction

- 2.1.1 In July 2015 petitioners from Wendover Parish Council and the Wendover Society put forward to the Select Committee a case for longer tunnel options in the Wendover area, should the substantive case for a long tunnel through the Chilterns AONB put forward by Local Authority petitioners not be accepted. These options comprised:
- a 500m northern extension of the Proposed Scheme Wendover Green tunnel;
  - a 700m long surface level enclosure of the railway between the southern end of the Wendover green tunnel and the Small Dean viaduct; or
  - a longer extension of the Wendover green tunnel southwards, passing under the Chiltern line and the A413 at Small Dean.

- 2.1.2 Subsequently the Select Committee made the following announcement:
- 2.1.3 *'We heard argument and submissions this week and last week in relation to options for further Chilterns tunnelling. Our views are as follows.*
- ...
- Thirdly, on Wendover, we are minded to recommend a southward extension of the currently proposed green tunnel, unless HS2 report back with a very convincing scheme of further mitigation, on which we expect a report back in September.'*
- 2.1.4 This report is intended to address the Committee's decision in respect of Wendover and describes a range of measures that could be adopted which would address the petitioner concerns and provide the convincing package of mitigation that the Select Committee seeks. This report also considers further the dis-benefits of a southward extension of the currently proposed green tunnel.

### 3 Hybrid Bill Proposed Scheme description

- 3.1.1 The Proposed Scheme, as it passes Wendover, was assessed as part of the Environmental Statement (ES) in Community Forum Area 10 (CFA10). The Volume 2 ES and associated map book describes the Proposed Scheme in this area and reports the effects of it on the environment and seeks to mitigate these effects through a range of measures such as noise fence barrier, green tunnels, landscape earthworks and planting. In addition, route wide effects and notably those on the AONB in terms of the area's special landscape qualities were further assessed in the Volume 3, Route wide effects.
- 3.1.2 The Proposed Scheme as it approaches Wendover from the south crosses the A413 London Road and the Marylebone to Aylesbury Line on the Small Dean viaduct before passing onto an approximately 400m long section of embankment and then dropping down into the southern portal of the Wendover green tunnel at Bacombe Lane. The Proposed Scheme then passes under Ellesborough Road and emerges from the green tunnel immediately to the north of Wendover.

- 3.1.3 Where the Proposed Scheme is in green tunnel, landscape earthworks will be used to integrate the green tunnel structure and tunnel portals (including porous portal hoods) into the wider landscape. Landscape planting will supplement this integration and hedgerows restored where they are lost due to construction.
- 3.1.4 At the southern portal to the Wendover Green tunnel, extensive planting is required on both sides of the Proposed Scheme to mitigate the impacts of the porous portal which, owing to the rising landform leading to the Small Dean viaduct, will be a prominent feature in the local landscape. Two photomontages of this structure were included in the Environmental Statement (LV-01-051 and LV-01-235) and are reproduced in Figure 1 and Figure 2 of this report.
- 3.1.5 In addition to the screen planting to reduce the landscape effects of the porous portal, a 4m noise fence barrier is proposed on the Wendover side of the Proposed Scheme running from the portal to approximately Ch. 53+200 where it reduces down to 3m to the edge of the Small Dean viaduct. A section of 1.4m barrier is provided on the viaduct itself. The 4m noise fence barrier is mirrored on the western side of the Proposed Scheme.
- 3.1.6 Portal buildings are required at the southern end of the Wendover green tunnel. These are located on the western side of the Proposed Scheme and accessed from the A413 Nash Lee Road/London Road roundabout.

## 4 Hybrid Bill noise effects

- 4.1.1 Taking account of all of the envisaged mitigation, the main ES identified the following likely residual operational noise significant effects to the south of Wendover:
- Wendover South, reference OSV10-Co3. A significant (on a community basis) operational airborne noise effect was identified around approximately 10 dwellings in the vicinity of Bacombe Lane where the forecast increases in sound from the railway are likely to cause a major adverse effect on the acoustic character of the area around the three very closest properties to the Proposed Scheme reducing to a minor effect at those furthest away.
  - Wendover South, St. Mary's Church, reference OSV10-No1. A minor airborne noise effect on the acoustic character around the church and on a worst case basis there is a risk of disturbing activities inside church buildings due to the operation of train services.

- 4.1.2 The main ES did not identify a likely significant adverse noise effect on the Wendover House School (reported as Chiltern Way Federation School, represented by assessment location 370197). At the Wendover House School the main ES identified no change in the ambient noise level during the day and a 1 dB change at night.
- 4.1.3 The main ES identifies 12 residential properties in the main urban area of Wendover, on South Street, Church Lane and Hale Road that are forecast to experience operational noise greater than the lowest observed adverse effect level but at which the adverse noise effects are not considered significant when assessed on a community basis, taking into account local context. These properties are represented by assessment locations 361567, 370197, 370218 and 700312.
- 4.1.4 Since submission of the Bill, additional background noise measurements and analysis have been undertaken at St. Mary's Church, along with measurements of the degree of sound insulation provided by the church fabric. Meetings have also been held with the church's users to better understand the use of the church as a concert venue. The review of these results concluded that:
- The additional information obtained through the surveys does not alter the basis of the likely significant operational airborne noise effect identified in the main ES on a precautionary basis for the church's use as a musical performance space. Therefore the likely residual significant operational airborne noise effect at St. Mary's Church remains as reported in the main ES.*
- 4.1.5 Concerns have also been raised with regard to likely noise impact at Wendover House School, given its specialism and that the school includes boarding facilities.

## 5 Petitioner proposals and environmental effects

- 5.1.1 Southern extensions to the Wendover green tunnel were considered in the ES (Section 2.6.40 of CFA10 Volume 2). Option C in this section refers to an extension of the green tunnel as far as the Small Dean viaduct. This option, which would need to comprise a surface enclosure of the railway in this location, was suggested by the community to reduce potential noise and visual effects and to allow reinstatement of land for agricultural use. This is broadly the same as the current community request.

- 5.1.2 The assessment of this option confirmed that a longer tunnel or enclosure of the railway would benefit the local area in terms of the noise effect but that this could also be effectively managed by adopting noise fence barriers.
- 5.1.3 It was acknowledged that generally it is possible and desirable to reinstate land for agricultural use over green tunnels. However, any benefits in this particular location would be marginal given that the railway is at ground level or on embankment between the Small Dean viaduct and the existing Green tunnel southern portal. With the height of the enclosure required it is not feasible to reinstate land on the Wendover side of the enclosure for agricultural use due to the limited space available.
- 5.1.4 The inability to cover over an enclosed railway at this location is illustrated in Figures 3 and 4 which show cross sections of the suggested extension between the existing green tunnel portal and the Small Dean viaduct. The cross-sections show a concrete box structure compatible with an extension of the adjacent green tunnel (as required for aerodynamic consistency). The top of the box structure has an assumed 10m height above rail level and it is approximately 18m wide.
- 5.1.5 These figures show the likely extent of land required to effectively cover the green tunnel extension and allow for a return to agriculture slopes of 1:8. On the Wendover side of the Proposed Scheme this is clearly shown to be impracticable, as it would cover the A413 Nash Lee Road, the London Road and the Marylebone to Aylesbury Line. On the western side it would require the demolition of Grove Farm and further significant diversion works to the National Grid overhead line. A steeper 1:4 slope is also shown which would reduce these effects to a degree but would not allow the land to be returned to agriculture and would still cover the A413. The earthworks for a 1:4 slope are unlikely to fit with the landscape character in this area of the AONB, notably when viewed from the Coombe Hill direction but also from the edge of Wendover and could cause significant effects in its own right. This landscape issue was acknowledged in the ES.
- 5.1.6 The cost of such an extension was also noted as being a contributing factor for not promoting this option and it was thus not included in the Proposed Scheme. Costs prepared when the option was first prepared suggested an additional cost of £37m would be required for the structure, assuming no backfill covering. Reviews based on more current assumptions indicate this cost could be approximately £41m, again excluding any backfill or cover over the structure.



- 5.1.7 Any such structure, whilst dealing with the local noise effects, would be likely to lead to a range of other significant effects. These would be mainly focused on landscape and visual impacts as the structure would be incongruous within the AONB landscape and be highly visible from a number of surrounding receptors.
- 5.1.8 It is highly unlikely that it would be possible to mitigate these wider landscape and visual effects due to the height and width of the structure and any adjacent tree planting would be inadequate to provide the necessary screening, even if this could be designed to be in keeping with the character of the area. This issue is exacerbated by many of the surrounding views looking down onto the structure from high points in the landscape making it difficult to screen, even after 60 years.
- 5.1.9 HS2 Ltd are of the view that there are likely to be a number of counter petitions to any enclosure or box structure such as this and it is unlikely to gain support from those who are entrusted with minimising the impacts on the Chilterns AONB.
- 5.1.10 To show the potential significant effects of this structure two new photomontages of the proposed extension as far as the Small Dean viaduct can be found in Figures 5 and 6. These show an updated view from the Bacombe Lane view point used in the ES and a further view point located west of the route by Bacombe Hill looking north-east towards the structure. Whilst these viewpoints show the finished structure in the AONB landscape it should also be noted that the construction effects of such a structure would require a different construction methodology and be more time consuming than that currently described in the ES, potentially increasing the construction effects in this area.

## 6 Further mitigation proposals and impacts

### 6.1 Select Committee request

- 6.1.1 As noted in Section 2, the Select Committee stated that HS2 Ltd would need to provide a very convincing wider mitigation package to reduce the significant noise effects at St Mary's Church and wider concerns on the noise environment on the southern side of Wendover.

- 6.1.2 HS2 Ltd do not believe that it is possible to create a mitigated green tunnel extension without introducing new and potentially more significant effects on the environment. Instead, a range of further mitigation measures, aimed at further improving the noise environment in Wendover, are being proposed.

## 6.2 Petitioner Meetings

- 6.2.1 Two meetings were held on the 29<sup>th</sup> July 2015 and the 18<sup>th</sup> August 2015 between HS2 Ltd and the petitioners who presented the case for the Wendover tunnel extensions. The meeting was held to discuss implications of this proposed southern tunnel extension and other alternative options that could potentially address noise concerns at the St Mary's church and Wendover School. The latter meeting also focused on wider noise mitigation for Wendover as a whole.

- 6.2.2 A subsequent meeting was held on the 30<sup>th</sup> July 2015 between HS2 Ltd and Mr David Lidington MP, regarding potential noise mitigation for Wendover. This focussed on the ability to mitigate noise at the Church and School, the potential impacts of a large extended structure at ground level to cover the railway and whether a wider package of measures could provide improved noise mitigation for Wendover generally.

## 6.3 Noise mitigation

- 6.3.1 In order to inform discussions with petitioners regarding potential improvements to noise levels around Wendover, the following further mitigation measures have been considered:

- Further HS2 trackside mitigation:
  - An increased-height noise fence barrier located from the southern portal of the Wendover green tunnel and extending to the Small Dean viaduct along the eastern side of the railway. A noise fence barrier of 6m above rail level has been assessed. This is an increase of up to 3m compared with the noise fence barrier identified in the ES;
  - A noise fence barrier located from the northern portal of the Wendover green tunnel and extending to the access track leading to the portal buildings, approximately 300m in length, along the eastern side of the railway. A noise fence barrier of 6m above rail level has been assessed; and
  - An additional noise fence barrier around the western side of the southern portal. A noise fence barrier at a height of 4m above local ground level and approximately 200m in length has been assessed.

- Road traffic mitigation
    - Provision of a noise fence barrier adjacent to the A413, on the north east side of the road northwards from the junction with London Road. A noise fence barrier at a height of 2m above the local ground level for a length of 1.7km has been assessed; and,
    - Provision of a noise fence barrier adjacent to London Road, on the north east side of the road from the junction with A413, adjacent to St. Mary's Church and Wendover House School. A noise fence barrier at a height of 2m above the local ground level for a length of 500m has been assessed.
- 6.3.2 The assessment of noise around Wendover with these further mitigation provisions is reported in Appendix 1. A plan showing their location can also be found in Figure 7.
- 6.3.3 The following additional mitigation measures were also considered:
- Improvements to further insulate St. Mary's Church façade. A package of potential improvements to the sound insulation provided by the church fabric;
  - Receptor-based mitigation at Wendover House School;
  - Rail mitigation – a noise fence barrier along the existing Marylebone to Aylesbury Line railway corridor; and
  - Further road traffic noise mitigation. Changing the road surface on the A413 to reduce tyre noise.
- 6.3.4 Commentary on the likely improvement if these additional measures were to be adopted is provided in the qualitative assessment section below.
- 6.3.5 The results of the quantitative analysis, assuming the measures defined in section 6.3.1, are compared in Appendix 1 to the levels presented in the main ES and those for a tunnel extension option from the current portal to the Small Dean viaduct.

## 6.4 Qualitative assessments

- 6.4.1 With the proposed further trackside noise mitigation a significant adverse effect within the Church as a live concert performance venue would be less likely. Further improvements to St. Mary's Church façade could include improvements to the doors, windows, belfry and, if practicable, the roof. It is noted that the Church is grade II\* listed and any mitigation would need to be sensitive to this designation. HS2 Ltd will continue work with Church and other stakeholders to consider proposals at this location.
- 6.4.2 Noise mitigation at Wendover House School could include improvements to the sound insulation provided by the doors and windows. The main ES did not identify a significant operational noise effect at this property. Such mitigation would reduce the internal noise levels as a result of the operation of the Proposed Scheme and vehicles on neighbouring roads. HS2 Ltd is in discussion with the Wendover House School and our acoustic consultants with regard to further survey work at the School to better understand their noise environment and some of the subtleties required in understanding the needs of their pupils.
- 6.4.3 Noise fence barriers on the existing rail corridor would have little reduction in the noise climate in this area given that the baseline noise levels at Wendover are currently dominated by road traffic noise, although it would reduce the sound levels of trains on the Marylebone to Aylesbury Line. Given the limited benefits, it is not proposed to include these noise barriers as part of the further mitigation.
- 6.4.4 Whilst specifying a low noise road surface on the A413 may be a feasible option in terms of controlling noise at source, it would not be as efficient at reducing noise as a wayside barrier, would not reduce engine noise and would require ongoing maintenance and support from the road operator/owner to ensure that the performance is maintained once the scheme becomes operational. Accordingly it is not proposed to include this measure as part of the further mitigation.

## 6.5 Further mitigation

- 6.5.1 Discussions continue with the Wendover Parish Council and with The Wendover Society regarding further mitigation measures that could be considered to help ameliorate construction and operational effects in Wendover, many of which will form part of the Code of Construction Practice (CoCP) and/or Schedule 16 approvals. The outcome of these discussions will be reported back to the Committee at a later time.

# 7 Recommendations

7.1.1

A package of measures has been identified which would remove the likely significant noise effect on the Church, would reduce the likely noise impact on the school and would offer an opportunity to improve the existing general noise environment along the southern and northern edges of Wendover and to reduce effects on the AONB. The package comprises of:

- An increased-height noise fence barrier located from the southern portal of the Wendover green tunnel and extending to the Small Dean viaduct along the eastern side of the railway. A noise fence barrier of 6m above rail level has been assessed. This is an increase of up to 3m compared with the noise fence barrier identified in the ES;
- Support for the provision of a noise fence barrier adjacent to the A413, on the north east side of the road at a height of 2m above the local ground level for a length of 1.7km northwards from the junction with London Road;
- Support for the provision of a noise fence barrier adjacent to London Road, on the north east side of the road at a height of 2m above the local ground for a length of 500m from the junction with A413, adjacent to St. Mary's Church and Wendover House School;
- An additional noise fence barrier located from the northern portal of the Wendover green tunnel extending to the access track leading to the portal buildings, approximately 300m in length, along the eastern side of the railway. A noise fence barrier of 6m above rail level has been assessed;
- An additional noise fence barrier around the western side of the southern portal. A barrier with a height of 4m above local ground level approximately 200m in length has been assessed;
- Potential improvements to further insulate St. Mary's Church façade, subject to the relevant approvals for a grade II\* listed building, to improve receptor insulation, potentially including improvements to the doors, windows, belfry and, if practicable, the roof. With this mitigation in place, the internal noise levels as a result of the operation of the Proposed Scheme and vehicles on neighbouring roads, could be controlled to maintain musical performance; and
- The offer of noise mitigation to Wendover House School which could include improvements to the sound insulation provided by the doors and windows of the accommodation building. Such mitigation would reduce the internal noise levels as a result of the operation of the Proposed Scheme and from vehicles on neighbouring roads

- 7.1.2 In conclusion, this package of measures proposed would not only be predicted to remove all the likely community and individual significant operational noise effects in Wendover identified in the Environmental Statement but also to reduce the impact of existing road traffic noise on the town in general and the School in particular.

# Figures

Figure 1: Photomontage included in the ES from Bacombe Lane, existing view and year 1

Figure 2: Photomontage included in the ES from Bacombe Lane, year 15

Figure 3: Cross section of the Wendover Southern green tunnel extension – Location Plan

Figure 4: Cross section of the Wendover southern green tunnel extension – Cross Sections

Figure 5: Photomontage of the Wendover southern green tunnel extension from Bacombe Lane

Figure 6: Photomontage of the Wendover southern green tunnel extension from the bottom of Bacombe hill looking north-east.

Figure 7: Noise mitigation locations

**Current baseline (2013)**



**Operation Year 1 (2026) - Winter verifiable photomontage**



**Technical Information**

Location: Viewpoint 104-3-002: View south-west from PRoW (Bridleway WEN/14) on Bacombe Lane, Wendover.

Date taken: 28/02/13  
Time taken: 10:48  
Focal length: 57.296mm

Viewpoint location shown on Map LV-04-036.

This verifiable photomontage provides an illustration of how the Proposed Scheme may look in 2026 (the opening year). The design of the Proposed Scheme may be subject to design development in response to consultation. Design development will not result in any significant adverse change in the environmental effects detailed in the photomontages of the Proposed Scheme. Where new planting is proposed, it has been shown as immature plants which would mature over time to further integrate the Proposed Scheme into the landscape.

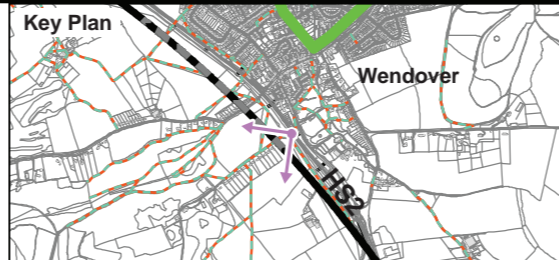



Figure Number	LV-01-051
Figure Name	Verifiable Photomontage Operation Year 1 (2026) - Winter Viewpoint 104-3-002
	Community Forum Area CFA10: Dunsmore, Wendover and Halton



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 anyway.

Registered in England. Registration number 06791686.  
Registered office: Eland House, Bressenden Place,  
London SW1E 5DU.  
© Crown copyright and database rights 2012  
Ordnance Survey Licence Number 100049190  
Doc Number: C250-ARP-EV-PHO-000-001050-P01



**Current baseline (2013)**



**Operation Year 15 (2041) - Summer verifiable photomontage**



**Technical Information**

Location: Viewpoint 104-3-002: View south-west from PRoW (Bridleway WEN/14) on Bacombe Lane, Wendover.

Date taken: 28/08/13  
Time taken: 13:05  
Focal length: 57.296mm

Viewpoint location shown on Map LV-04-036. Legend refer to map series LV-04.

This verifiable photomontage provides an illustration of how the Proposed Scheme may look in 2041 (15 years after opening). The design of the Proposed Scheme may be subject to design development in response to consultation. Design development will not result in any significant adverse change in the environmental effects detailed in the photomontages of the Proposed Scheme. Where new planting is proposed, it has been shown as semi-mature trees which have put on 15 years of growth to illustrate how the Proposed Scheme will further integrate into the landscape over time.

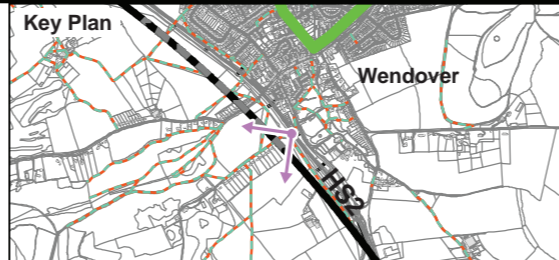



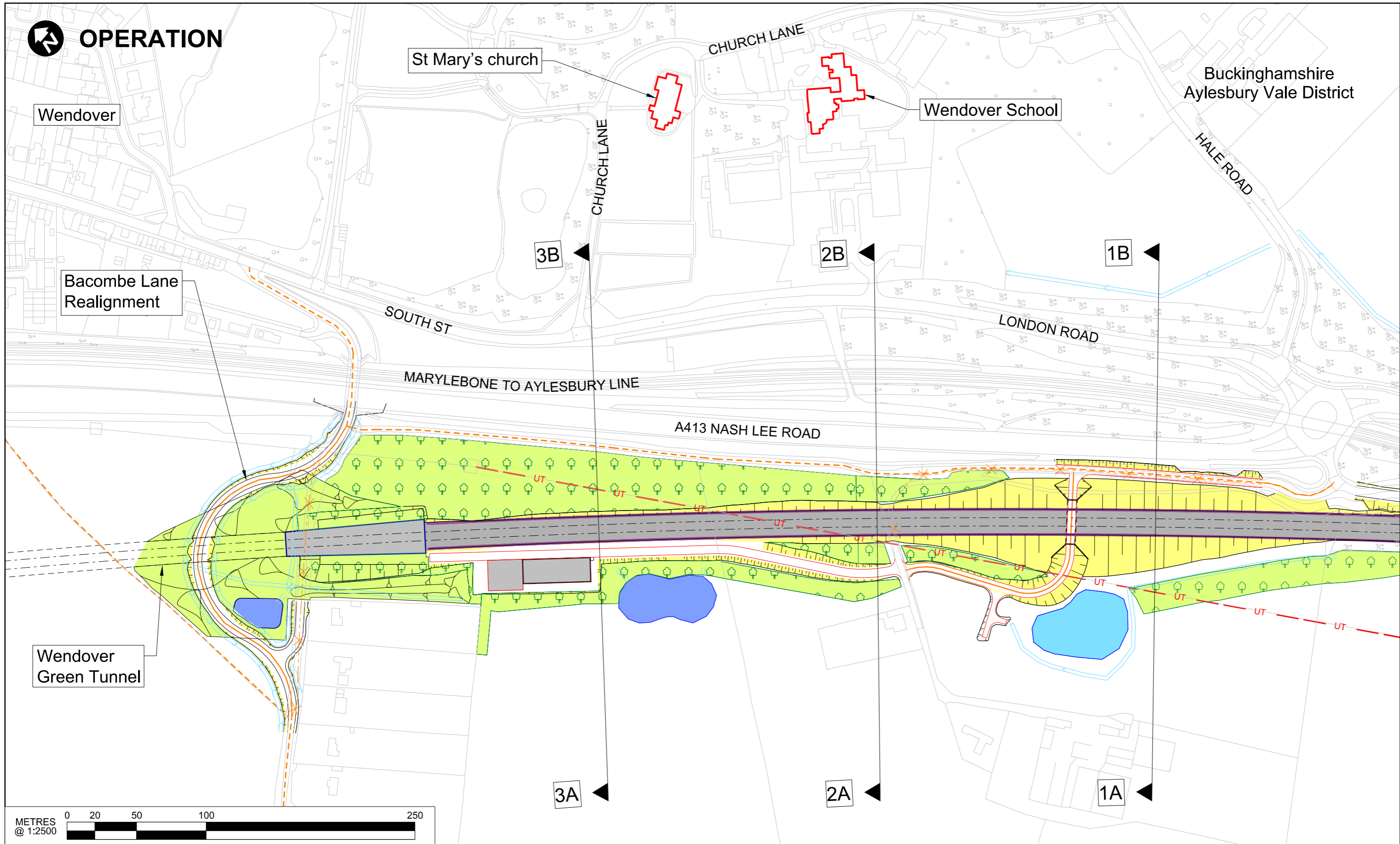
Figure Number	LV-01-235
Figure Name	Verifiable Photomontage Operation Year 15 (2041) - Summer Viewpoint 104-3-002
Community Forum Area CFA10: Dunsmore, Wendover and Halton	



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 anyway.

Registered in England. Registration number 06791686.  
Registered office: Eland House, Bressenden Place, London SW1E 5DU.  
© Crown copyright and database rights 2012  
Ordnance Survey Licence Number 100049190  
Doc Number: C250-ARP-EV-PHO-000-001193-P01

**OPERATION**



Buckinghamshire  
Aylesbury Vale District

Wendover

St Mary's church

CHURCH LANE

Wendover School

HALE ROAD

Bacombe Lane  
Realignment

SOUTH ST

3B

2B

1B

MARYLEBONE TO AYLESBURY LINE

A413 NASH LEE ROAD

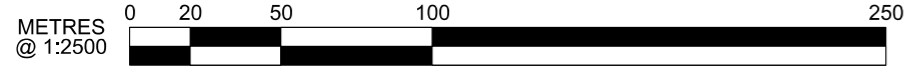
LONDON ROAD

Wendover  
Green Tunnel

3A

2A

1A



P00.1					

HS2 accepts no responsibility for any circumstances which arise from the reproduction of this document after alteration, amendment or abbreviation or if it is issued in part or issued incompletely in any way.

© Crown Copyright and database right 2015. All rights reserved. Ordnance Survey Licence number 100049190

© Crown Copyright material is reproduced with the permission of Land Registry under delegated authority from the Controller of HMSO.

This material was last updated on 2015 and may not be copied, distributed, sold or published without the formal permission of Land Registry. Only an official copy of a title plan or register obtained from the Land Registry may be used for legal or other official purposes.

Scale with caution as distortion can occur.

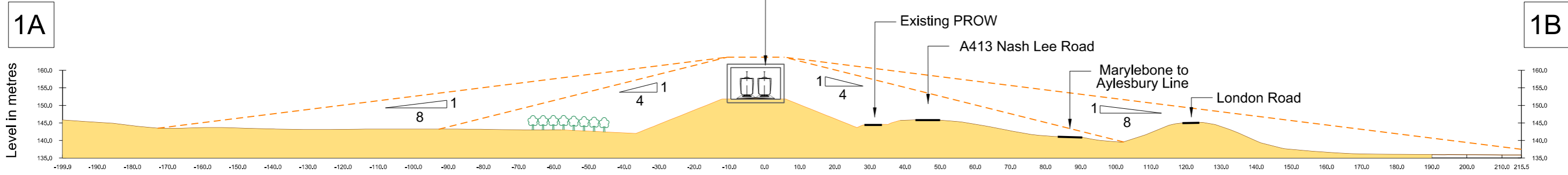
- Legends/Notes:
- Depot, station, headhouse or portal building
  - Tunnel portal
  - Balancing pond
  - Land drainage area
  - Replacement floodplain storage
  - Landscape mitigation planting (scrub / woodland)
  - Grassed areas
  - Engineering earthworks
  - Landscape earthworks
  - Rail alignment formation
  - Grassland habitat creation
  - Tunnels external extent
  - Rail alignment
  - Noise fence barrier
  - Ditches - new
  - Hedgerow habitat creation
  - HS2 Access road
  - Existing public right of way (PRoW)
  - New, diverted or realigned PRoW
  - Stopped-up PRoW
  - Main utility works
  - Direction of cross section view

Registered in England  
Registration No. 06791686  
Registered office:  
One Canada Square,  
London, E14 5AB

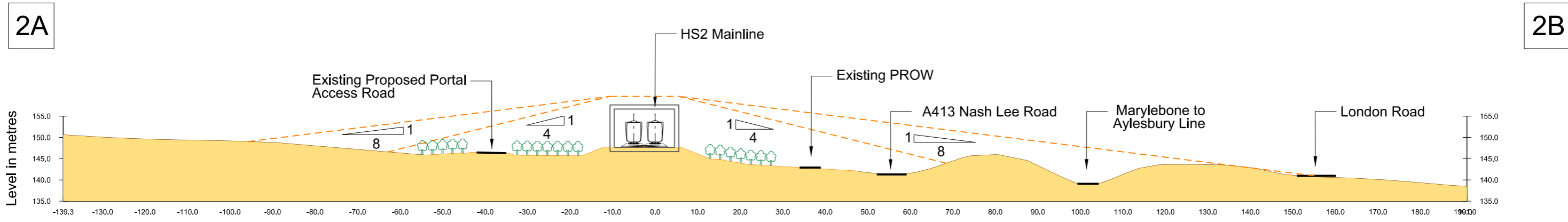
Creator/Originator  
Atkins

Zone	Country South	
Design Stage	DESIGN-FOR-PETITION	
Drawing Title	Wendover Parish Council Petition 1512 Cross Section Plan	

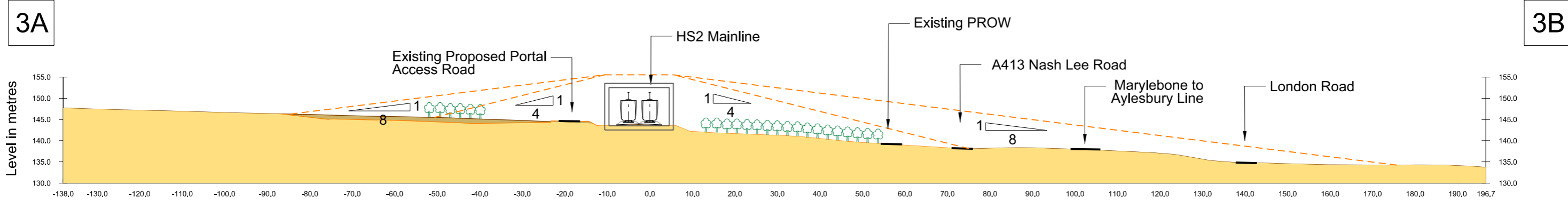
Project/Contract	Country South Design		
Discipline/Function	Environmental		
Drawn	Checked	Approved	
TB			
Date	Scale	Size	
04/08/2015	AS SHOWN	A1	
Drawing No.	Rev.		
C222-ATK-EV-DPL-020-560920-PET001512	P00.1		



Section 1A-1B (Year 15)  
Scale as shown



Section 2A-2B (Year 15)  
Scale as shown



Section 3A-3B (Year 15)  
Scale as shown

For Location Of Sections Refer To Drawing No. C222-ATK-EV-DPL-020-560920-PET001512

P00.1 Description Drawn Checked Con App HS2 App	HS2 accepts no responsibility for any circumstances which arise from the reproduction of this document after alteration, amendment or abbreviation or if it is issued in part or issued incompletely in any way.		<b>Legends/Notes:</b> Proposed mitigation tree planting Existing trees Existing hedgerow Existing ground Proposed hedgerow planting Proposed HS2 embankment/landscape earthworks Indicative landform required to cover the extended tunnel at a 1:4 and 1:8 slope		 Registered in England Registration No. 06791686 Registered office: One Canada Square, London, E14 5AB Creator/Originator Atkins	Zone Country South		Project/Contract Country South Design	
	© Crown Copyright and database right 2014. All rights reserved. Ordnance Survey Licence number 100049190		DESIGN-FOR-PETITION			Discipline/Function Environmental			
	© Crown Copyright material is reproduced with the permission of Land Registry under delegated authority from the Controller of HMSO. This material was last updated on 2014 and may not be copied, distributed, sold or published without the formal permission of Land Registry. Only an official copy of a title plan or register obtained from the Land Registry may be used for legal or other official purposes.		Drawing Title Wendover Parish Council Petition 1512 Cross Sections			Drawn TB		Checked Approved	
	Scale with caution as distortion can occur.		Date 05/01/2015			Scale AS SHOWN		Size A1	
	P8161 (18)		Drawing No. C222-ATK-EV-DSE-020-560920-PET001512				Rev. P00.1		

**Current baseline (2013)**



**Operation Year 1 (2026) - Winter verifiable photomontage**



**Technical Information**

Location: Viewpoint 104-3-002: View south-west from PRoW (Bridleway WEN/14) on Bacombe Lane, Wendover.

Date taken: 28/02/13  
Time taken: 10:48  
Focal length: 57.296mm

Viewpoint location shown on Map LV-04-036. Legend refer to map series LV-04.

This verifiable photomontage provides an illustration of how the Proposed Scheme may look in 2041 (15 years after opening). The design of the Proposed Scheme may be subject to design development in response to consultation. Design development will not result in any significant adverse change in the environmental effects detailed in the photomontages of the Proposed Scheme. Where new planting is proposed, it has been shown as semi-mature trees which have put on 15 years of growth to illustrate how the Proposed Scheme will further integrate into the landscape over time.

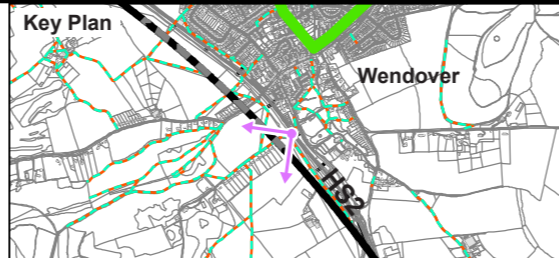


Figure Number	LV-01-298
Figure Name	Verifiable Photomontage Operation Year 15 (2041) - Summer Viewpoint 104-3-002
Community Forum Area CFA10: Dunsmore, Wendover and Halton	

**hs2**

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 anyway.

Registered in England. Registration number 06791686.  
Registered office: Eland House, Bressenden Place,  
London SW1E 5DU.  
© Crown copyright and database rights 2012  
Ordnance Survey Licence Number 100049190  
Doc Number: C250-ARP-EV-PHO-000-001193-P01

**Current baseline (2015)**



**Operation Year 15 (2041) - Summer verifiable photomontage**



**Technical Information**

Location: Viewpoint WGT-01: View north-east from PRoW near Coxgrove Wood.

Date taken: 06/08/15  
Time taken: 11:59  
Focal length: 57.296mm

Viewpoint location shown on Map LV-04-035b. Legend refer to map series LV-04.

This verifiable photomontage provides an illustration of how the Proposed Scheme may look in 2041 (15 years after opening). The design of the Proposed Scheme may be subject to design development in response to consultation. Design development will not result in any significant adverse change in the environmental effects detailed in the photomontages of the Proposed Scheme. Where new planting is proposed, it has been shown as semi-mature trees which have put on 15 years of growth to illustrate how the Proposed Scheme will further integrate into the landscape over time.

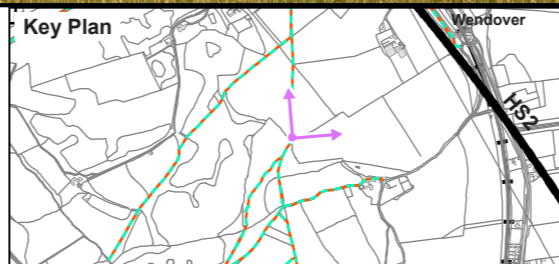



Figure Number	LV-01-297
Figure Name	Verifiable Photomontage Operation Year 15 (2041) - Summer Viewpoint WGT-01
Community Forum Area CFA10: Dunsmore, Wendover and Halton	



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 anyway.

Registered in England. Registration number 06791686.  
Registered office: Eland House, Bressenden Place,  
London SW1E 5DU

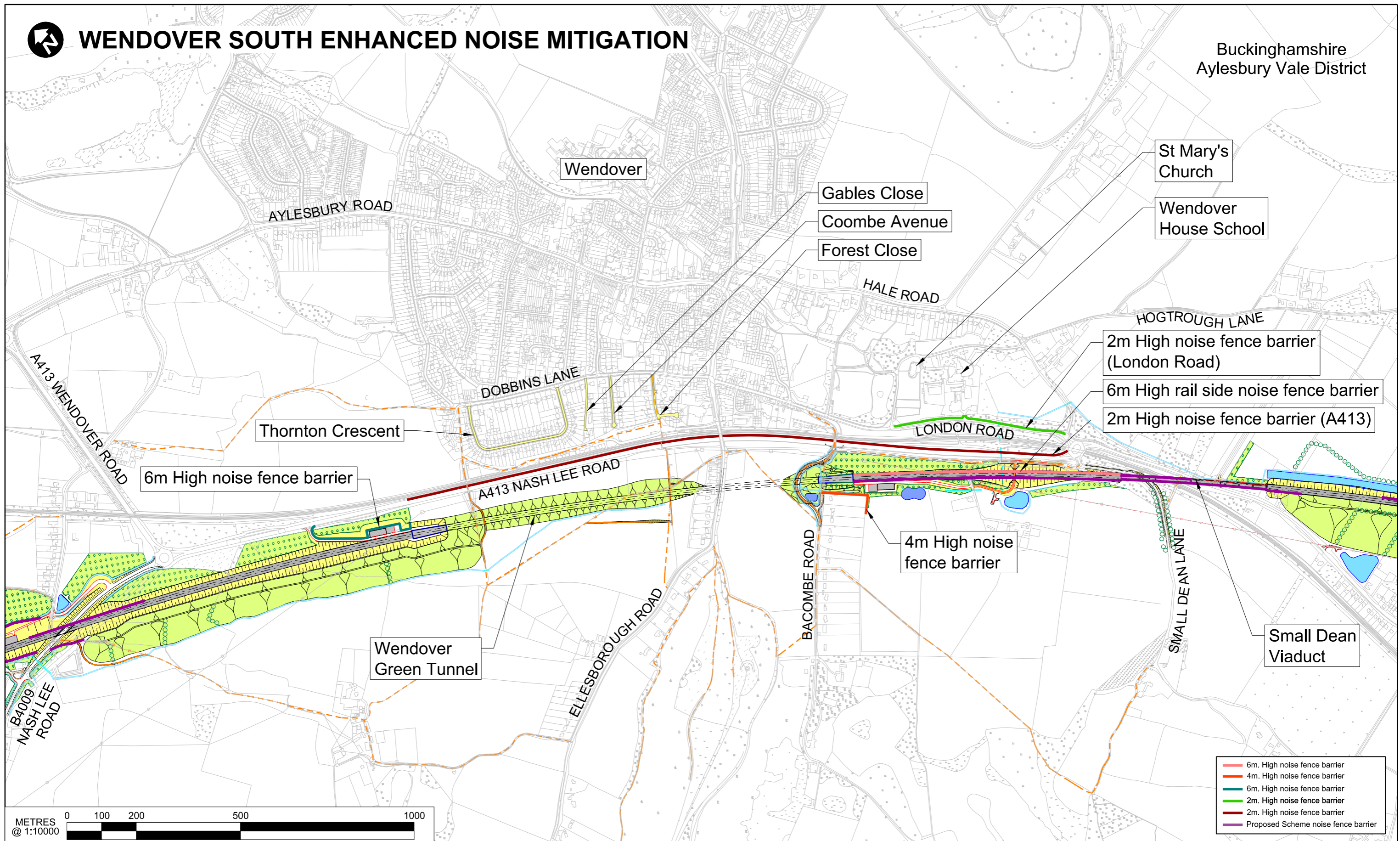
© Crown copyright and database rights 2012  
Ordnance Survey Licence Number 100049190

Doc Number: C250-ARP-EV-PHO-000-001191-P01



# WENDOVER SOUTH ENHANCED NOISE MITIGATION

Buckinghamshire  
Aylesbury Vale District



6m High noise fence barrier

Wendover Green Tunnel

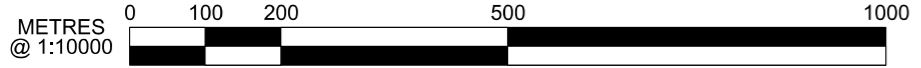
4m High noise fence barrier

2m High noise fence barrier (London Road)

6m High rail side noise fence barrier

2m High noise fence barrier (A413)

Small Dean Viaduct



- 6m. High noise fence barrier
- 4m. High noise fence barrier
- 6m. High noise fence barrier
- 2m. High noise fence barrier
- 2m. High noise fence barrier
- Proposed Scheme noise fence barrier

P00.1					

HS2 accepts no responsibility for any circumstances which arise from the reproduction of this document after alteration, amendment or abbreviation or if it is issued in part or issued incompletely in any way.

© Crown Copyright and database right 2015. All rights reserved. Ordnance Survey Licence number 100049190

© Crown Copyright material is reproduced with the permission of Land Registry under delegated authority from the Controller of HMSO.

This material was last updated on 2015 and may not be copied, distributed, sold or published without the formal permission of Land Registry. Only an official copy of a title plan or register obtained from the Land Registry may be used for legal or other official purposes.

Scale with caution as distortion can occur.

- Legends/Notes:
- Depot, station, headhouse or portal building
  - Tunnel portal
  - Balancing pond
  - Land drainage area
  - Replacement floodplain storage
  - Landscape mitigation planting (scrub / woodland)
  - Grassed areas
  - Engineering earthworks
  - Landscape earthworks
  - Rail alignment formation
  - Grassland habitat creation
  - Tunnels external extent
  - Rail alignment
  - Ditches - new
  - Hedgerow habitat creation
  - HS2 Access road
  - Existing public right of way (PRoW)
  - New, diverted or realigned PRoW
  - Stopped-up PRoW
  - UT - Main utility works
  - Likely significant beneficial effect

Registered in England  
Registration No. 06791686  
Registered office:  
One Canada Square,  
London, E14 5AB

Creator/Originator  
Atkins

Zone	Country South
Design Stage	DESIGN-FOR-PETITION
Drawing Title	Wendover Parish Council Petition 1512
	Wendover South Enhanced Noise Mitigation

Project/Contract	Country South Design		
Discipline/Function	Environmental		
Drawn	Checked	Approved	
IE			
Date	Scale	Size	
14/08/2015	AS SHOWN	A1	
Drawing No.	Rev.		
C222-ATK-EV-DPL-020-160915-PET001512	P00.1		

# A1 Appendix 1 – Detailed assessment of further mitigation

A1.1.1 Assessment has been undertaken at locations representative of residential and non-residential properties in Wendover, including dwellings forecast in the Bill scheme to experience subject to levels greater than LOAEL, St Mary's Church and Wendover House School. The results are presented in Table 1 for the Bill design reported in the main ES. Commentary is provided on the outcome of the further mitigation measures against that expected for an extended green tunnel option.

Table 1 – Operational airborne noise impacts, effects and significant effects – Main ES

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day <sup>2</sup>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sup>2</sup>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sup>2</sup>	Night <sup>3</sup>	Day <sup>2</sup>	Night <sup>3</sup>									
359341	Bacombe Lane, Wendover	50	40	69/72	49	47	51	53	48	3	1	A	6	R	T	-	-	-	-	OSV10-C03
359368	Bacombe Lane, Wendover	52	43	73/76	49	47	51	54	48	5	1	A	1	R	T	-	-	-	-	OSV10-C03
359406	Bacombe Lane, Wendover	62	53	83/86	52	45	41	63	54	10	9	A	3	R	T	-	-	-	-	OSV10-C03 OSV10-D01
359821	Forest Close, Wendover	37	28	58/61	62	51	59	62	51	0	0	NA	41	R	T	-	-	-	-	
359991	Coombe Avenue, Wendover	35	26	55/58	62	51	59	62	51	0	0	NA	20	R	T	-	-	-	-	

<sup>2</sup> Day - L<sub>pAeq,07:00-23:00</sub>

<sup>3</sup> Night - L<sub>pAeq,23:00-07:00</sub>

<sup>4</sup> Max - L<sub>pAFmax</sub>. In the Proposed Scheme only column, two values are presented. The first is the value for the HS2 mitigated train and the second is the value for the TSI compliant train. For further information refer to main ES, Volume 5: Appendix SV-001-000.



Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Day <sub>2</sub>	Night <sup>3</sup>									
360117	Thornton Crescent, Wendover	37	28	58/61	53	44	55	53	44	0	0	NA	31	R	T	-	-	-	-	
360282	Witchell, Wendover	43	33	64/67	52	49	56	52	50	1	0	NA	32	R	T	-	-	-	-	
360527	High Street, Wendover	39	30	61/64	52	49	56	52	49	0	0	NA	34	R	T	-	-	-	-	
361026	Dobbins Lane, Wendover	39	30	60/63	53	44	55	53	44	0	0	NA	69	R	T	-	-	-	-	
361283	Tring Road, Wendover	38	29	58/61	53	44	55	53	44	0	0	NA	32	R	T	-	-	-	-	
361353	Little Hampden Close, Wendover	43	34	67/70	62	51	59	62	51	0	0	NA	62	R	T	-	-	-	-	
361567	South Street, Wendover	50	41	70/73	52	49	56	54	50	2	1	A	4	R	T	-	-	-	-	
361934	Dobbins Lane, Wendover	37	27	55/58	53	44	55	53	44	0	0	NA	14	R	T	-	-	-	-	
362513	Dobbins Lane, Wendover	40	31	58/61	53	44	55	53	44	0	0	NA	22	R	T	-	-	-	-	
362638	Thornton Crescent, Wendover	42	33	62/65	59	53	63	59	53	0	0	NA	49	R	T	-	-	-	-	
362785	Bridleways, Wendover	47	37	64/67	50	45	53	52	45	2	1	NA	22	R	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Day <sub>2</sub>	Night <sup>3</sup>									
363661	Dobbins Lane, Wendover	43	33	60/63	50	41	48	50	41	1	1	NA	19	R	T	-	-	-	-	
364294	The Cedars, Wendover	40	31	56/59	50	41	48	50	41	0	0	NA	53	R	T	-	-	-	-	
365001	Lionel Avenue, Wendover	39	30	55/58	46	45	51	47	45	1	0	NA	24	R	T	-	-	-	-	
365130	Aylesbury Road, Wendover	36	27	51/54	50	43	75	50	43	0	0	NA	15	R	T	-	-	-	-	
365216	Aylesbury Road, Wendover	37	28	51/54	50	43	75	50	43	0	0	NA	10	R	T	-	-	-	-	
365280	Aylesbury Road, Wendover	41	32	56/59	46	45	51	47	45	1	0	NA	1	R	T	-	-	-	-	
366563	Lionel Avenue, Wendover	37	28	53/56	46	45	51	47	45	1	0	NA	38	R	T	-	-	-	-	
366705	Lionel Avenue, Wendover	43	34	59/62	46	45	51	48	45	2	0	NA	32	R	T	-	-	-	-	
369223	St Mary's Church (Church)	51	42	65/70	55	49	56	56*	50	1	1	B	1	G <sub>3</sub>	T	-	-	-	-	OSV10-No1

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Day <sub>2</sub>	Night <sup>3</sup>									
369288	Hale Road, Wendover	48	39	61/65	47	39	46	51	42	3	3	NA	11	R	T	-	-	-	-	5
369370	Hale Road, Wendover	47	38	61/65	47	39	46	50	41	3	3	NA	12	R	T	-	-	-	-	5
369461	Heron Path, Wendover	46	37	67/70	52	49	56	53	50	1	0	NA	7	R	T	-	-	-	-	
369725	Honey Banks, Wendover	39	30	61/64	52	49	56	52	49	0	0	NA	38	R	T	-	-	-	-	
369820	Hale road, Wendover	39	30	59/62	52	49	56	52	49	0	0	NA	1	R	T	-	-	-	-	
369935	Hale road, Wendover	42	33	62/65	47	39	46	48	40	1	1	NA	7	R	T	-	-	-	-	
370028	Hazeldene, Wendover	43	34	64/67	52	49	56	52	50	1	0	NA	8	R	T	-	-	-	-	
370197	Church Lane, Wendover	53	43	66/71	55	49	56	57*	50	2	1	A	4	R	T	-	-	-	-	
370600	Hampden Road, Wendover	35	26	55/58	52	49	56	52	49	0	0	NA	65	R	T	-	-	-	-	

<sup>5</sup> A change of 3dB or greater has been identified however, the assessment methodology only defines an impact where the absolute sound level from the Proposed Scheme is greater or equal to 50 dB L<sub>pAeq, 23:00 – 07:00</sub> during the daytime or 40 dB L<sub>pAeq, 07:00 – 23:00</sub> at night. At the receptor denoted the absolute level condition is not met and therefore no impact is identified.

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Day <sub>2</sub>	Night <sup>3</sup>									
700313	Heron path, Wendover	48	39	68/71	52	49	56	53	50	2	0	NA	1	R	T	-	-	-	-	
700315	South Street, Wendover	48	39	71/74	62	51	59	62	51	0	0	NA	2	R	T	-	-	-	-	
700326	Forest Close, Wendover	36	27	55/58	62	51	59	62	51	0	0	NA	2	R	T	-	-	-	-	
700327	Bridleways, Wendover	47	37	64/67	50	45	53	52	45	2	1	NA	1	R	T	-	-	-	-	
370197	Chiltern Way Federation (School)	53	43	66/71	55	49	56	57*	50	2	1	B	1	G4	T	-	-	-	-	

\*Typographical error in ES

A1.1.2 The results for those properties presented in Table 1, with the envisaged HS2 trackside mitigation (see section 6.3 for details) are presented in Table 2.

Table 2 – Operational airborne noise impacts, effects and significant effects – with further HS2 trackside mitigation

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Day <sub>2</sub>	Night <sup>3</sup>									
359341	Bacombe Lane, Wendover	49	40	66/69	49	47	51	52	48	3	1	NA	6		T	-	-	-	-	5
359368	Bacombe Lane, Wendover	51	42	68/71	49	47	51	53	48	4	1	A	1		T	-	-	-	-	
359406	Bacombe Lane, Wendover	55	46	76/79	52	45	41	57	48	4	4	A	3		T	-	-	-	-	
359821	Forest Close, Wendover	40	33	55/58	62	51	59	62	51	0	0	NA	22	R	T	-	-	-	-	
359991	Coombe Avenue, Wendover	38	31	51/54	62	51	59	62	51	0	0	NA	20	R	T	-	-	-	-	
360117	Thornton Crescent, Wendover	33	25	55/58	53	44	55	53	44	0	0	NA	31	R	T	-	-	-	-	
360282	Witchell, Wendover	38	29	55/58	52	49	56	52	49	0	0	NA	32	R	T	-	-	-	-	
360527	High Street, Wendover	35	26	53/56	52	49	56	52	49	0	0	NA	34	R	T	-	-	-	-	
361026	Dobbins Lane, Wendover	35	27	53/56	53	44	55	53	44	0	0	NA	69	R	T	-	-	-	-	
361283	Tring Road, Wendover	33	24	50/53	53	44	55	53	44	0	0	NA	32	R	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Day <sub>2</sub>	Night <sup>3</sup>									
361353	Little Hampden Close, Wendover	39	30	58/61	62	51	59	62	51	0	0	NA	62	R	T	-	-	-	-	
361567	South Street, Wendover	46	36	62/65	52	49	56	53	49	1	0	NA	4	R	T	-	-	-	-	
361934	Dobbins Lane, Wendover	33	25	52/55	53	44	55	53	44	0	0	NA	14	R	T	-	-	-	-	
362513	Dobbins Lane, Wendover	38	29	56/58	53	44	55	53	44	0	0	NA	22	R	T	-	-	-	-	
362638	Thornton Crescent, Wendover	38	30	60/62	59	53	63	59	53	0	0	NA	49	R	T	-	-	-	-	
362785	Bridleways, Wendover	43	34	60/63	50	45	53	51	45	1	0	NA	22	R	T	-	-	-	-	
363661	Dobbins Lane, Wendover	40	31	56/59	50	41	48	50	41	0	0	NA	19	R	T	-	-	-	-	
364294	The Cedars, Wendover	37	28	53/56	50	41	48	50	41	0	0	NA	53	R	T	-	-	-	-	
365001	Lionel Avenue, Wendover	37	28	51/55	46	45	51	47	45	1	0	NA	24	R	T	-	-	-	-	
365130	Aylesbury Road, Wendover	35	27	48/51	50	43	75	50	43	0	0	NA	15	R	T	-	-	-	-	
365216	Aylesbury Road, Wendover	36	28	49/52	50	43	75	50	43	0	0	NA	10	R	T	-	-	-	-	
365280	Aylesbury Road, Wendover	39	30	52/56	46	45	51	47	45	1	0	NA	1	R	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria							Significant effect	
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact		Mitigation of effect
		Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Day <sub>2</sub>	Night <sup>3</sup>									
366563	Lionel Avenue, Wendover	36	27	49/53	46	45	51	47	45	1	0	NA	38	R	T	-	-	-	-	
366705	Lionel Avenue, Wendover	40	31	55/59	46	45	51	47	45	1	0	NA	32	R	T	-	-	-	-	
369223	St Mary's Church (Church)	47	38	60/64	55	49	56	56	50	1	1	B	1	G <sub>3</sub>	T	-	-	-	-	
369288	Hale Road, Wendover	45	36	60/63	47	39	46	49	40	2	1	NA	11	R	T	-	-	-	-	
369370	Hale Road, Wendover	43	34	58/61	47	39	46	49	40	2	1	NA	12	R	T	-	-	-	-	
369461	Heron Path, Wendover	42	33	56/60	52	49	56	52	49	0	0	NA	7	R	T	-	-	-	-	
369725	Honey Banks, Wendover	35	26	51/54	52	49	56	52	49	0	0	NA	38	R	T	-	-	-	-	
369820	Hale road, Wendover	34	25	50/53	52	49	56	52	49	0	0	NA	1	R	T	-	-	-	-	
369935	Hale road, Wendover	38	29	53/57	47	39	46	48	39	1	0	NA	7	R	T	-	-	-	-	
370028	Hazeldene, Wendover	39	30	55/58	52	49	56	52	49	0	0	NA	8	R	T	-	-	-	-	
370197	Church Lane, Wendover	49	40	61/65	55	49	56	56	50	1	1	A	4	R	T	-	-	-	-	
370600	Hampden Road, Wendover	32	23	47/51	52	49	56	52	49	0	0	NA	65	R	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria							Significant effect	
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact		Mitigation of effect
		Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Day <sub>2</sub>	Night <sup>3</sup>									
700313	Heron path, Wendover	44	35	58/61	52	49	56	52	50	0	1	NA	1	R	T	-	-	-	-	
700315	South Street, Wendover	42	33	61/64	62	51	59	62	51	0	0	NA	2	R	T	-	-	-	-	
700326	Forest Close, Wendover	39	32	54/56	62	51	59	62	51	0	0	NA	2	R	T	-	-	-	-	
700327	Bridleways, Wendover	43	34	60/64	50	45	53	51	45	1	0	NA	1	R	T	-	-	-	-	
370197	Chiltern Way Federation (School)	49	40	61/65	55	49	56	56	50	1	1	B	1	G4	T	-	-	-	-	

A1.1.3 The envisaged HS2 trackside mitigation reduces the sound at all residential properties in the main urban area of Wendover<sup>6</sup> to a level below the daytime and night-time LOAELs, which is equitable with the outcome of a tunnelled option.

<sup>6</sup> The noise levels at Bacombe Lane are discussed separately in Section A1.2.



- A1.1.4 With the envisaged mitigation, the sound levels at St. Mary's Church are forecast to be reduced to a level of 60 dB  $L_{pAFmax}$  during the pass-by of the HS2 mitigated train, which represents the vast majority of the movements on the alignment and 64 dB  $L_{pAFmax}$  during the pass-by of a train which just complies with the Trans European Standard on Interoperability (TSI). Considering the ambient noise levels typically incident at the church during performance times of 59 – 64 dB  $L_{pAFmax}$ , the forecast maximum levels from train pass-bys are not considered likely to result in a significant adverse effect at the church. The presence of sound from HS2 would result in a negligible effect on the acoustic character surrounding the church.
- A1.1.5 The results for those properties presented in Table 1, with the further HS2 trackside mitigation and the further road traffic mitigation, namely the noise fence barriers on A413 and London Road as described in 6.3.1, are presented in Table 3.

Table 3 – Operational airborne noise impacts, effects and significant effects – with HS2 trackside mitigation and road traffic mitigation

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Day <sub>2</sub>	Night <sup>3</sup>									
359341	Bacombe Lane, Wendover	49	40	66/69	49	47	51	52	48	3	1	NA	6		T	-	-	-	-	5
359368	Bacombe Lane, Wendover	51	42	68/71	49	47	51	53	48	4	1	A	1		T	-	-	-	-	6
359406	Bacombe Lane, Wendover	55	46	76/79	52	45	41	57	48	4	4	A	3		T	-	-	-	-	6
359821	Forest Close, Wendover	40	33	55/58	62	51	59	57	46	-6	-5	B	22	R	T	-	-	-	-	
359991	Coombe Avenue, Wendover	38	31	51/54	62	51	59	57	46	-5	-5	B	20	R	T	-	-	-	-	
360117	Thornton Crescent, Wendover	33	25	55/58	53	44	55	51	42	-2	-1	NA	31	R	T	-	-	-	-	
360282	Witchell, Wendover	38	29	55/58	52	49	56	51	49	0	0	NA	32	R	T	-	-	-	-	
360527	High Street, Wendover	35	26	53/56	52	49	56	51	49	0	0	NA	34	R	T	-	-	-	-	
361026	Dobbins Lane, Wendover	35	27	53/56	53	44	55	52	44	0	0	NA	69	R	T	-	-	-	-	
361283	Tring Road, Wendover	33	24	50/53	53	44	55	51	42	-1	-1	NA	32	R	T	-	-	-	-	
361353	Little Hampden Close, Wendover	39	30	58/61	62	51	59	62	51	0	0	NA	62	R	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Day <sub>2</sub>	Night <sup>3</sup>									
361567	South Street, Wendover	46	36	62/65	52	49	56	52	49	0	0	NA	4	R	T	-	-	-	-	
361934	Dobbins Lane, Wendover	33	25	52/55	53	44	55	51	42	-2	-2	NA	14	R	T	-	-	-	-	
362513	Dobbins Lane, Wendover	38	29	56/58	53	44	55	51	42	-1	-1	NA	22	R	T	-	-	-	-	
362638	Thornton Crescent, Wendover	38	30	60/62	59	53	63	53	48	-6	-5	Ben	49	R	T	-	-	-	-	
362785	Bridleways, Wendover	43	34	60/63	50	45	53	47	41	-3	-4	Ben	22	R	T	-	-	-	-	
363661	Dobbins Lane, Wendover	40	31	56/59	50	41	48	48	40	-1	-1	NA	19	R	T	-	-	-	-	
364294	The Cedars, Wendover	37	28	53/56	50	41	48	49	40	0	0	NA	53	R	T	-	-	-	-	
365001	Lionel Avenue, Wendover	37	28	51/55	46	45	51	45	43	-1	-2	NA	24	R	T	-	-	-	-	
365130	Aylesbury Road, Wendover	35	27	48/51	50	43	75	48	40	-2	-2	NA	15	R	T	-	-	-	-	
365216	Aylesbury Road, Wendover	36	28	49/52	50	43	75	48	41	-2	-2	NA	10	R	T	-	-	-	-	
365280	Aylesbury Road, Wendover	39	30	52/56	46	45	51	45	42	-2	-3	Ben	1	R	T	-	-	-	-	
366563	Lionel Avenue, Wendover	36	27	49/53	46	45	51	47	44	0	0	NA	38	R	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria							Significant effect	
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact		Mitigation of effect
		Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Day <sub>2</sub>	Night <sup>3</sup>									
366705	Lionel Avenue, Wendover	40	31	55/59	46	45	51	44	41	-2	-4	Ben	32	R	T	-	-	-	-	
369223	St Mary's Church (Church)	47	38	60/64	55	49	56	52	45	-3	-4	Ben	1	G <sub>3</sub>	T	-	-	-	-	
369288	Hale Road, Wendover	45	36	60/63	47	39	46	47	38	0	-1	NA	11	R	T	-	-	-	-	
369370	Hale Road, Wendover	43	34	58/61	47	39	46	46	37	-1	-1	NA	12	R	T	-	-	-	-	
369461	Heron Path, Wendover	42	33	56/60	52	49	56	49	46	-2	-3	Ben	7	R	T	-	-	-	-	
369725	Honey Banks, Wendover	35	26	51/54	52	49	56	49	47	-2	-2	NA	38	R	T	-	-	-	-	
369820	Hale road, Wendover	34	25	50/53	52	49	56	51	49	-1	-1	NA	1	R	T	-	-	-	-	
369935	Hale road, Wendover	38	29	53/57	47	39	46	45	37	-2	-2	NA	7	R	T	-	-	-	-	
370028	Hazeldene, Wendover	39	30	55/58	52	49	56	49	47	-2	-3	Ben	8	R	T	-	-	-	-	
370197	Church Lane, Wendover	49	40	61/65	55	49	56	52	45	-3	-4	Ben	4	R	T	-	-	-	-	
370600	Hampden Road, Wendover	32	23	47/51	52	49	56	51	49	-1	-1	NA	65	R	T	-	-	-	-	
700313	Heron path, Wendover	44	35	58/61	52	49	56	49	46	-2	-3	Ben	1	R	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria							Significant effect	
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact		Mitigation of effect
		Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Max <sup>4</sup>	Day <sub>2</sub>	Night <sup>3</sup>	Day <sub>2</sub>	Night <sup>3</sup>									
700315	South Street, Wendover	42	33	61/64	62	51	59	60	49	-3	-2	Ben	2	R	T	-	-	-	-	
700326	Forest Close, Wendover	39	32	54/56	62	51	59	57	47	-5	-4	Ben	2	R	T	-	-	-	-	
700327	Bridleways, Wendover	43	34	60/64	50	45	53	47	40	-3	-4	Ben	1	R	T	-	-	-	-	
370197	Chiltern Way Federation (School)	49	40	61/65	55	49	56	52	45	-3	-4	Ben	1	G4	T	-	-	-	-	

## A1.2 Bacombe Lane

A1.2.1 The assessment presented in main ES (Table 1) identified 3 major, 1 moderate and 6 minor operational airborne noise impacts at residential properties on Bacombe Lane (assessment locations 359406, 359368 and 359341) and 2 major impacts at Grove Farm (assessment location 359264). 3 properties on Bacombe Lane were also estimated to be likely to qualify for noise insulation. The adverse effects as a result of the noise impacts in the properties on Bacombe Lane are considered significant when assessed on a community basis, and consequently a likely significant effect was identified around these properties (OSV10-Co3). The Bill scheme includes mitigation in the form of a 4m above rail noise fence barrier.

A1.2.2 The inclusion of an additional noise fence barrier (a barrier of height 4m above local ground level has been assumed) around the western side of the southern portal is forecast to reduce airborne sound levels such that the operational airborne noise impacts at dwellings on Bacombe Lane become 4 minor impacts. With this envisaged mitigation, the residual effects would not be significant when assessed on a community basis, so the significant effect at Bacombe Lane would be removed.

*Note: The plans below do not include the effects of the noise fence barriers on the A413 or London Road.*

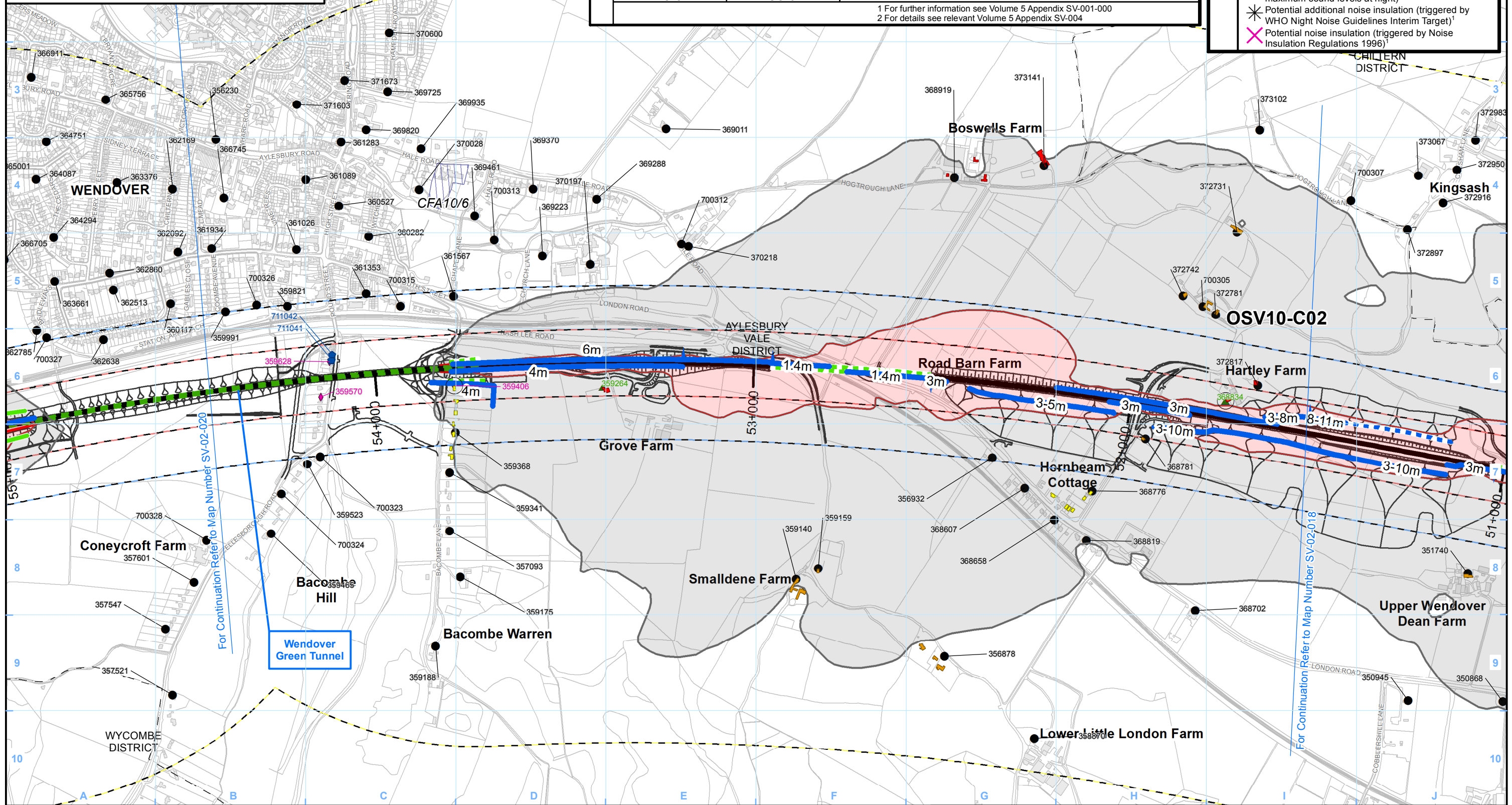
See text for full description and extent of significant effects. (\*) Where SES/AP is reason for significant effect.

Receptor/significant effect removed/added (as a result of amendment\*: AP4-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 <sup>1,2</sup>	
	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# <sup>2</sup>
	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# <sup>2</sup>	Generally no adverse effect expected <sup>1</sup>
< 40 dB	< 50 dB			

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) <sup>1</sup>			
*	Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target) <sup>1</sup>			
✕	Potential noise insulation (triggered by Noise Insulation Regulations 1996)			



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

Engineering earthworks:  
 Embankment  
 Cutting  
 Non engineering earthworks:  
 Embankment  
 Cutting  
 \* Residential buildings only  
 \* Labelled with total barrier height above rail level

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 features 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) SES3 and AP4 ES  
 Community Forum Area CFA10: Dunsmore, Wendover & Halton

hs2 logo  
 Registered in England. Registration number 06791686.  
 Registered office: One Canada Square, London, E14 5AB.  
 © Crown copyright and database rights 2015.  
 Ordnance Survey Licence Number 100049190.  
 Scale at A3: 1:10,000  
 Doc Number: HOC/10518/0039

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

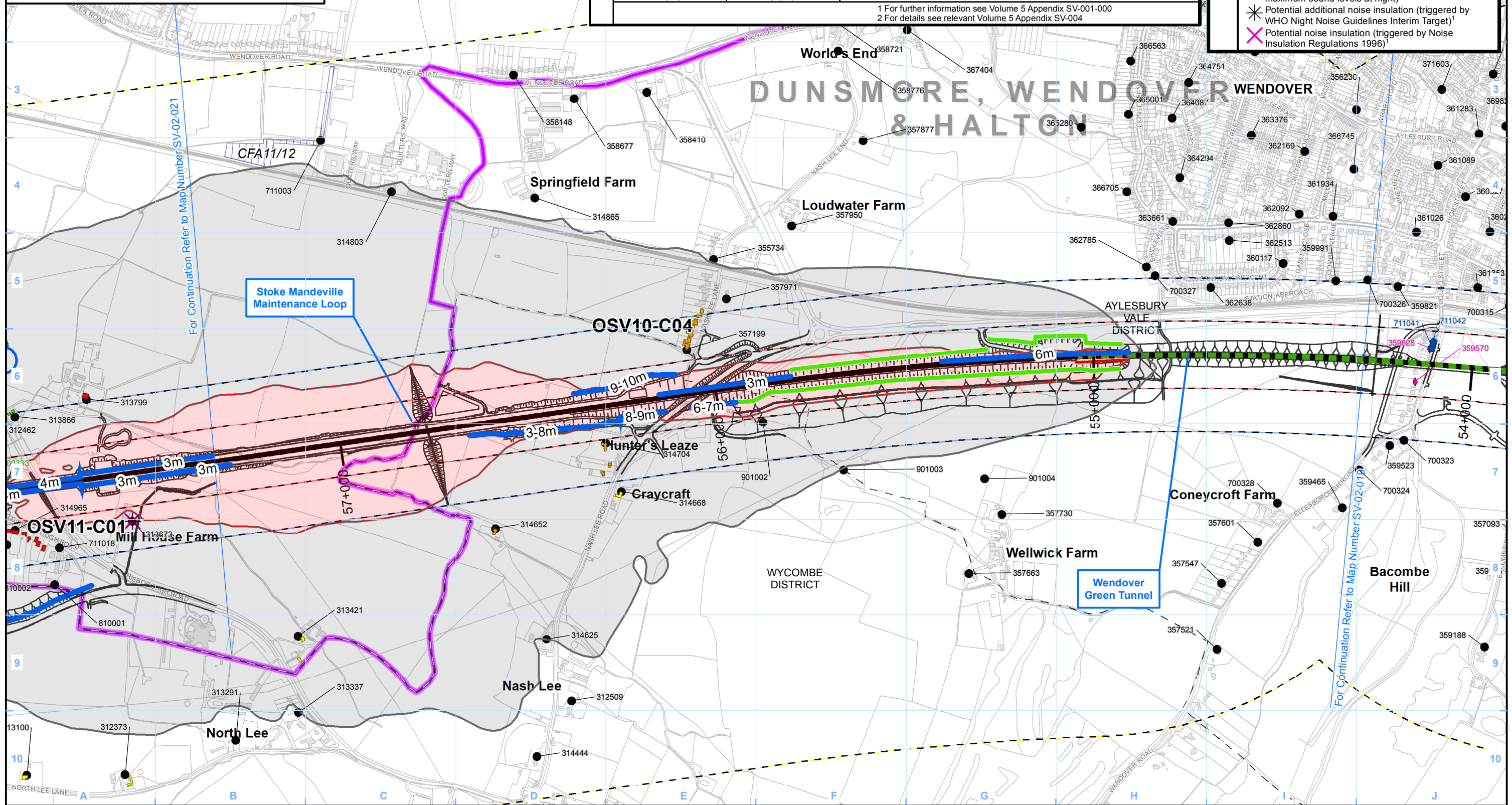
Receptor/significant effect removed/added (as a result of amendment\*: AP4-XXX-YYY). — SES/AP change ref.  
 Significant effect descriptor  
 Reduced effect Increased effect

Panel A	HS2 (rail only) sound level $L_{pAeq,T}$		Potential noise effect <sup>1,2</sup>	
	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 X 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#
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#		
< 40 dB	< 50 dB	Generally no adverse effect expected <sup>1</sup>		

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)<sup>1</sup>  
 \* Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)<sup>1</sup>  
 Potential noise insulation (triggered by Noise Insulation Regulations 1996)



**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

**Engineering earthworks:**

- Embankment
- Cutting

**Non engineering earthworks:**

- Embankment
- Cutting

\* Residential buildings only  
 \* Labelled with total barrier height above rail level

**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 features 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) SES3 and AP4 ES

Community Forum Area CFA10: Dunsmore, Wendover & Halton

hs2 logo

Scale at A3: 1:10,000

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

© Crown copyright and database rights 2015. Ordnance Survey Licence Number 100049190.

Doc Number: HOC/10518/0040



