

High Speed Rail (West Midlands - Crewe)

Environmental Statement

Volume 5: Map book

Sound, Noise and Vibration (SV-01, SV-02, SV-03 & SV-04)

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Department
for Transport

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

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A report prepared for High Speed Two (HS2) Limited:

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Contents

Mapping explanatory notes

Data dictionary and definitions

| Map series name | SV-01 - Operational Sound Contour Maps and Likely Significant Effects | SV-02 - Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) | SV-03 - Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments | SV-04 - Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments |
|-------------------------------|--|--|--|---|
| Map series description | <p>SV-01 presents the predicted operational sound from the new railway.</p> <p>The sound levels from the new railway (expressed as $L_{pAeq,T}$) are presented in typical noise mapping colours in 5 dB steps. There is a panel at the top right of the figure; the left-hand section of this panel contains a key communicating the night-time and daytime sound levels represented by the various colours. The right-hand part of the same panel contains text explaining how the sound levels presented on the figure inform the assessment of direct noise impacts and likely significant effects. A corresponding and similar panel is found on SV-02, along with the key sound contours that were used within the environmental assessment.</p> | <p>SV-02 presents the direct operational noise impacts and likely significant effects of the Proposed Scheme.</p> <p>The SV-02 figure series necessarily contains a large amount of information relating to the operational noise and vibration assessment. It is designed to communicate visually the assessment process from the prediction of impacts to the determination of likely residual significant effects. The corresponding text is included in Vol2 and Vol5.</p> | <p>The SV-03 figure series accompanies the construction noise & vibration assessments. It shows the locations at which a quantitative assessment of the direct effects of construction noise and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the construction noise and vibration reports contained in Volume 5: Appendix SV-002-0XX</p> <p>The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002-0XX.</p> | <p>The SV-04 figure series shows the locations at which a quantitative assessment of the direct effects of operational sound and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-002-0XX</p> <p>The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable crossreference to the baseline sound reports contained in Volume 5: Appendix SV-002-0XX</p> |
| Community Area name | | | | |
| CA1 Fradley to Colton | ✓ | ✓ | ✓ | ✓ |
| CA2 Colwich to Yarlet | ✓ | ✓ | ✓ | ✓ |
| CA3 Stone and Sywnnerton | ✓ | ✓ | ✓ | ✓ |
| CA4 Whitmore Heath to Madeley | ✓ | ✓ | ✓ | ✓ |
| CA5 South Cheshire | ✓ | ✓ | ✓ | ✓ |

Mapping explanatory notes

Structure of the HS2 Phase 2a Environmental Statement

This map book is part of the suite of documents that make up the Environmental Statement (ES) for Phase 2a of the proposed High Speed Two (HS2) rail network between the West Midlands and Crewe (the Proposed Scheme).

The ES documentation comprises the following:

- Non-technical summary. This provides: a summary in non-technical language of the Proposed Scheme and the reasonable alternatives studied; the likely significant effects of the Proposed Scheme; the means to avoid, prevent or reduce the likely significant environmental effects; and an outline of the monitoring measures to manage the effects of construction and the effectiveness of mitigation post construction, as well as appropriate operational phase monitoring.
- Glossary of terms and list of abbreviations. This contains terms and abbreviations, including units of measurement used throughout the ES documentation.
- Volume 1: Introduction and methodology. This provides: a description of HS2, the EIA process and the approach to consultation and engagement; details of the permanent features of the Proposed Scheme and general construction techniques; a summary of the scope and methodology for the environmental topics; an outline of the general approach to mitigation; an outline of the approach to monitoring, including measures to manage the effects of construction, the effectiveness of mitigation post construction, as well as the approach to operational phase monitoring; and a summary of the reasonable alternatives studied (including local alternatives studied prior to the November 2015 route announcement). Local alternatives studied post November 2015 are discussed in the relevant Volume 2 community area reports.
- Volume 2: Community area reports and map books. These cover the following community areas: 1 Fradley to Colton; 2 Colwich to Yarlet; 3 Stone and Swynnerton; 4 Whitmore Heath to Madeley; and 5 South Cheshire. The reports provide the following for each area: an overview of the area; a description of the construction and operation of the Proposed Scheme within the area; a summary of the local alternatives studied since November 2015; a description of the environmental baseline; a description of the likely significant environmental effects of the Proposed Scheme; the proposed means to avoid, prevent or reduce the likely significant environmental effects; and the proposals for monitoring, including measures during and post construction, and during the operational phase.
The maps relevant to each community area are provided in separate Volume 2 map books. These maps should be read in conjunction with the relevant community area report. These maps include the location of the key environmental features (Map Series CT-10), key construction features (Map Series CT-05) and key operation features (Map Series CT-06) of the Proposed Scheme. There are also specific maps showing viewpoint and photomontage locations (Map Series LV, to be read in conjunction with Section 11, Landscape and visual of the Volume 2: community area reports) and noise contours (Map Series SV, to be read in conjunction with Section 13, Sound, noise and vibration of the Volume 2: community area reports).
- Volume 3: Route-wide effects. This describes the likely significant environmental effects that are likely to occur at a geographical scale greater than the community areas described in Volume 2.
- Volume 4: Off-route effects. This provides an assessment of the likely significant environmental effects of the Proposed Scheme at locations beyond the Phase 2a route corridor and its associated local environment. The maps relevant to the assessment of off-route effects are provided in a separate map book.
- Volume 5: Appendices and map books. This contains supporting technical information and associated map books to be read in conjunction with the other volumes of the ES.

Copyright statements

Copyright statements are presented in the Data dictionary and definitions section at the front of the map book, due to limited space to include this on the individual maps themselves.

Ordnance Survey data

All maps produced as part of the ES contain Ordnance Survey (OS) data. HS2 Ltd use the most up to date mapping available, where possible, supplied by the OS and as such, we cannot be held responsible for any inaccuracies within this data.

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Chainage

Most of the maps presented as part of the ES have a chainage value shown next to the alignment. Chainage is presented on the maps in black font, in the form of XX+YYY. E.g. 192+000 or 239+500.

Chainage (known as reference chainage) is referenced from Euston Station, which is 0+000, and the value presented is in metres. E.g. 192+000 refers to the point, 192,000m, or 192km, from Euston Station. Chainage values increase in intervals dependant on the map scale. For maps at 1:50,000 scale chainage is shown at 5km intervals. For maps at 1:25,000 scale chainage is shown at 2km intervals. For maps at 1:20,000, 1:10,000, 1:5,000 and 1:2,500 scales, chainage is shown at 1km intervals.

Chainage has been included on the maps as a useful tool for comparing different map sets showing the different environmental themes or engineering plans, due to map sets having different scales and therefore showing differing amounts of alignment on the map.

Map orientation

The majority of the maps presented in these map books are presented with the railway alignment running horizontally across the page. The direction of travel to London would be following the alignment to the right hand side of the page, and Crewe to the left.

The exception to this, are map series LV-02, LV-03, LV-04, LV-07 and LV-08, which present the alignment running from bottom to top of the page. This is to allow more of the modelled outputs to be shown at the appropriate map scale. In this instance, the direction of travel to London would be to the bottom of the page, and Crewe to the top. Map series TR-08 is orientated north.

Map books

In total there are 22 map books which make up the ES, spread across volumes 2, 4 and 5. A list of the titles is provided below for reference.

| Name | Name |
|---|--|
| Volume 2: Map book – CA1: Fradley to Colton | Volume 5: Map book – Land Quality (LQ-01) |
| Volume 2: Map book – CA2: Colwich to Yarlet | Volume 5: Map book – CA1: Fradley to Colton - Landscape and visual (LV-00, LV-02, LV-07, LV-08, LV-17) |
| Volume 2: Map book – CA3: Stone and Swynnerton | Volume 5: Map book – CA2: Colwich to Yarlet - Landscape and visual (LV-00, LV-02, LV-07, LV-08, LV-17) |
| Volume 2: Map book – CA4: Whitmore Heath to Madeley | Volume 5: Map book – CA3: Stone and Swynnerton - Landscape and visual (LV-00, LV-02, LV-07, LV-08, LV-17) |
| Volume 2: Map book – CA5: South Cheshire | Volume 5: Map book – CA4: Whitmore Heath to Madeley - Landscape and visual (LV-00, LV-02, LV-07, LV-08, LV-17) |
| Volume 4: Map book – Off-route effects | Volume 5: Map book – CA5: South Cheshire - Landscape and visual (LV-00, LV-02, LV-07, LV-08, LV-17) |
| Volume 5: Map book – Agriculture, forestry and soils (AG-01, AG-02 & AG-04) | Volume 5: Map book – Planning Data/Committed Development (CT-13) |
| Volume 5: Map book – Air quality (AQ-01) | Volume 5: Map book – Socio-Economics (SE-01) |
| Volume 5: Map book – Community (CM-01) | Volume 5: Map book – Sound, Noise and Vibration (SV-01, SV-02, SV-03 & SV-04) |
| Volume 5: Map book – Cultural Heritage (CH-01, CH-02, CH-03) | Volume 5: Map book – Traffic and Transport (TR-03, TR-04 & TR-08) |
| Volume 5: Map book – Ecology - designated sites (EC-01) | Volume 5: Map book – Water Resources and Flood Risk (WR-01, WR-02, WR-03, WR-05, WR-06) |

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High Speed Rail (West Midlands-Crewe)
Environmental Statement
Data dictionary and definitions

Data dictionary and definitions

| Legend features | Definition | Source | Copyright |
|--|--|--------------------------|--|
| 1km Airborne sound study area | This defines the area within which operational airborne sound impacts of the scheme have been quantitatively assessed. This area is defined as within 1km of surface sections of the route in rural areas and within 500m of surface sections of the route in urban areas. | High Speed Two (HS2) Ltd | |
| Airborne sound and vibration assessment location | Locations near surface sections of the route at which a quantitative assessment of airborne sound and ground-borne vibration impacts due to the operation of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-004. | High Speed Two (HS2) Ltd | |
| Airborne sound assessment location | Locations at which a quantitative assessment of airborne sound impacts due to the operation of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-004. | High Speed Two (HS2) Ltd | |
| Airborne sound, ground-borne sound and vibration assessment location | Locations at which a quantitative assessment of airborne sound, ground-borne sound and vibration impacts due to the operation of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the operational sound & vibration reports contained in Volume 5: Appendix SV-004. | High Speed Two (HS2) Ltd | |
| Baseline measurement locations | These represent locations at which sound measurements were carried out as part of the baseline sound surveys. Measurements of existing baseline sound levels at these locations have been used to derive baseline sound levels at operational and construction sound assessment locations. These baseline measurement locations are labelled with a reference number which enables cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002, which also describes how these are linked to baseline levels at assessment locations. | High Speed Two (HS2) Ltd | |
| Committed developments – SV Only | This informs the assessment of the future baseline. A development consent or allocation that has full or outline planning permission, or is allocated in an adopted development plan. | High Speed Two (HS2) Ltd | © Crown copyright. Reproduced by permission of Ordnance Survey Licence Number 100049190. Year of Publication 2017. |
| Community area boundary | The Environmental Statement has been split into 5 sections called Community Areas. | High Speed Two (HS2) Ltd | © Crown copyright. Reproduced by permission of Ordnance Survey Licence Number 100049190. Year of Publication 2017. |
| Construction airborne sound and vibration assessment location | Locations at which a quantitative assessment of construction noise and vibration impacts of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the construction sound & vibration reports contained in Volume 5: Appendix SV-003. | High Speed Two (HS2) Ltd | |
| Construction airborne sound assessment location | Locations at which a quantitative assessment of construction noise impacts of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the construction sound & vibration reports contained in Volume 5: Appendix SV-003. | High Speed Two (HS2) Ltd | |
| Construction vibration assessment locations | Locations at which a quantitative assessment of construction vibration impacts of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the construction sound & vibration reports contained in Volume 5: Appendix SV-003. | High Speed Two (HS2) Ltd | |
| County boundary | County boundaries from Ordnance Survey boundary mapping. | Ordnance Survey | © Crown copyright. Reproduced by permission of Ordnance Survey Licence |

| Legend features | Definition | Source | Copyright |
|--|---|--------------------------|--|
| | | | Number 100049190. Year of Publication 2017. |
| Depot, station, headhouse or portal building | Extends to cover operational footprint of each depot and station and the footprint of each tunnel vent shaft and headhouse at surface level. Excludes any ancillary buildings associated with these structures. | High Speed Two (HS2) Ltd | |
| District/Borough boundary | Ordnance Survey local authority boundary mapping. | Ordnance Survey | © Crown copyright. Reproduced by permission of Ordnance Survey Licence Number 100049190. Year of Publication 2017. |
| Engineering earthworks: Cutting | Cuttings created in the construction of the railway and associated works such as highways. | High Speed Two (HS2) Ltd | |
| Engineering earthworks: Embankment | Embankments created in the construction of the railway and associated works such as highways. | High Speed Two (HS2) Ltd | |
| Envisaged measures further reducing noise effects | <p>Other environmental features e.g. landscaping: These lines represent environmental mitigation features provided for reasons other than noise mitigation which also reduce sound levels from the Proposed Scheme to the surrounding environment. These features are not placed specifically to reduce or remove a likely significant noise effect. Examples include landscaping and visual mitigation earthworks (non-engineering earthworks).</p> <p>Engineering e.g. cuttings: These lines represent engineering features which reduce sound levels from the Proposed Scheme to the surrounding environment but are not placed specifically to reduce or remove a likely significant noise effect. Examples include cuttings and safety barriers on viaducts which are not close to sensitive receptors.</p> | High Speed Two (HS2) Ltd | |
| Envisaged mitigation to avoid / reduce significant noise effects | <p>Landscaping and/or fence barriers: These lines represent the envisaged mitigation provided specifically to reduce sound levels from the Proposed Scheme at sensitive receptors in order to reduce or remove likely operational significant noise effects. Examples include noise fence barriers or earth bunds (non-engineering earthworks) acting as noise barriers. These features are labelled with the height of the top of the barrier/bund above rail level.</p> <p>Engineering e.g. cuttings: These lines represent engineering features of the route which reduce sound levels from the Proposed Scheme at potentially significant sensitive receptors. These features, therefore, serve a material purpose in reducing or avoiding likely significant noise effects. Examples include engineering cuttings near to sensitive receptors. These features are labelled with the height of the top of the feature above rail level.</p> | High Speed Two (HS2) Ltd | |
| Ground-borne noise or vibration impact | Buildings at which an operational ground-borne sound or vibration impact is predicted from the Proposed Scheme. | High Speed Two (HS2) Ltd | © Crown copyright. Reproduced by permission of Ordnance Survey Licence Number 100049190. Year of Publication 2017. |
| Ground-borne sound & vibration study area (highly sensitive non-residential) | This defines the area within which direct operational ground-borne sound and vibration impacts of the scheme at highly sensitive non-residential receptors have been quantitatively assessed. This area is defined as within 200m of the route. | High Speed Two (HS2) Ltd | |
| Ground-borne sound & vibration study area (residential and non-residential) | This defines the area within which direct operational ground-borne sound and vibration impacts of the scheme at residential and non-residential receptors have been quantitatively assessed. This area is defined as within 85m of the route. | High Speed Two (HS2) Ltd | |
| Ground-borne sound and/or vibration assessment location | Locations near tunnelled sections of the route at which a quantitative assessment of ground-borne sound and vibration impacts due to the operation of the Proposed Scheme has been carried out. These are labelled with an assessment location reference code to enable cross-reference to the operational sound & vibration reports contained in Volume 5: Appendix SV-004. | High Speed Two (HS2) Ltd | |

| Legend features | Definition | Source | Copyright |
|--|--|--------------------------|--|
| L_{pAFmax} exceeds 60dB façade | Assessment locations where the predicted value of L_{pAFmax} is 60 dB or greater having applied a façade correction of +2.5 dB to the predicted free field value. | High Speed Two (HS2) Ltd | |
| Non engineering earthworks: Cutting | Cuttings created in the construction of landscape features and mitigation measures. | High Speed Two (HS2) Ltd | |
| Non engineering earthworks: Embankment | Embankments created in the construction of landscape features and mitigation measures. | High Speed Two (HS2) Ltd | |
| Operational airborne sound impacts at buildings | The buildings shown on SV-02 and SV-05 are colour-coded according to the magnitude of the predicted noise impacts of the Proposed Scheme. Noise impacts are calculated by comparing the sound levels predicted if the Proposed Scheme did not go ahead with those if it did (details of this process can be found in Volume 5: Appendix SV001-000). Panel B on SV-02/SV-05 contains a key showing the colours used with the corresponding impact categories. The impacts presented are the greatest (i.e. worst-case) of the impacts predicted for daytime and night-time. | High Speed Two (HS2) Ltd | © Crown copyright. Reproduced by permission of Ordnance Survey Licence Number 100049190. Year of Publication 2017. |
| Potential additional noise insulation (triggered by maximum sound levels at night) | This represents dwellings which would potentially be provided with noise insulation due maximum sound levels from the Proposed Scheme (further information regarding assessment criteria can be found in Volume 5 Appendix SV-001). | High Speed Two (HS2) Ltd | |
| Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target) | This represents dwellings which would potentially be provided with noise insulation due to noise from the Proposed Scheme exceeding the World Health Organization (WHO) night noise guidelines interim target (further information regarding assessment criteria can be found in Volume 5 Appendix SV-001). | High Speed Two (HS2) Ltd | |
| Potential noise insulation (triggered by Noise Insulation Regulations 1996) | This represents dwellings which would potentially qualify for noise insulation under the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 (further information regarding assessment criteria can be found in Volume 5 Appendix SV-001). | High Speed Two (HS2) Ltd | |
| Route in tunnel Route on surface | Represents the proposed route of HS2, split into route on surface and tunnelled sections. | High Speed Two (HS2) Ltd | |
| Sound Contours (SV-01) | The sound levels from the Proposed Scheme (expressed as $L_{pAeq,T}$ and representing sound from the new railway only) are presented in 5 dB steps. The levels are shown in the panel in the top-right hand corner of SV-01. | High Speed Two (HS2) Ltd | |
| Sound contours (SV-02/SV-05) | The sound levels from the Proposed Scheme (expressed as $L_{pAeq,T}$ and representing sound from the new railway only) are presented at two sound levels: 40 dB $L_{Aeq,T 23:00 to 07:00}$ and 55 dB $L_{Aeq,T 23:00 to 07:00}$. The corresponding daytime levels ($L_{Aeq,T 07:00 to 23:00}$) are shown in Panel A of SV-02/SV-05. | High Speed Two (HS2) Ltd | |

High Speed Rail (West Midlands-Crewe)

Environmental Statement

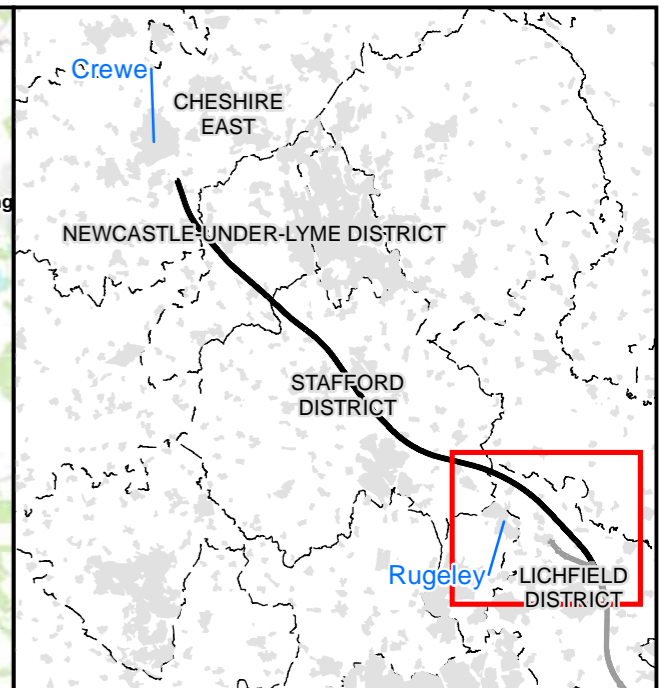
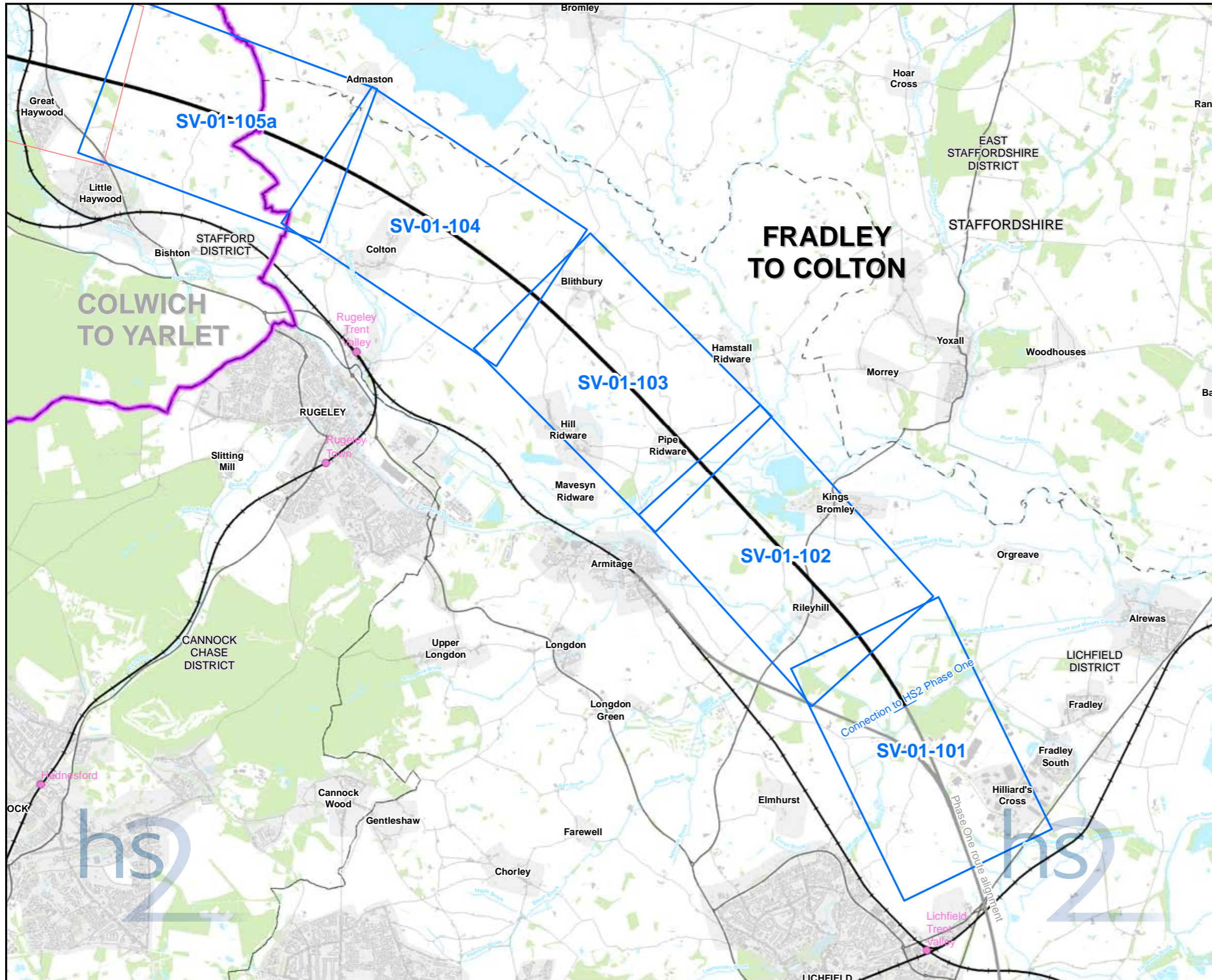
CA1 Fradley to Colton

**SV-01 - Operational Sound Contour Maps
and Likely Significant Effects**

**SV-02 - Operational Noise and Vibration Impacts
and Likely Significant Effects (with Assessment Locations)**

**SV-03 - Assessment and Monitoring Locations for Construction Sound,
Noise & Vibration Assessments**

**SV-04 - Assessment and Monitoring Locations for Operational Sound,
Noise & Vibration Assessments**



Map Series Information:

SV-01 presents the predicted operational sound from the new railway.

The sound levels from the new railway (expressed as $L_{pAeq,T}$) are presented in typical noise mapping colours in 5 dB steps. There is a panel at the top right of the figure; the left-hand section of this panel contains a key communicating the night-time and daytime sound levels represented by the various colours. The right-hand part of the same panel contains text explaining how the sound levels presented on the figure inform the assessment of direct noise impacts and likely significant effects. A corresponding and similar panel is found on SV-02, along with the key sound contours that were used within the environmental assessment.

Also presented on SV-01 are the following (which are also included on SV-02):

- A representation of the Proposed Scheme, including the railway alignment (indicating whether it is on the surface or in tunnel), any new and altered roads and all associated engineering and environmental mitigation earthworks;
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- symbols representing buildings that would potentially qualify for noise insulation;
- labels identifying the residual likely significant noise effects of the Proposed Scheme, and
- the extent of the study area within which the direct impacts and effects of the scheme have been quantitatively assessed.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- Existing railway station
- County boundary
- District/Borough boundary
- Map sheets included in this community area
- Map sheets not included in this community area

Map Number: **SV-01-INDEX-CA1**

Map Name: **Index Map of: Operational Sound Contour Maps and Likely Significant Effects**

Community Area 1: **Fradley to Colton**

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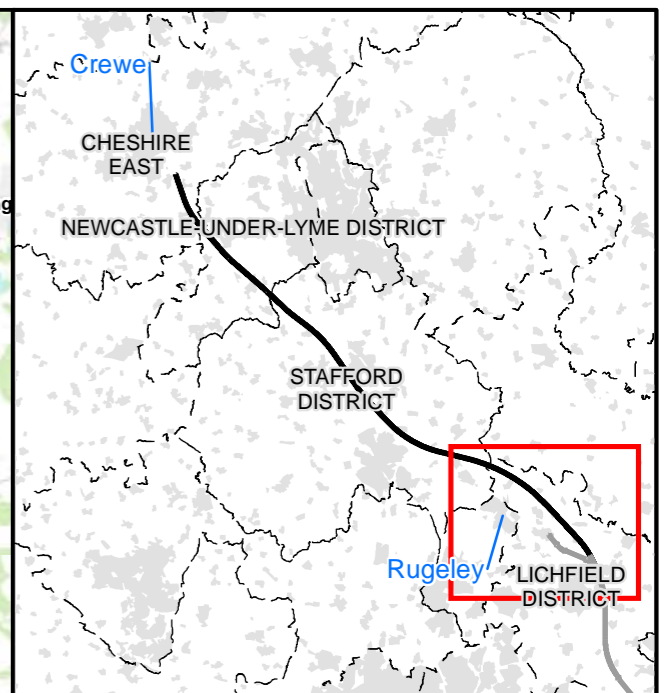
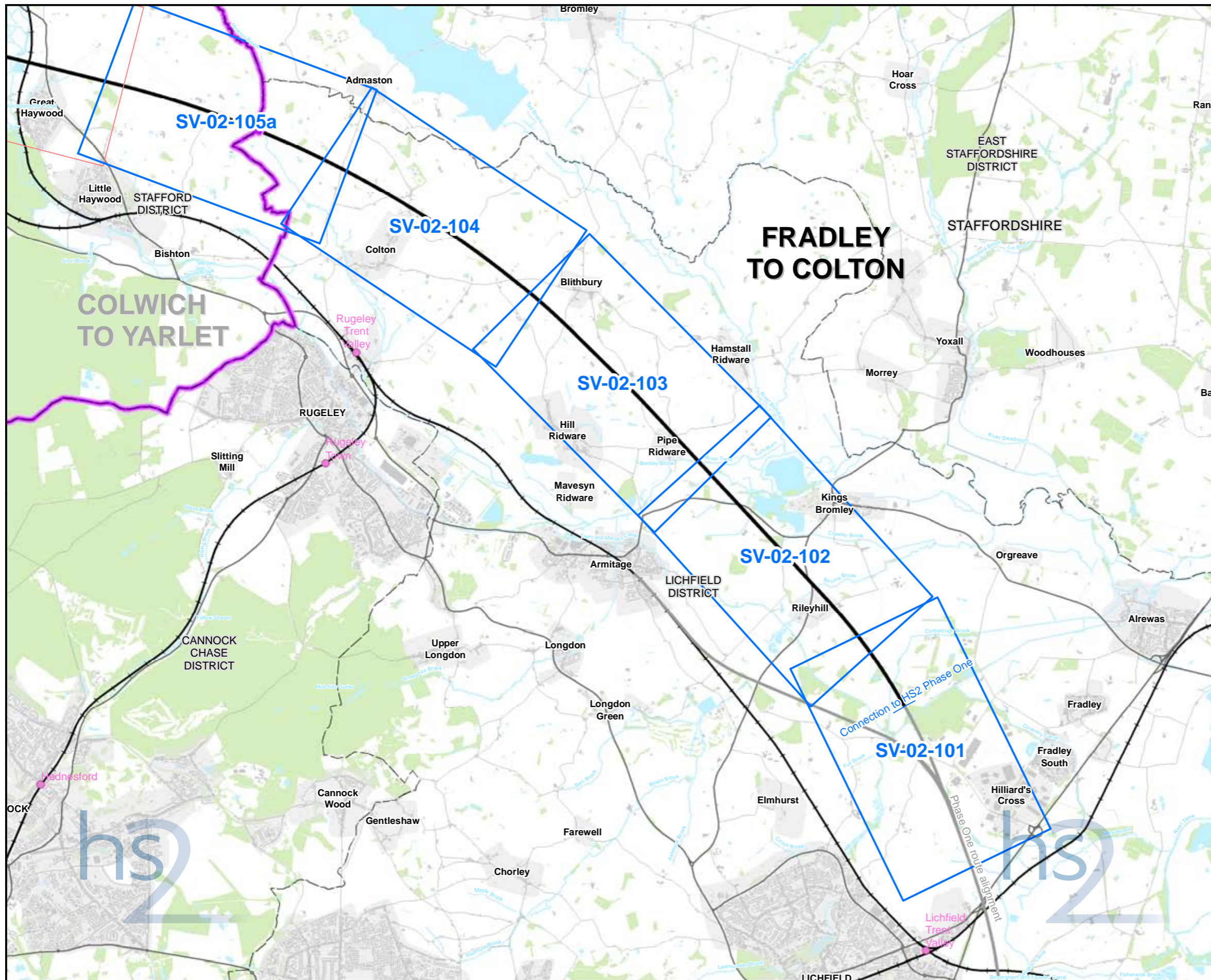
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0 500 1,000 1,500 2,000 2,500 Metres

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Doc Number: C861-ARP-EV-MAP-000-131001-P03

Date: 06/06/17



Map Series Information:

SV-02 presents the direct operational noise impacts and likely significant effects of the Proposed Scheme.

The SV-02 figure series necessarily contains a large amount of information relating to the operational noise and vibration assessment. It is designed to communicate visually the assessment process from the prediction of impacts to the determination of likely residual significant effects. The corresponding text is included in Vol2 and Vol5.

- Key items on the map include the following:
- The Proposed Scheme (the proposed railway alignments and surrounding associated earthworks/roads);
 - blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
 - the study areas, which indicate the areas within which direct sound and vibration impacts of the scheme have been quantitatively assessed;
 - the calculated direct operational impacts of the scheme, displayed as colour-coded buildings and symbols representing buildings that would potentially qualify for noise insulation;
 - sound contours representing sound produced by the new railway displayed in a simpler manner than on SV-01 in order not to obscure the features on the map series);
 - the assessment locations at which a quantitative prediction of sound and impacts have been carried out (representing a number of nearby buildings). These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004; and
 - labels indicating where the likely residual direct noise or vibration significant effects have been identified. These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- Existing railway station
- County boundary
- District/Borough boundary
- Map sheets included in this community area
- Map sheets not included in this community area

Map Number: **SV-02-INDEX-CA1**

Map Name: **Index Map of: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)**

Community Area 1: **Fradley to Colton**

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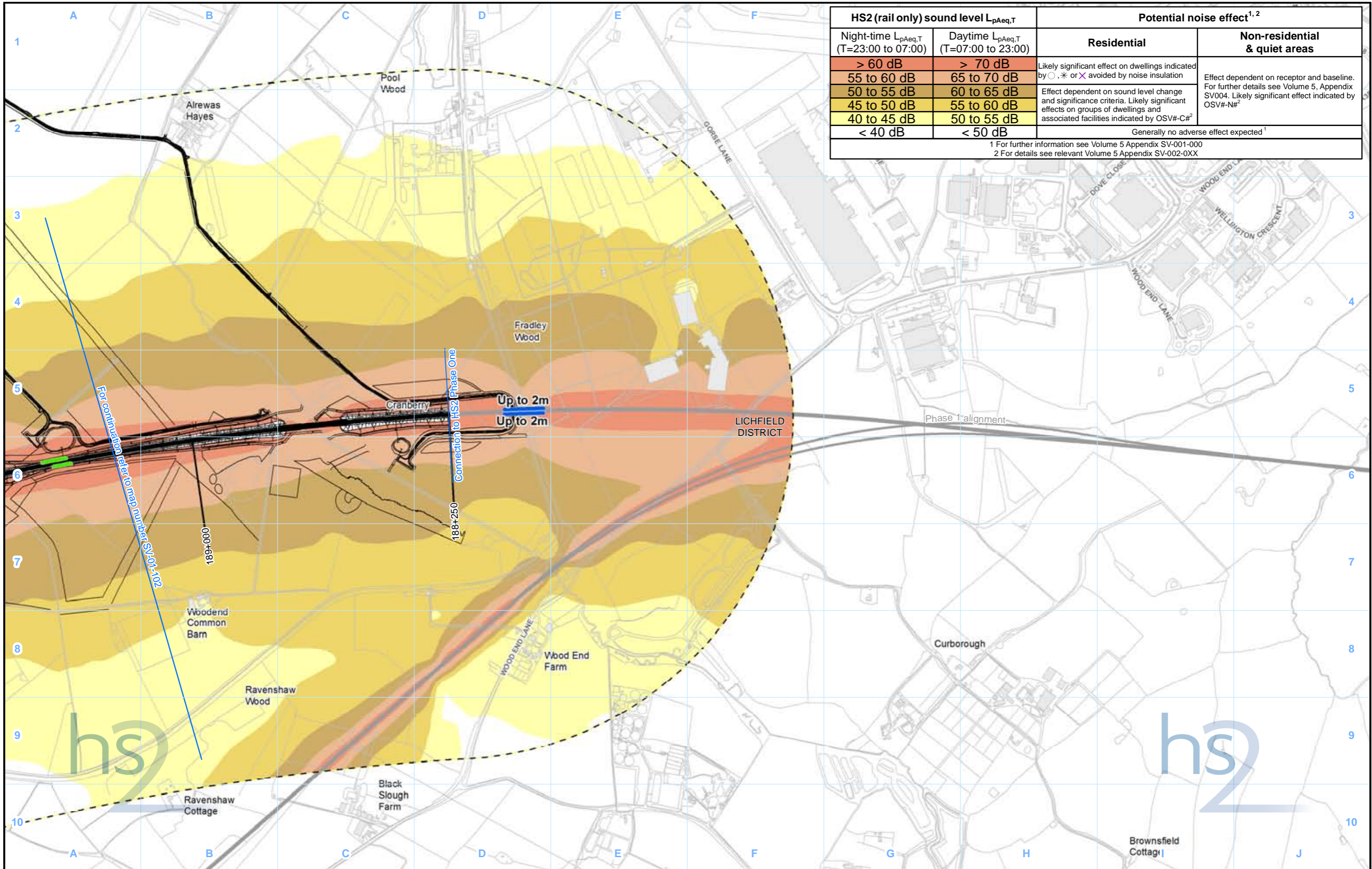
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0 500 1,000 1,500 2,000 2,500 Metres

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| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | Generally no adverse effect expected ¹ | |
| < 40 dB | < 50 dB | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

- Legend - General features**
- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Legend - Sound related features**
- Engineering earthworks:
- Embankment
 - Cutting
- Non engineering earthworks:
- Embankment
 - Cutting

- Legend - Sound related features**
- Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
 - Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged features further reducing noise effects:
- Other environmental e.g. landscaping
 - Engineering e.g. cuttings

- Legend - Sound related features**
- 1km Airborne sound study area
 - 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
- * Labelled with total barrier height above rail level

Map Number: SV-01-101

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 1: Fradley to Colton

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Scale at A3: 1:10,000

0 100 200 300 400 Metres

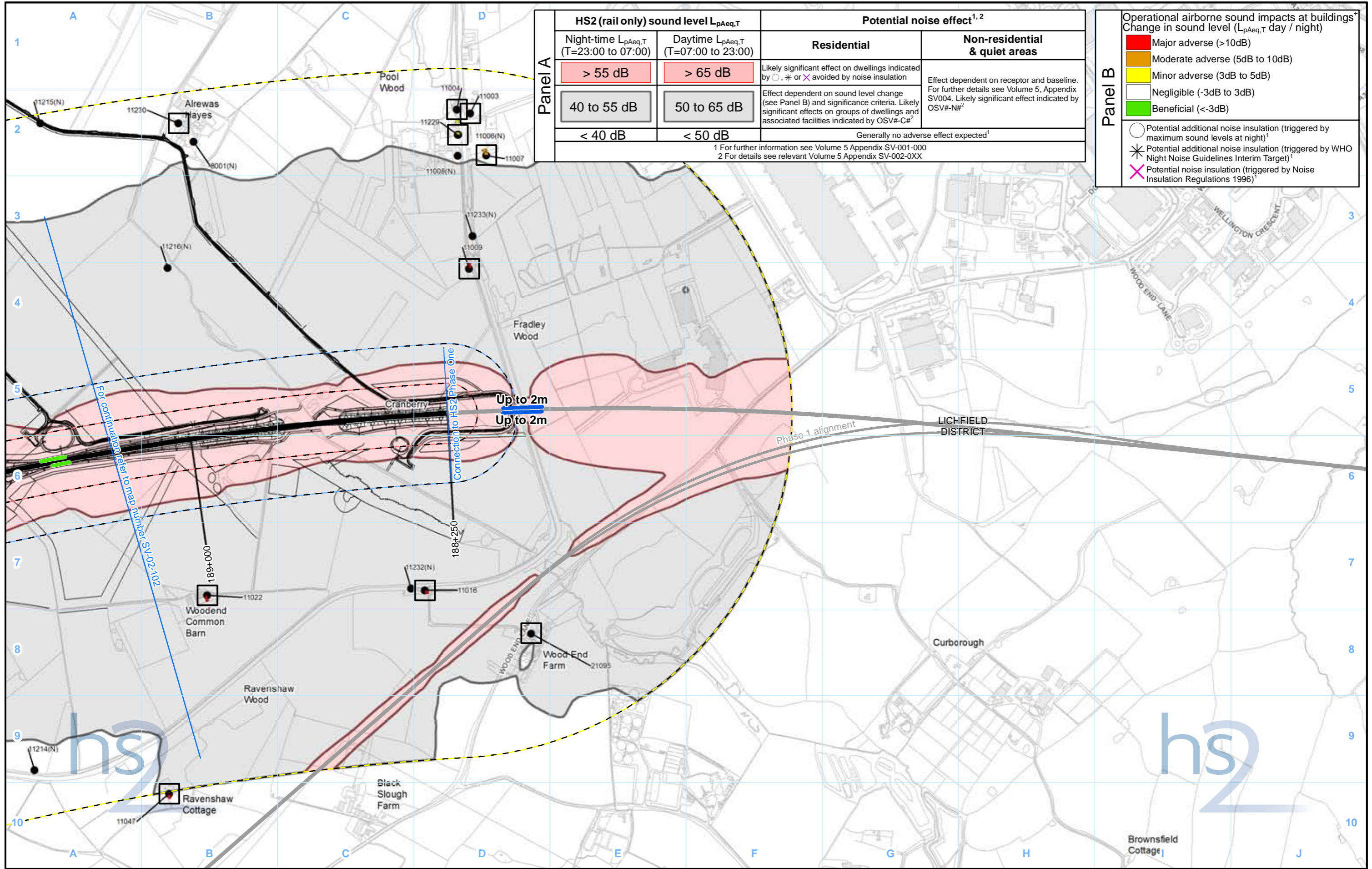
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| HS2 (rail only) sound level $L_{pAeq,T}$ | | Potential noise effect ^{1,2} | |
|---|--|---|--|
| Night-time $L_{pAeq,T}$ (T=23:00 to 07:00) | Daytime $L_{pAeq,T}$ (T=07:00 to 23:00) | Residential | Non-residential & quiet areas |
| > 55 dB | > 65 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 | Generally no adverse effect expected ¹ |
| < 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-002-0XX

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 cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Embankment
- Cutting
- L_{pAFmax} exceeds 60dB façade**

Non engineering earthworks:

- Embankment
- Cutting

* Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

Legend - Sound related features

- Committed developments - 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
- 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-101

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 1: Fradley to Colton

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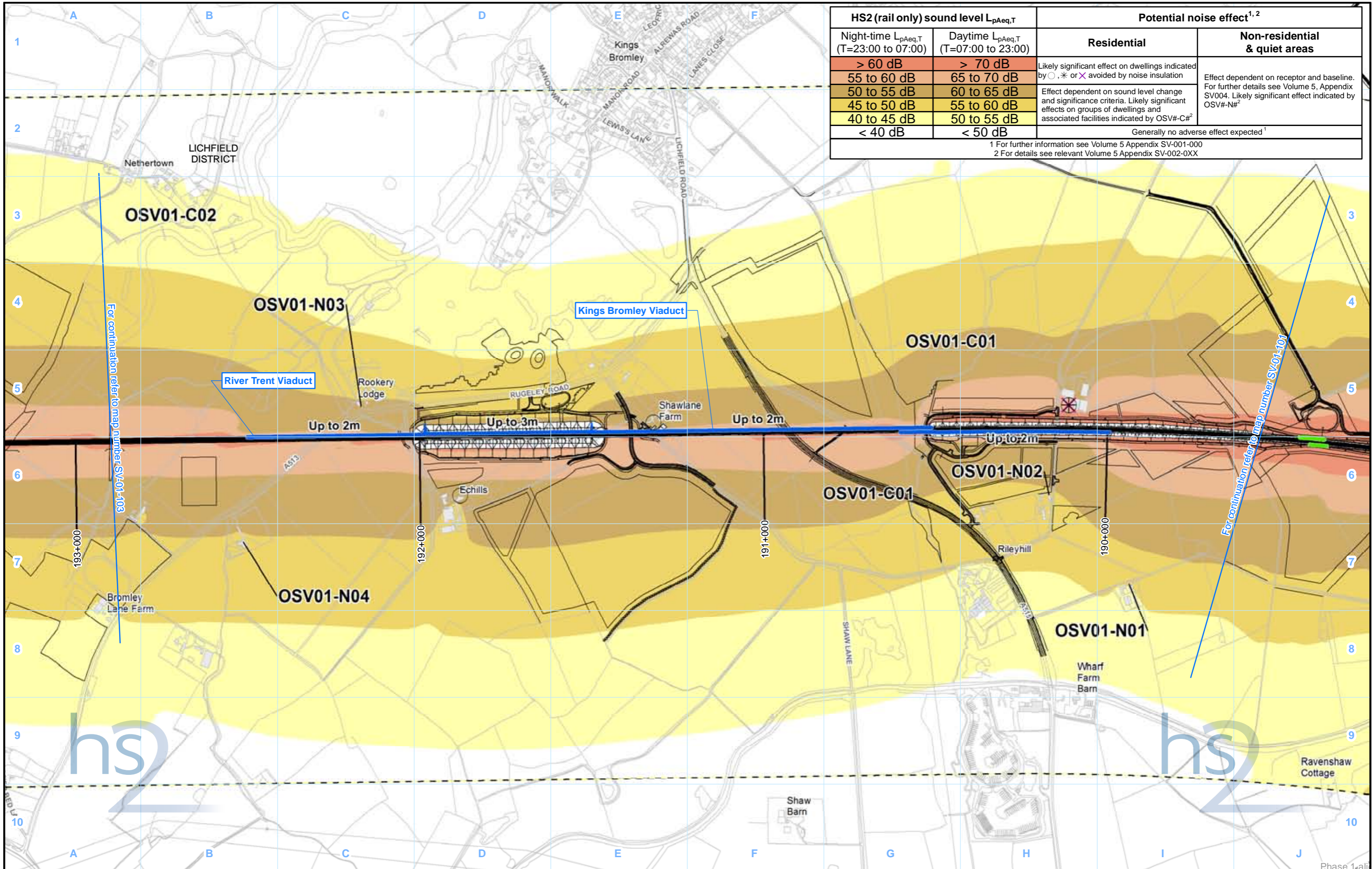
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| HS2 (rail only) sound level $L_{pAeq,T}$ | | Potential noise effect ^{1,2} | |
|---|--|---|--|
| Night-time $L_{pAeq,T}$ (T=23:00 to 07:00) | Daytime $L_{pAeq,T}$ (T=07:00 to 23:00) | Residential | Non-residential & quiet areas |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | Generally no adverse effect expected ¹ |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 40 dB | < 50 dB | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

Engineering earthworks:

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

Legend - Sound related features

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

Legend - Sound related features

- 1km Airborne sound study area
- 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

* Labelled with total barrier height above rail level

Map Number: SV-01-102

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 1: Fradley to Colton

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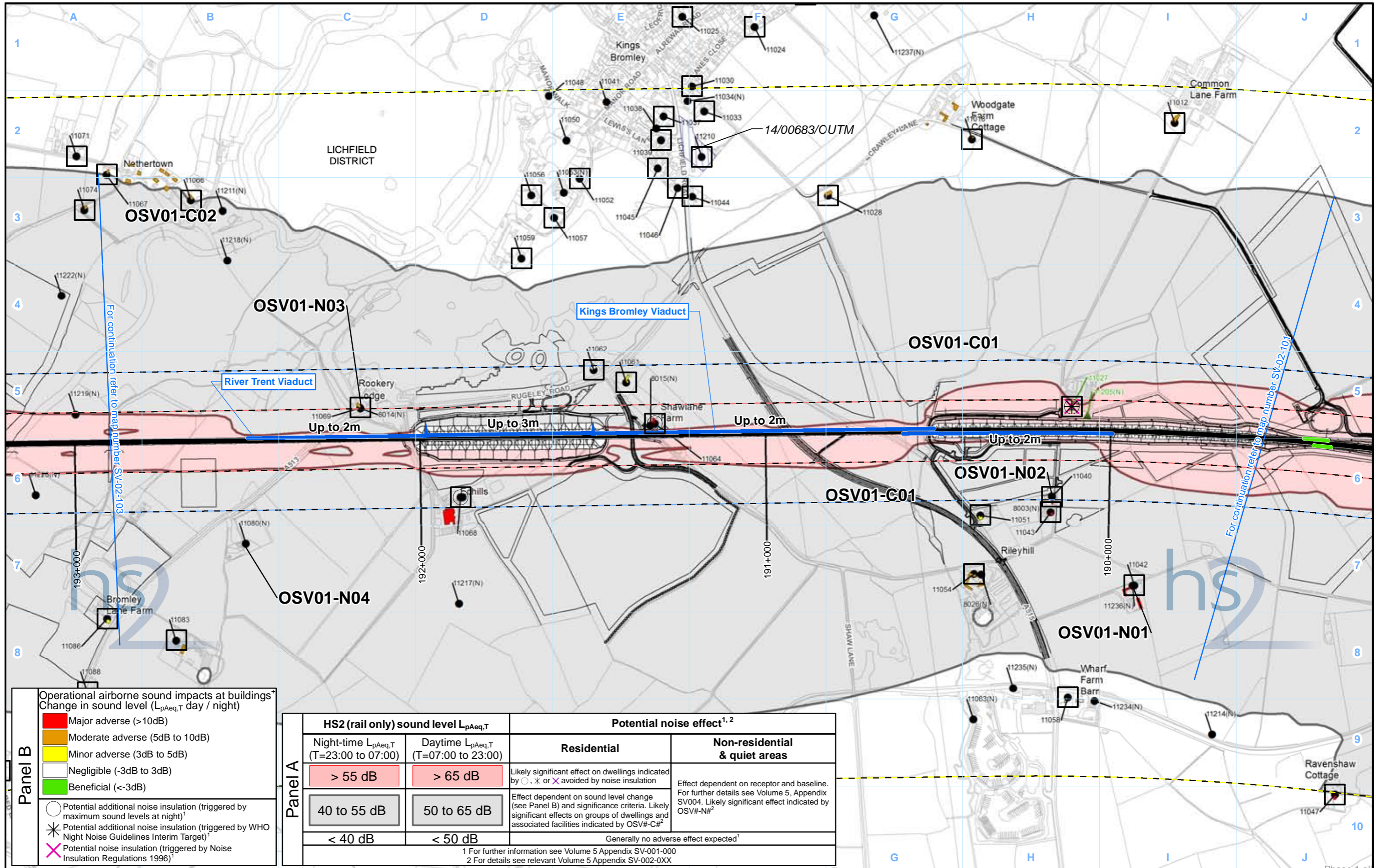
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Date: 06/06/17



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

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-002-0XX

Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Embankment
- Cutting
- L_{pAFmax} exceeds 60dB façade**

Non engineering earthworks:

- Embankment
- Cutting

* Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

Legend - Sound related features

- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-102

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 1: Fradley to Colton

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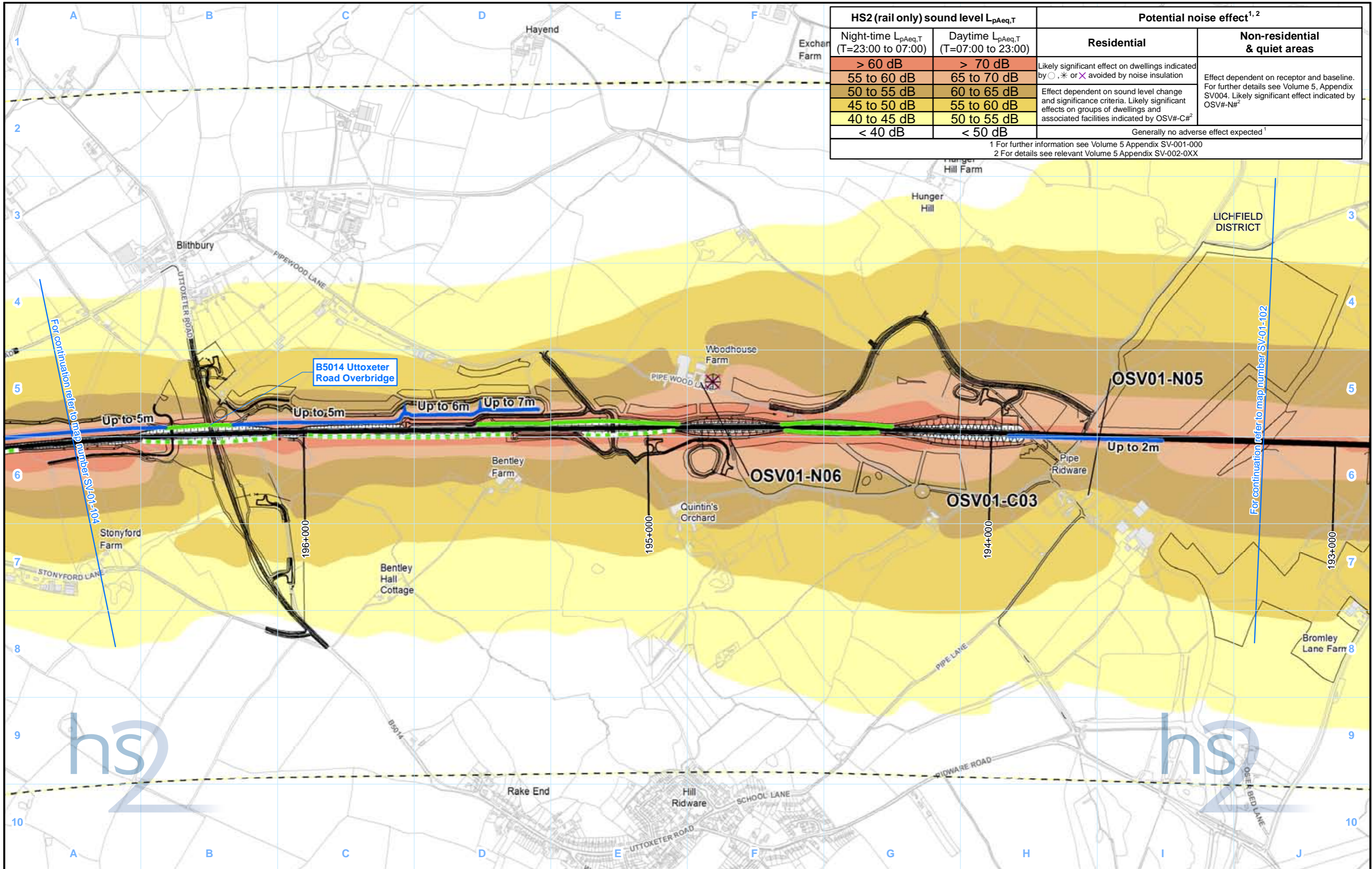
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| HS2 (rail only) sound level $L_{pAeq,T}$ | | Potential noise effect ^{1,2} | |
|---|--|---|--|
| Night-time $L_{pAeq,T}$ (T=23:00 to 07:00) | Daytime $L_{pAeq,T}$ (T=07:00 to 23:00) | Residential | Non-residential & quiet areas |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 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-002-0XX

- Legend - General features**
- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Legend - Sound related features**
- Engineering earthworks:
- Non engineering earthworks: Embankment, Cutting
 - Engineering earthworks: Embankment, Cutting

- Legend - Sound related features**
- Envisaged mitigation to avoid / reduce significant noise effects: Landscaping and/or fence barriers*, Engineering e.g. cuttings (green tunnels separately marked)
 - Envisaged features further reducing noise effects: Other environmental e.g. landscaping, Engineering e.g. cuttings

- Legend - Sound related features**
- 1km Airborne sound study area
 - 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
- * Labelled with total barrier height above rail level

Map Number: SV-01-103
 Map Name: Operational Sound Contour Maps and Likely Significant Effects
 Community Area 1: Fradley to Colton

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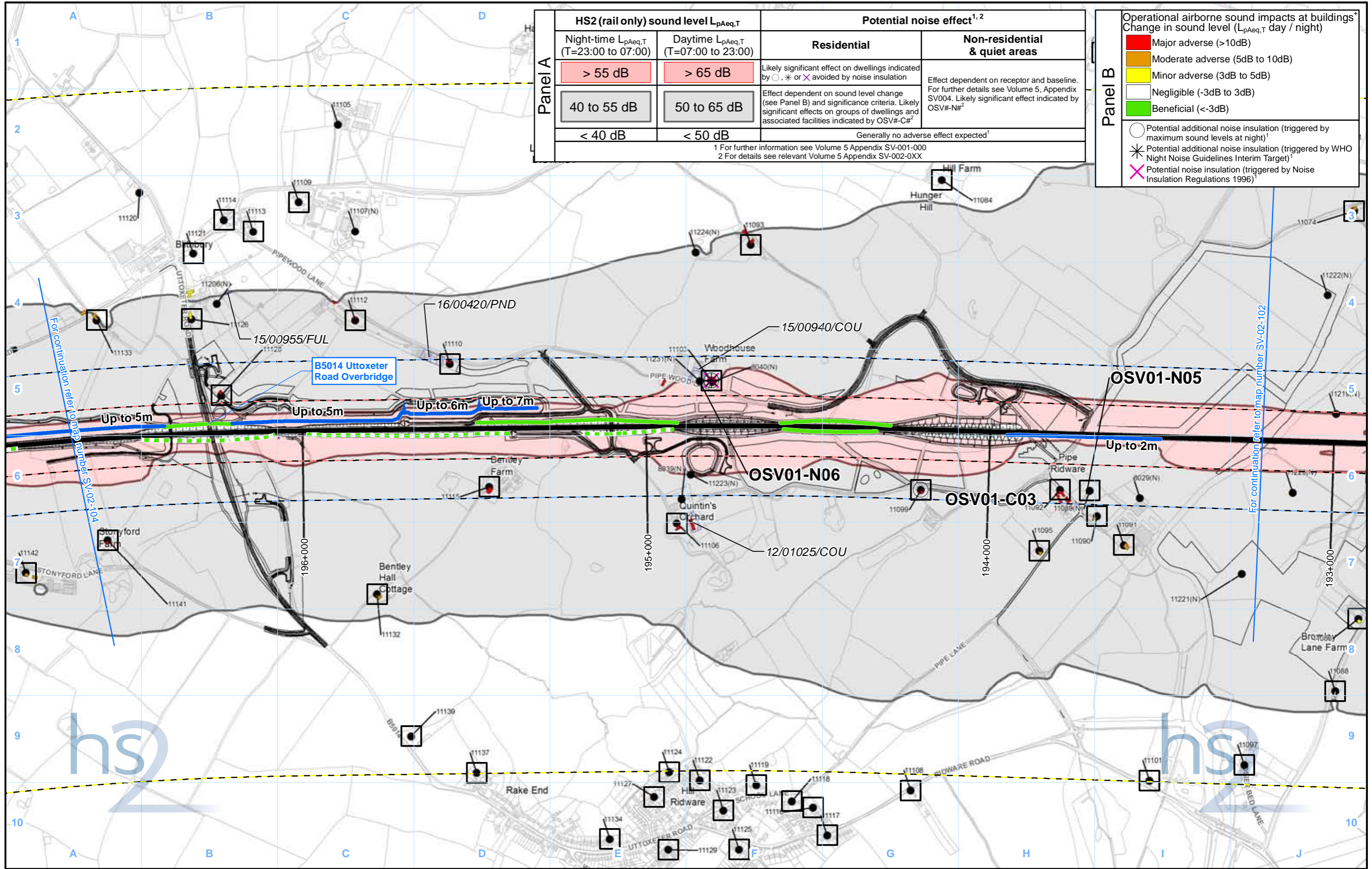
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| HS2 (rail only) sound level L _{pAeq,T} | | Potential noise effect ^{1,2} | |
|--|---|---|--|
| Night-time L _{pAeq,T} (T=23:00 to 07:00) | Daytime L _{pAeq,T} (T=07:00 to 23:00) | Residential | Non-residential & quiet areas |
| > 55 dB | > 65 dB | 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 | Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# 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-002-0XX

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 cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Embankment
- Cutting
- L_{pA}Fmax exceeds 60dB façade**

Non engineering earthworks:

- Embankment
- Cutting

* Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only L_{pA}Fmax + 2.5dB façade correction

Legend - Sound related features

- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-103

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 1: Fradley to Colton

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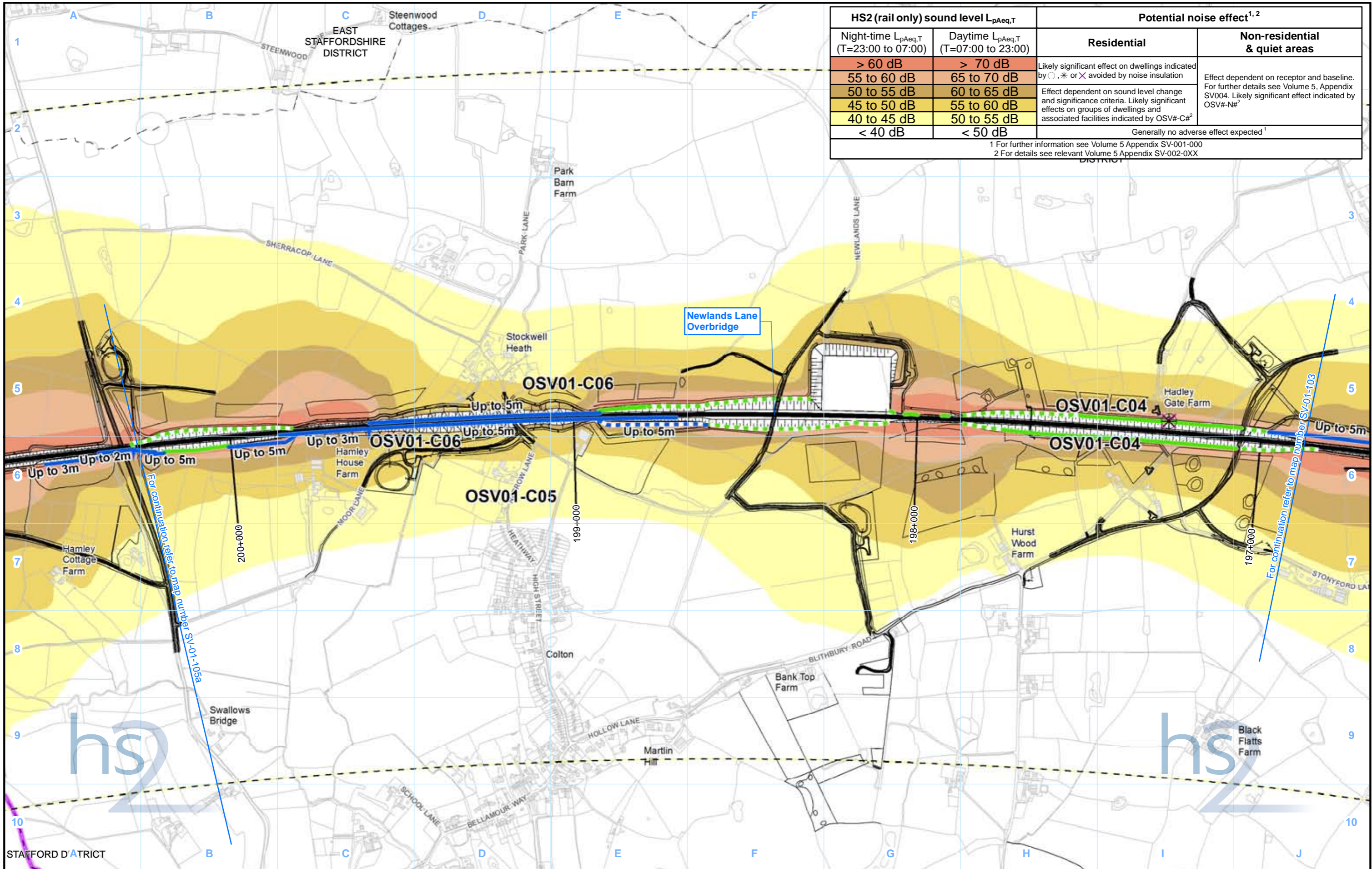
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| HS2 (rail only) sound level $L_{pAeq,T}$ | | Potential noise effect ^{1,2} | |
|---|--|---|--|
| Night-time $L_{pAeq,T}$ (T=23:00 to 07:00) | Daytime $L_{pAeq,T}$ (T=07:00 to 23:00) | Residential | Non-residential & quiet areas |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 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-002-0XX

Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

- Engineering earthworks: Non engineering earthworks:
- Embankment
 - Cutting
 - Embankment
 - Cutting

Legend - Sound related features

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

Legend - Sound related features

- 1km Airborne sound study area
 - 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
- * Labelled with total barrier height above rail level

Map Number: SV-01-104

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 1: Fradley to Colton

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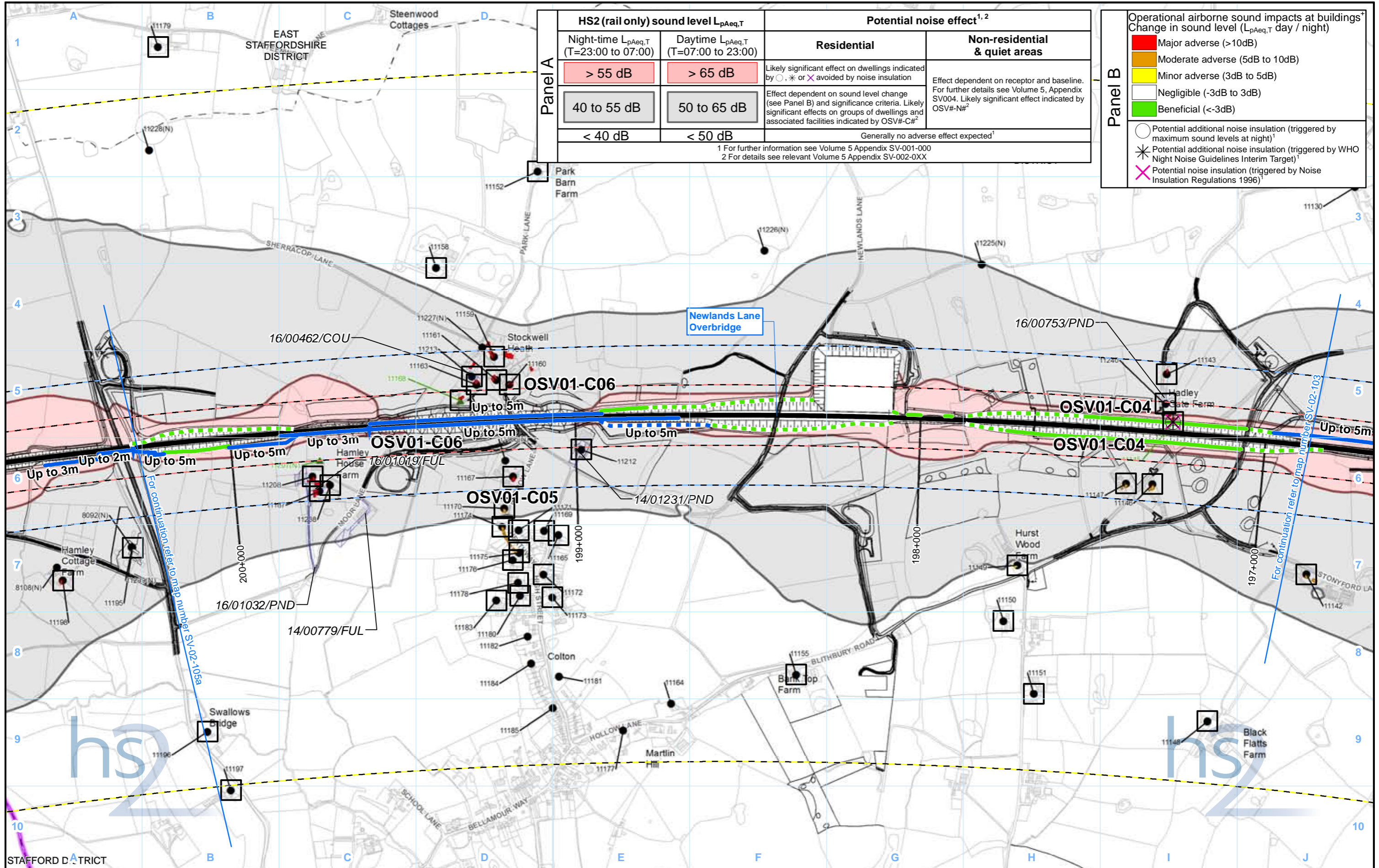
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Date: 06/06/17



| 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 | Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# 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-002-0XX

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 cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Engineering earthworks:**
- Embankment
 - Cutting
 - L_{pAFmax} exceeds 60dB façade**
- Non engineering earthworks:**
- Embankment
 - Cutting
- * Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

- Legend - Sound related features**
- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-104

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 1: Fradley to Colton

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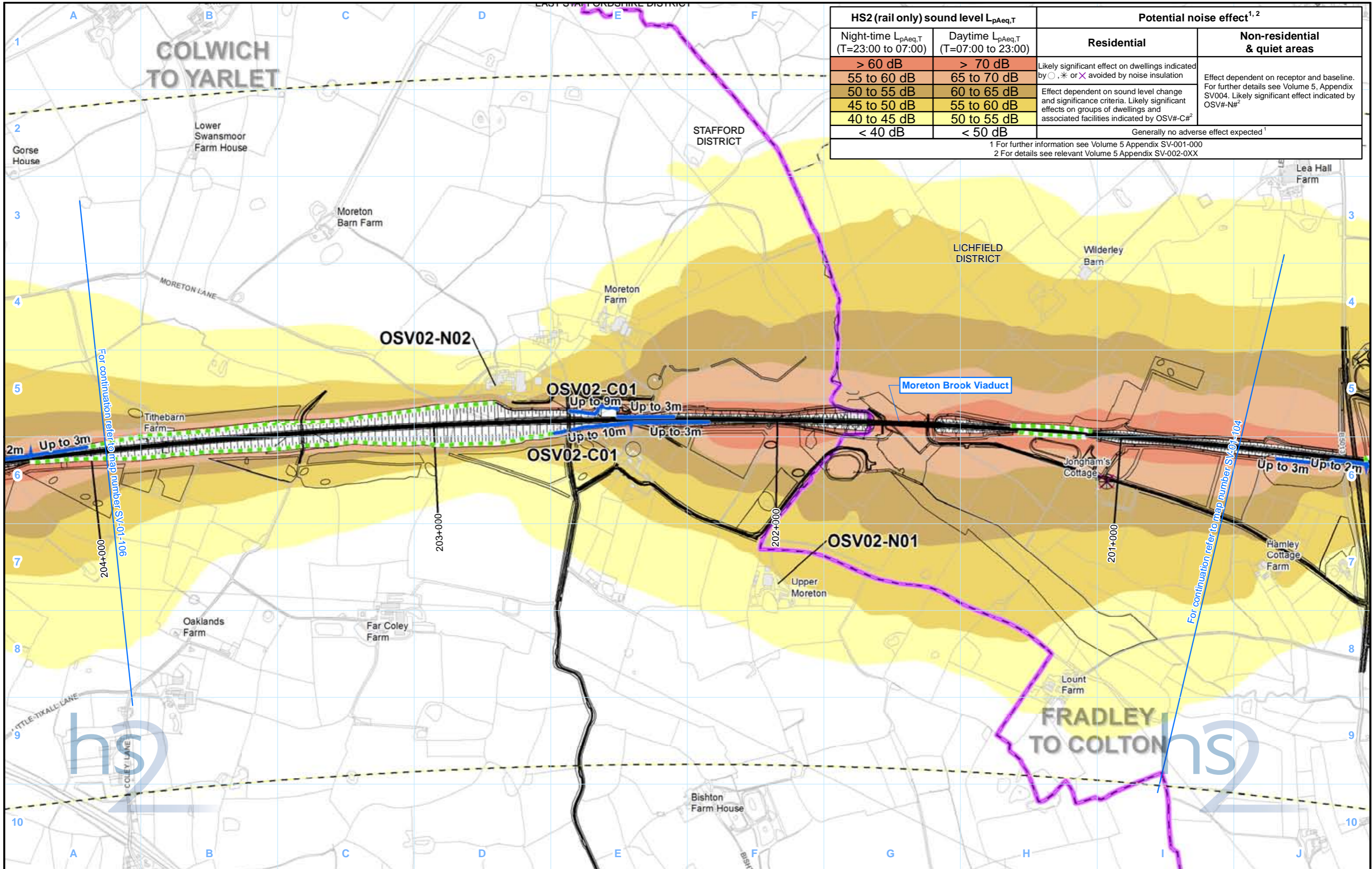
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| HS2 (rail only) sound level $L_{pAeq,T}$ | | Potential noise effect ^{1,2} | |
|---|--|---|--|
| Night-time $L_{pAeq,T}$ (T=23:00 to 07:00) | Daytime $L_{pAeq,T}$ (T=07:00 to 23:00) | Residential | Non-residential & quiet areas |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | Generally no adverse effect expected ¹ | |
| < 40 dB | < 50 dB | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

- Legend - General features**
- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

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

- Legend - Sound related features**
- Envisaged mitigation to avoid / reduce significant noise effects: Landscaping and/or fence barriers*, Engineering e.g. cuttings (green tunnels separately marked)
 - Envisaged features further reducing noise effects: Other environmental e.g. landscaping, Engineering e.g. cuttings

- 1km Airborne sound study area
 - 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
- * Labelled with total barrier height above rail level

Map Number: SV-01-105a
 Map Name: Operational Sound Contour Maps and Likely Significant Effects
 Community Area 1: Fradley to Colton

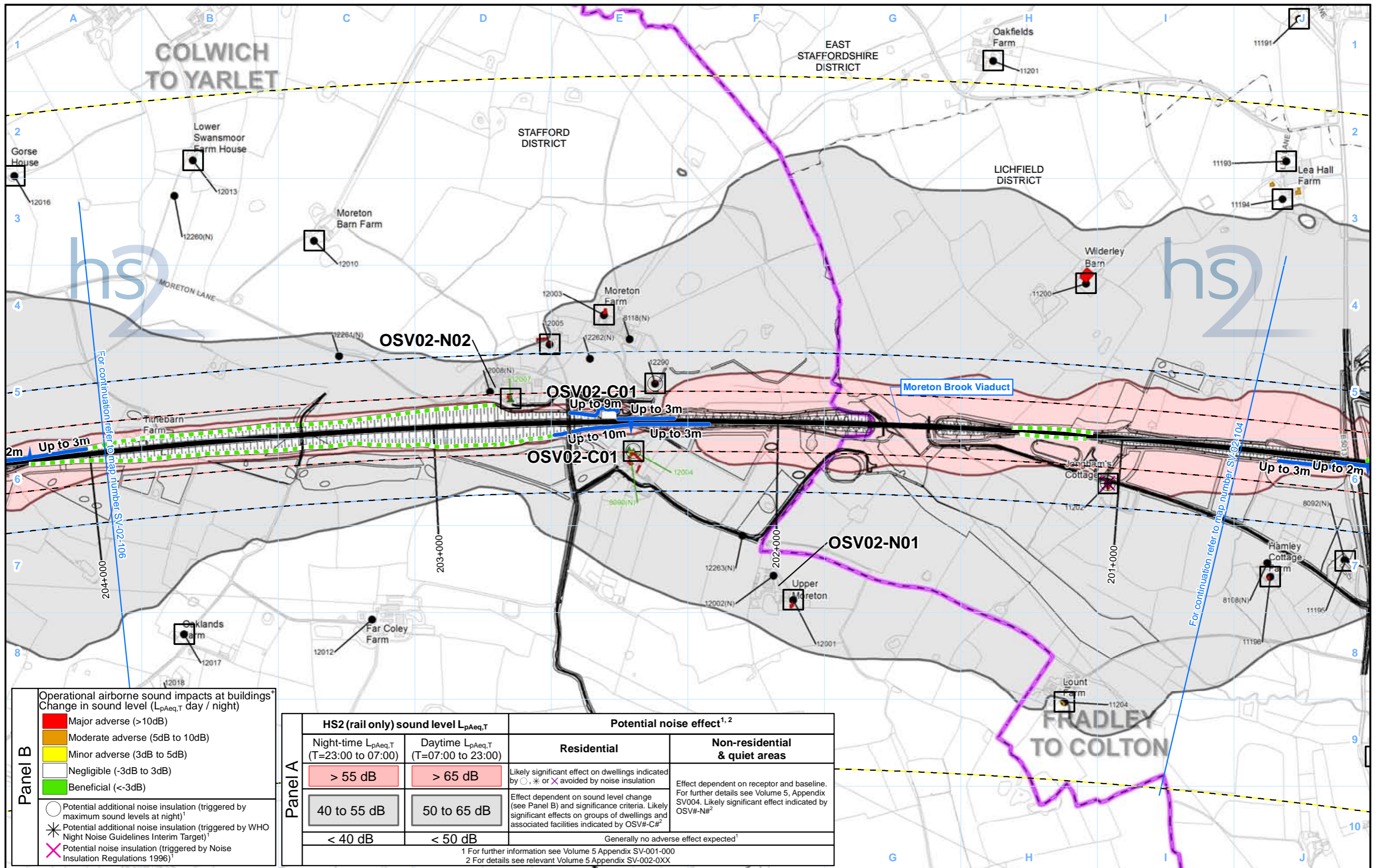
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 Date: 07/06/17



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

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 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 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-002-0XX

- Legend - General features**
- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Engineering earthworks:**
- Embankment
 - Cutting
 - L_{pAFmax} exceeds 60dB façade**
- Non engineering earthworks:**
- Embankment
 - Cutting
- * Residential buildings only
 * Labelled with total barrier height above rail level
 ** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

- Legend - Sound related features**
- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-105a

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 1: Fradley to Colton

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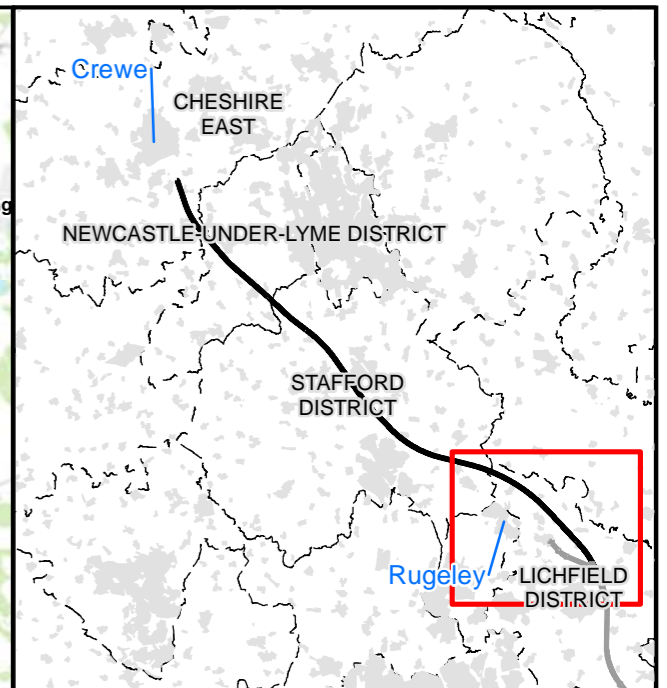
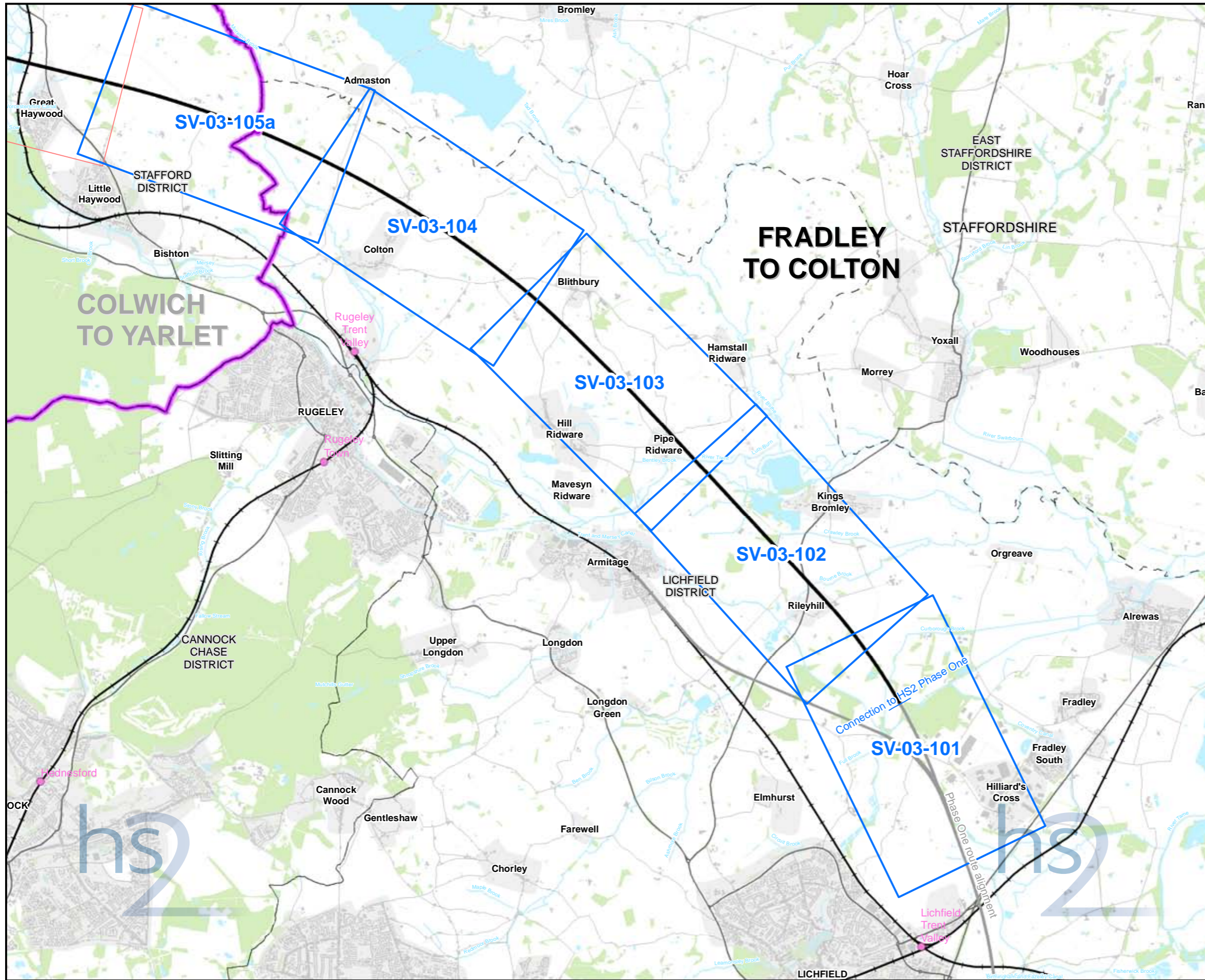
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Date: 07/06/17



Map Series Information:

The SV-03 figure series accompanies the construction noise & vibration assessments. It shows the locations at which a quantitative assessment of the direct effects of construction noise and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the construction noise and vibration reports contained in Volume 5: Appendix SV-002-0XX

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002-0XX.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

| Main Map Legend | |
|-----------------|--|
| | Route in tunnel |
| | Route on surface |
| | Depot, station, headhouse or portal building |
| | Community area boundary |
| | Existing railway station |
| | County boundary |
| | District/Borough boundary |
| | Map sheets included in this community area |
| | Map sheets not included in this community area |

| | |
|-------------------|--|
| Map Number | SV-03-INDEX-CA1 |
| Map Name | Index Map of: Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments |
| Community Area 1: | Fradley to Colton |

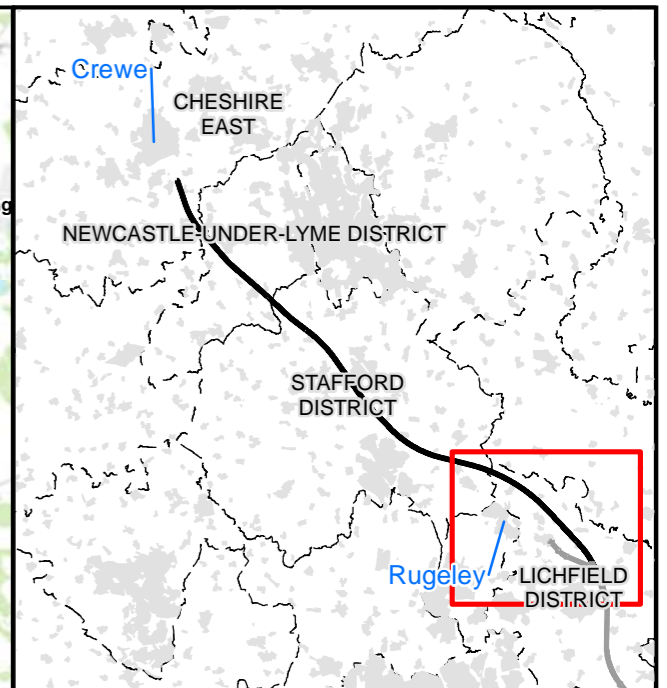
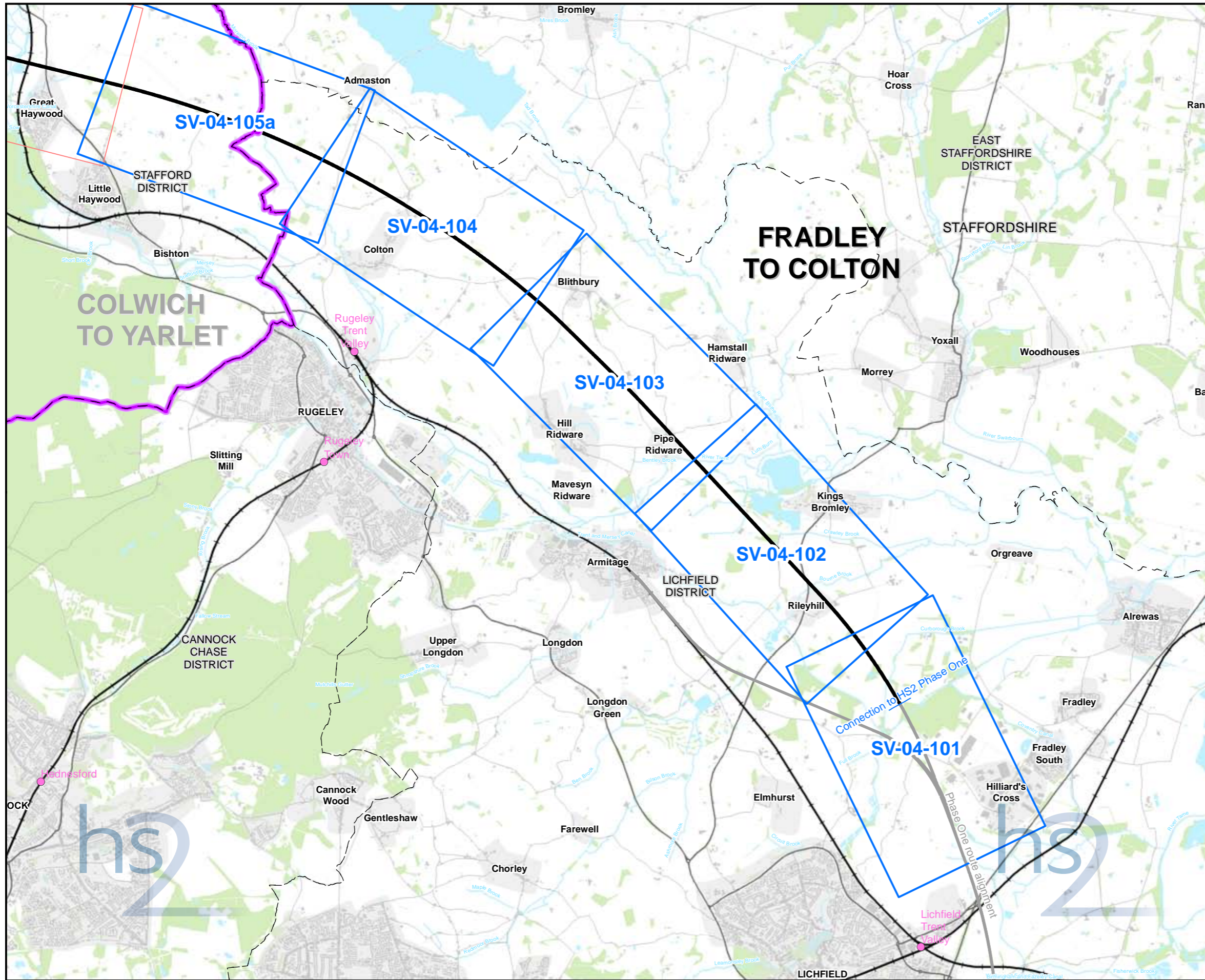
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Map Series Information:

The SV-04 figure series shows the locations at which a quantitative assessment of the direct effects of operational sound and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-002-0XX

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002-0XX

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

- Main Map Legend**
- Route in tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - Existing railway station
 - County boundary
 - District/Borough boundary
 - Map sheets included in this community area
 - Map sheets not included in this community area

| | |
|-------------------|---|
| Map Number | SV-04-INDEX-CA1 |
| Map Name | Index Map of: Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments |
| Community Area 1: | Fradley to Colton |

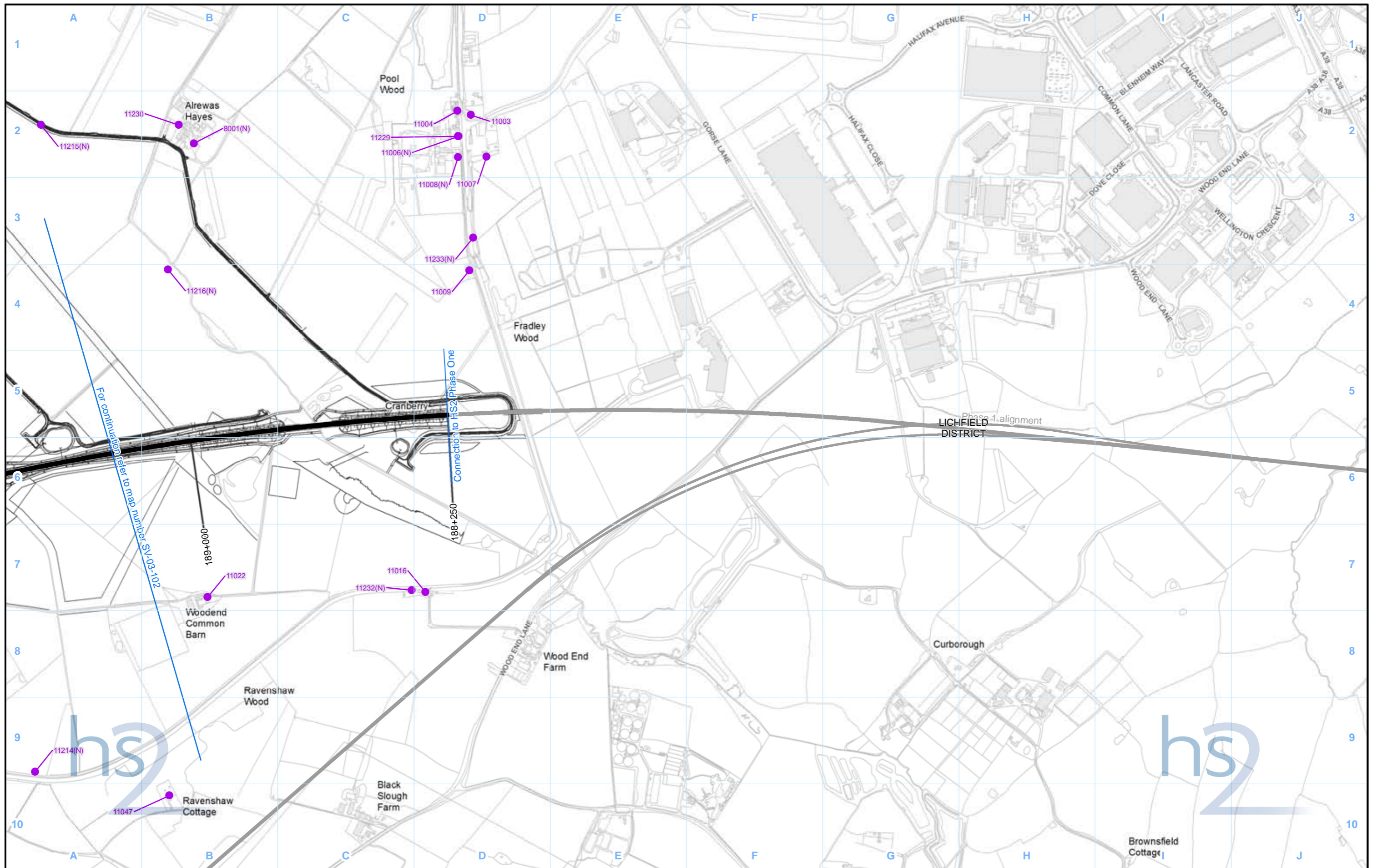
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Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks: Non engineering earthworks:

- Embankment
- Cutting
- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

Map Number: **SV-03-101**

Map Name: **Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments**

Community Area 1:
Fradley to Colton

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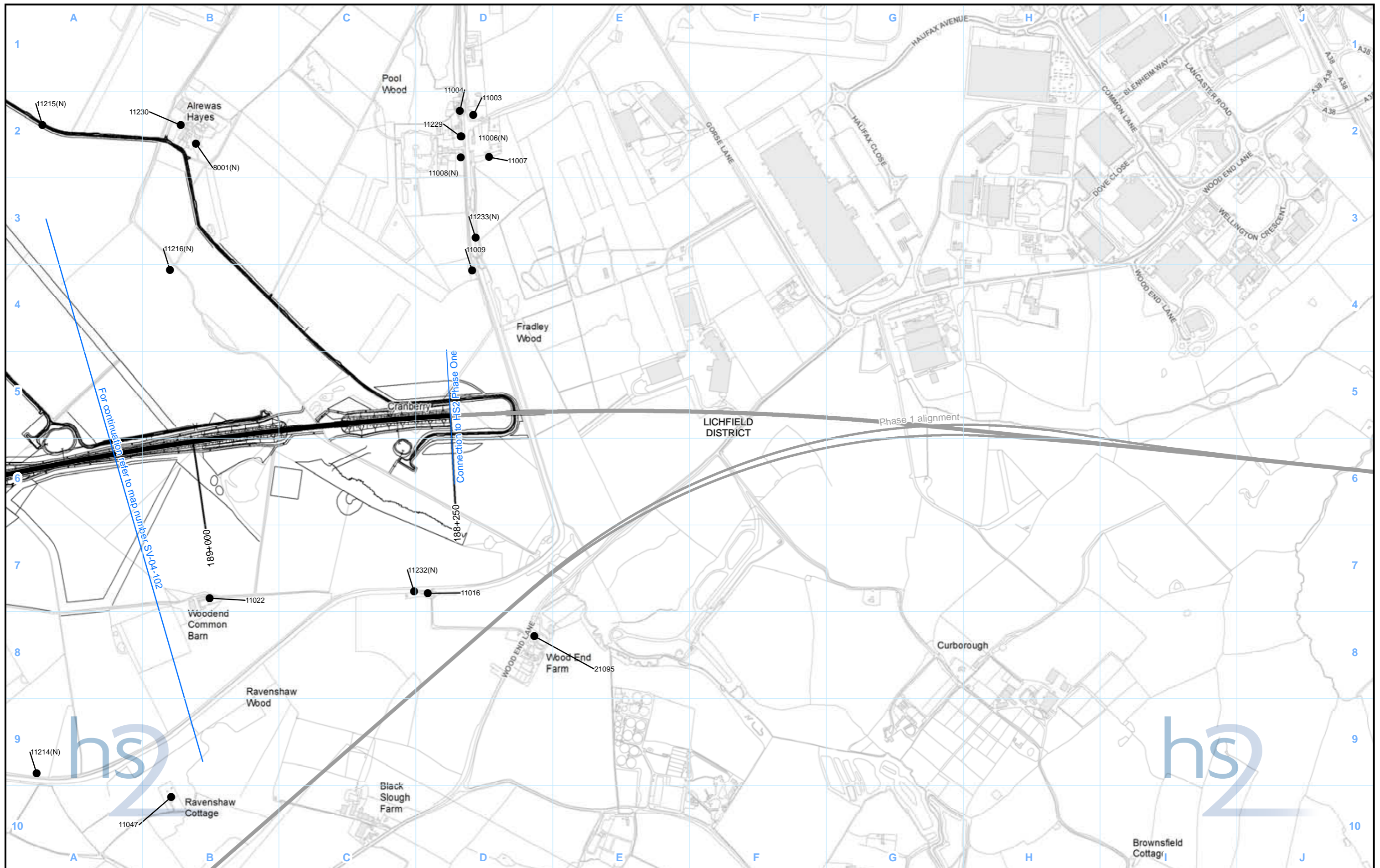
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Doc Number: C861-ARP-EV-MAP-000-133101-P03

Date: 07/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

- | | |
|------------|------------|
| Embankment | Embankment |
| Cutting | Cutting |

Legend - Sound related features

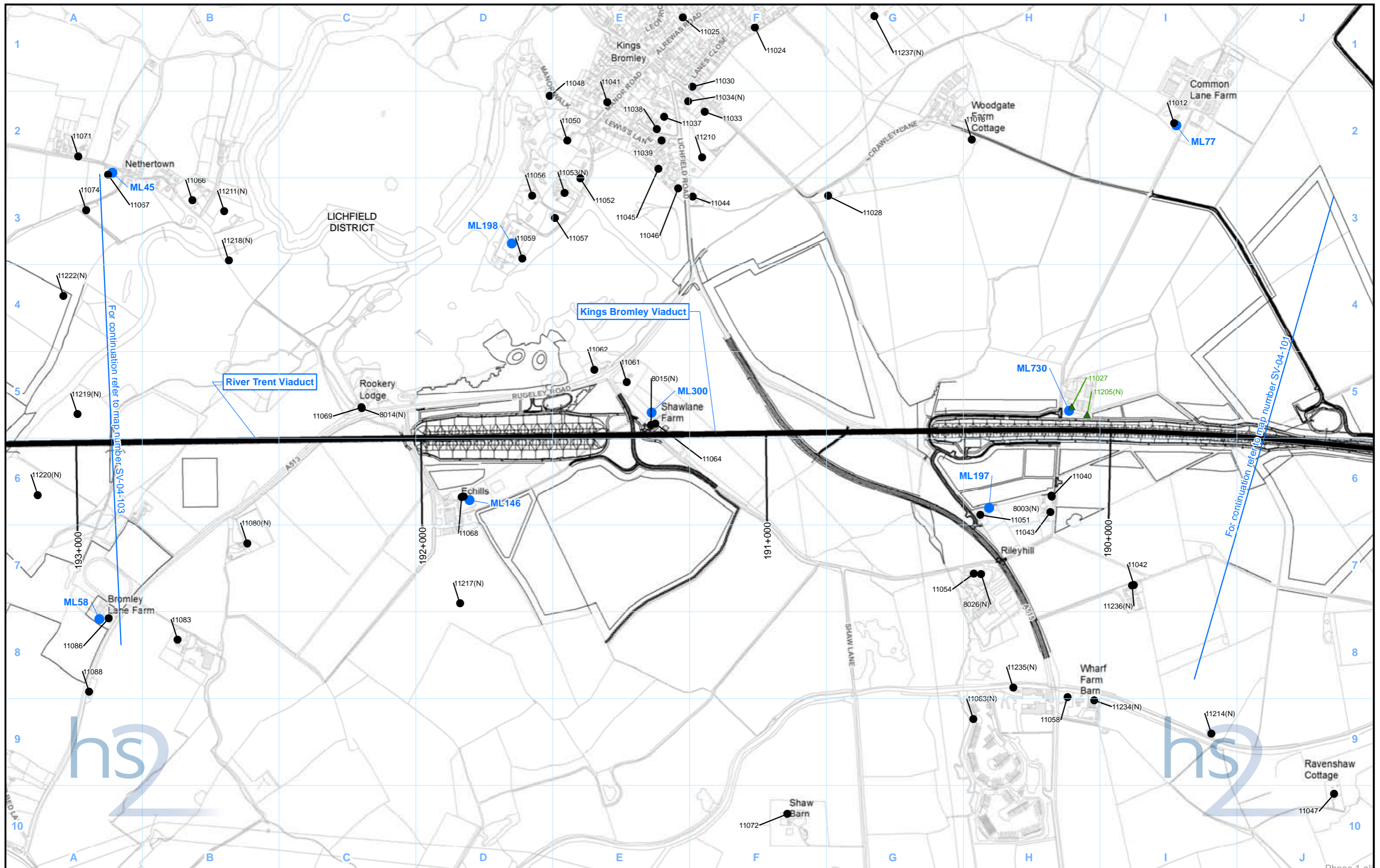
- Airborne sound assessment location
- Airborne sound and vibration assessment location
- Ground-borne sound and/or vibration assessment location
- Airborne sound, ground-borne sound and vibration assessment location
- Baseline measurement locations

labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV-002-0XX)

(labelled with Measurement Location reference code)

| | |
|--|--|
| Map Number | SV-04-101 |
| Map Name | Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments |
| Community Area 1: Fradley to Colton | |

| | |
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| <p>Date: 07/06/17</p> | |



Legend - General features

- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary
- Engineering earthworks:
- Non engineering earthworks: Embankment
 - Non engineering earthworks: Cutting

Legend - Sound related features

- 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
 - Baseline measurement locations
- labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

Map Number
SV-04-102

Map Name
Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments

Community Area 1:
Fradley to Colton

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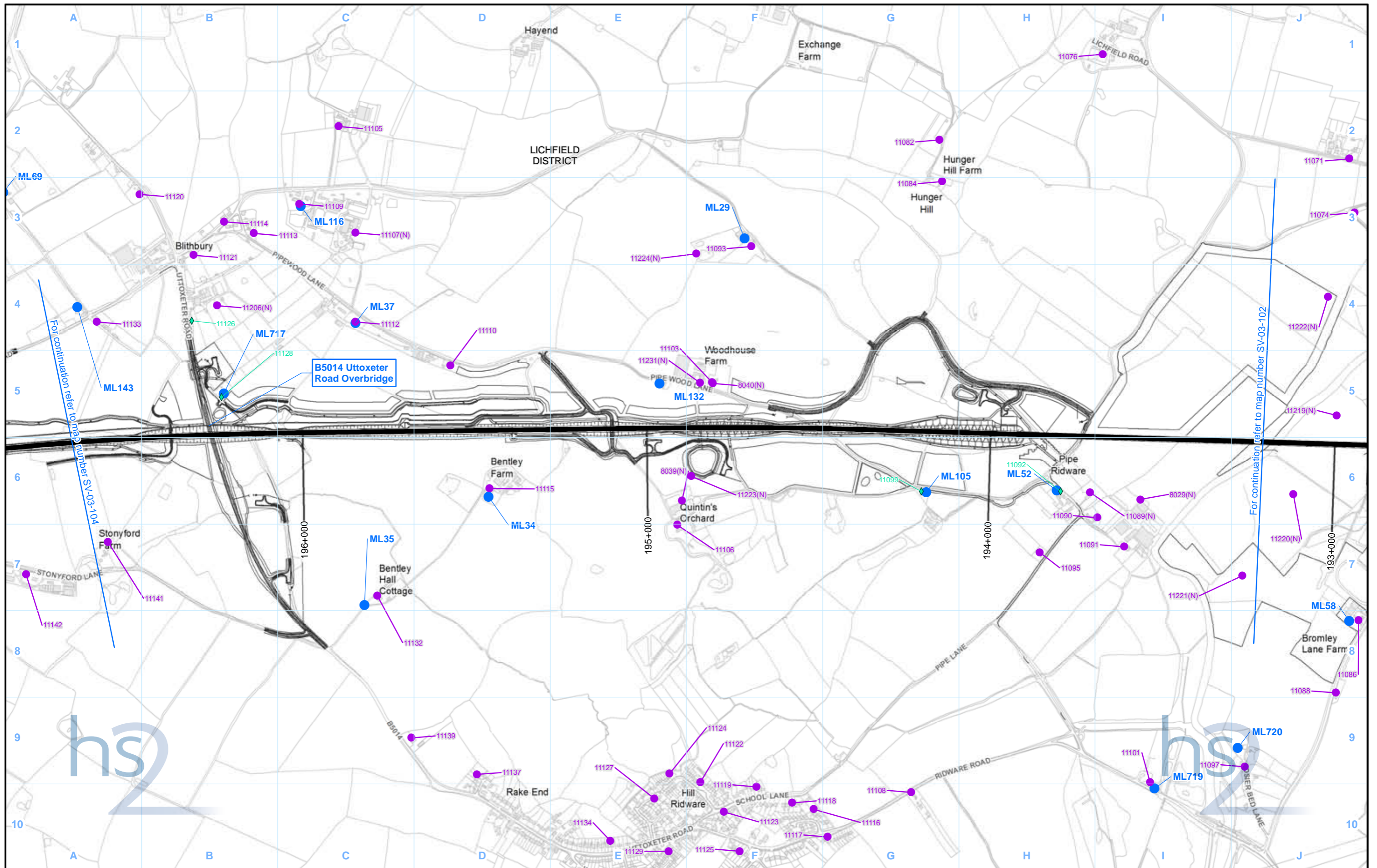
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Date: 07/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks:

- Non engineering earthworks: Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

| | |
|--|---|
| Map Number | SV-03-103 |
| Map Name | Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments |
| Community Area 1: Fradley to Colton | |

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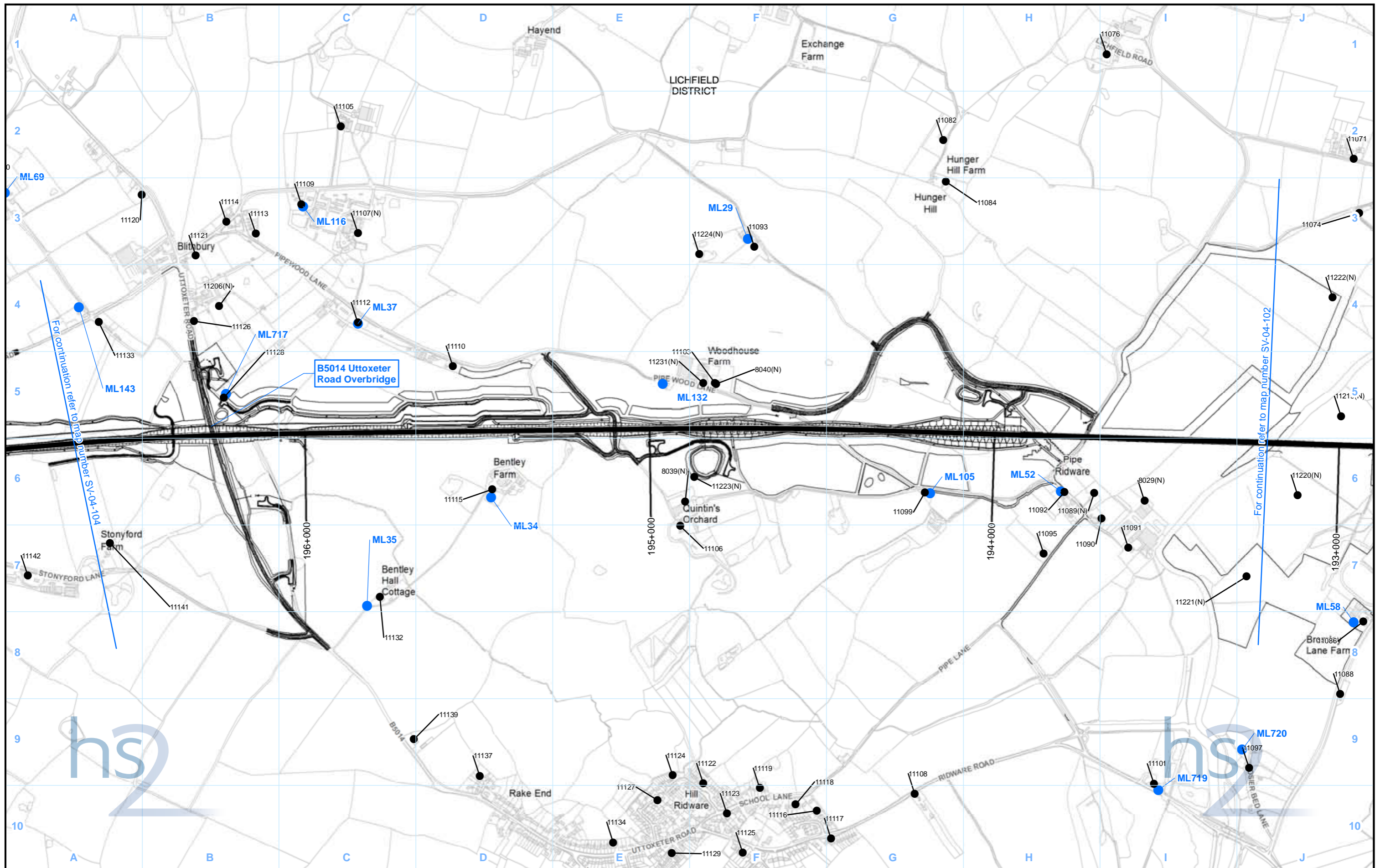
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Scale at A3: 1:10,000

Metres

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Date: 07/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

- Engineering earthworks:
- Embankment
 - Cutting
- Non engineering earthworks:
- Embankment
 - Cutting

Legend - Sound related features

- 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
- Baseline measurement locations

labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV-002-0XX)

labelled with Measurement Location reference code

Map Number: SV-04-103

Map Name: Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments

Community Area 1: Fradley to Colton

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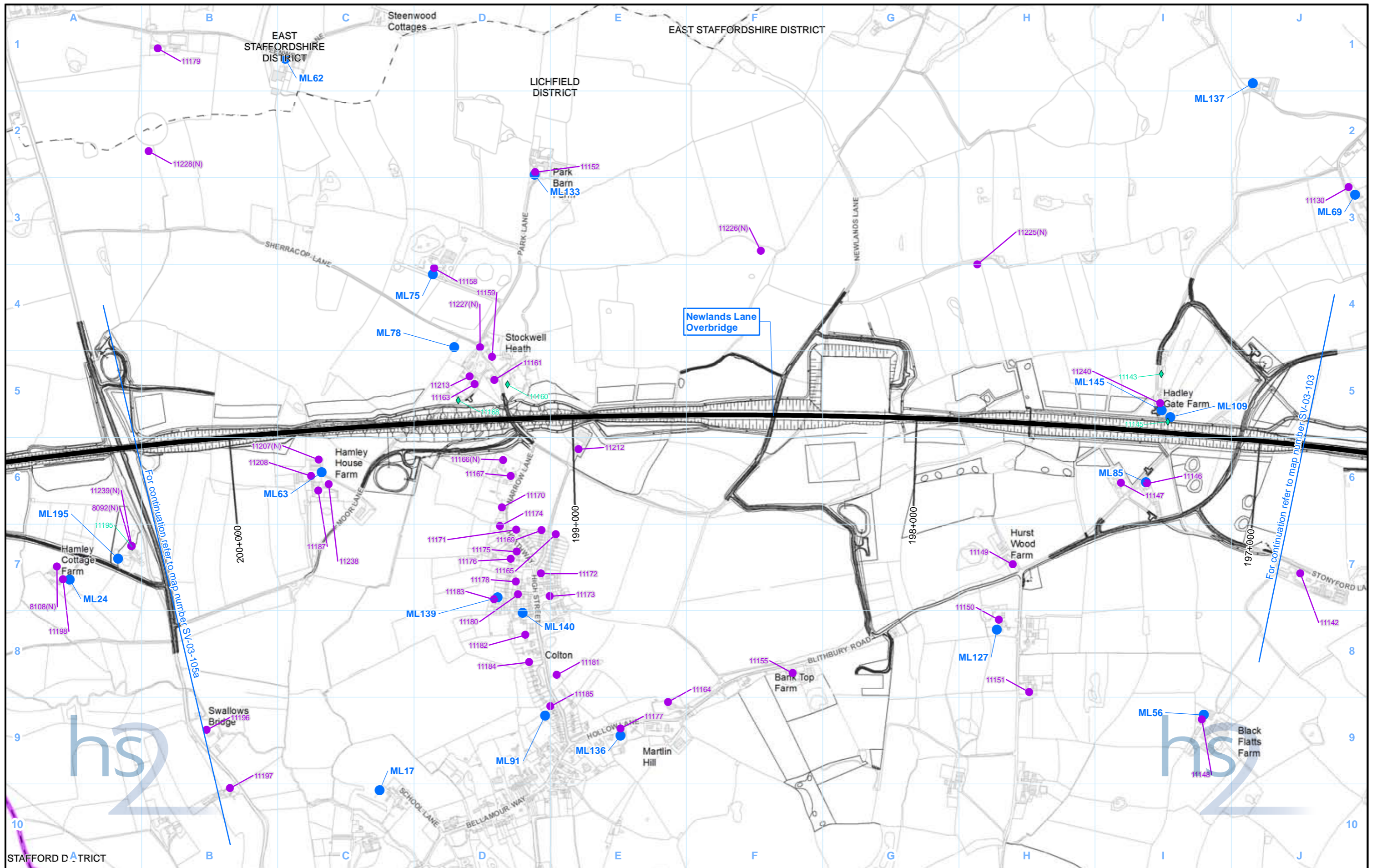
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Date: 07/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

| | |
|--|---|
| Map Number | SV-03-104 |
| Map Name | Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments |
| Community Area 1: Fradley to Colton | |

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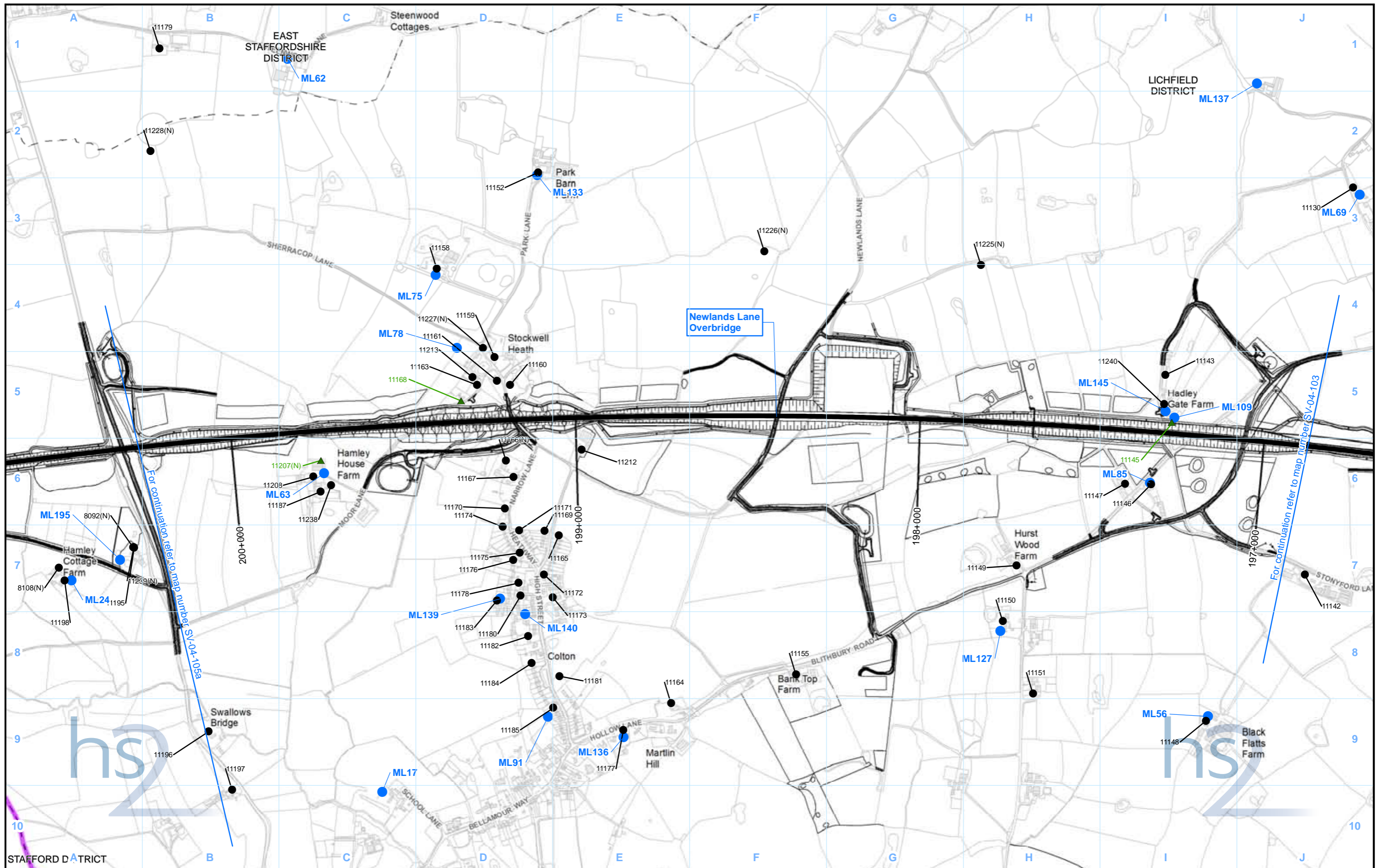
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Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

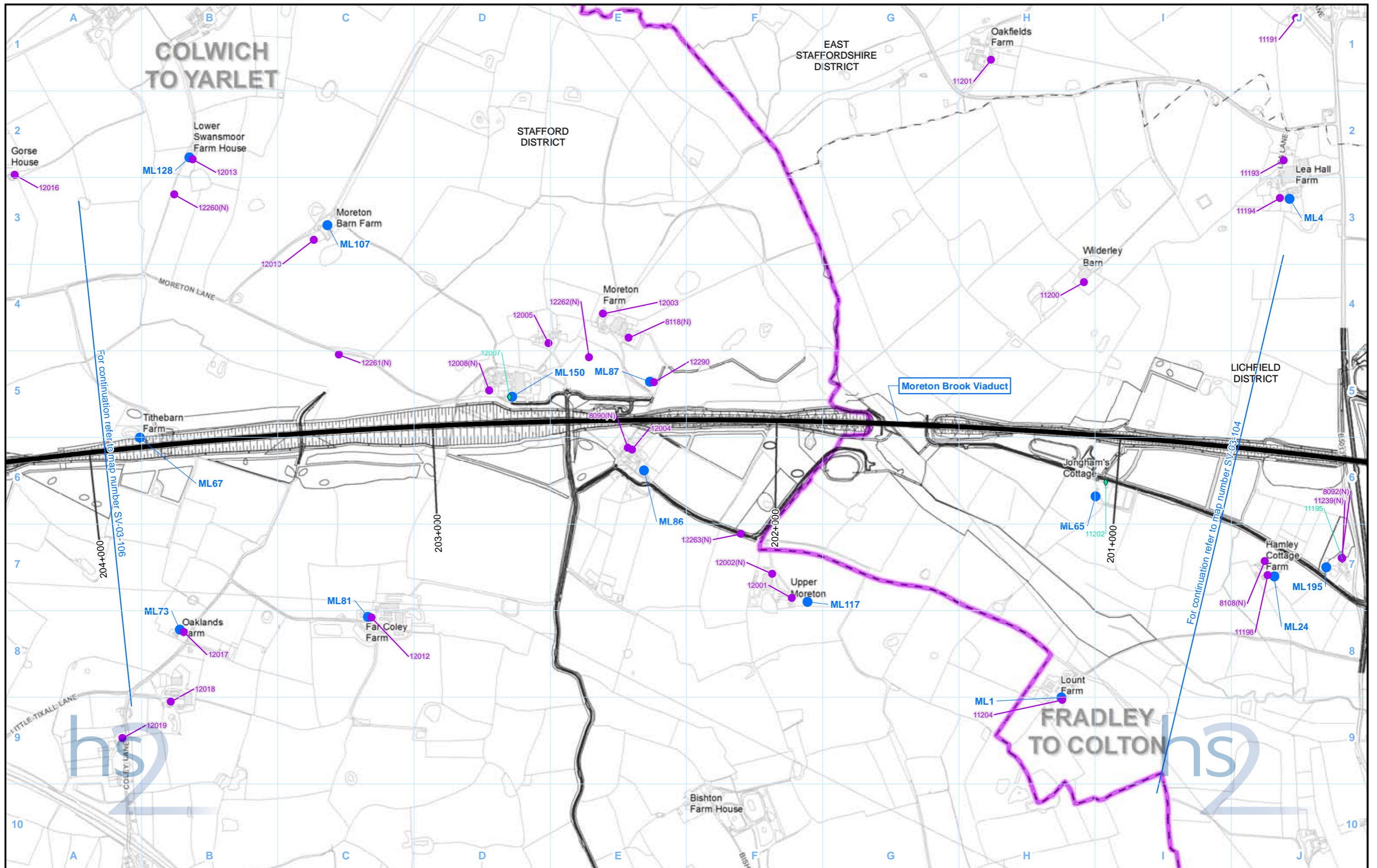
- | | |
|--|---|
| <ul style="list-style-type: none"> Airborne sound assessment location Airborne sound and vibration assessment location Ground-borne sound and/or vibration assessment location Airborne sound, ground-borne sound and vibration assessment location Baseline measurement locations | <p>Engineering earthworks:</p> <ul style="list-style-type: none"> Embankment Cutting <p>Non engineering earthworks:</p> <ul style="list-style-type: none"> Embankment Cutting |
|--|---|

labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)

(labelled with Measurement Location reference code)

| | |
|-------------------|---|
| Map Number | SV-04-104 |
| Map Name | Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments |
| Community Area 1: | Fradley to Colton |

| | | |
|--|--|--|
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Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks:

- Non engineering earthworks
- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

| | |
|--|---|
| Map Number | SV-03-105a |
| Map Name | Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments |
| Community Area 1: Fradley to Colton | |

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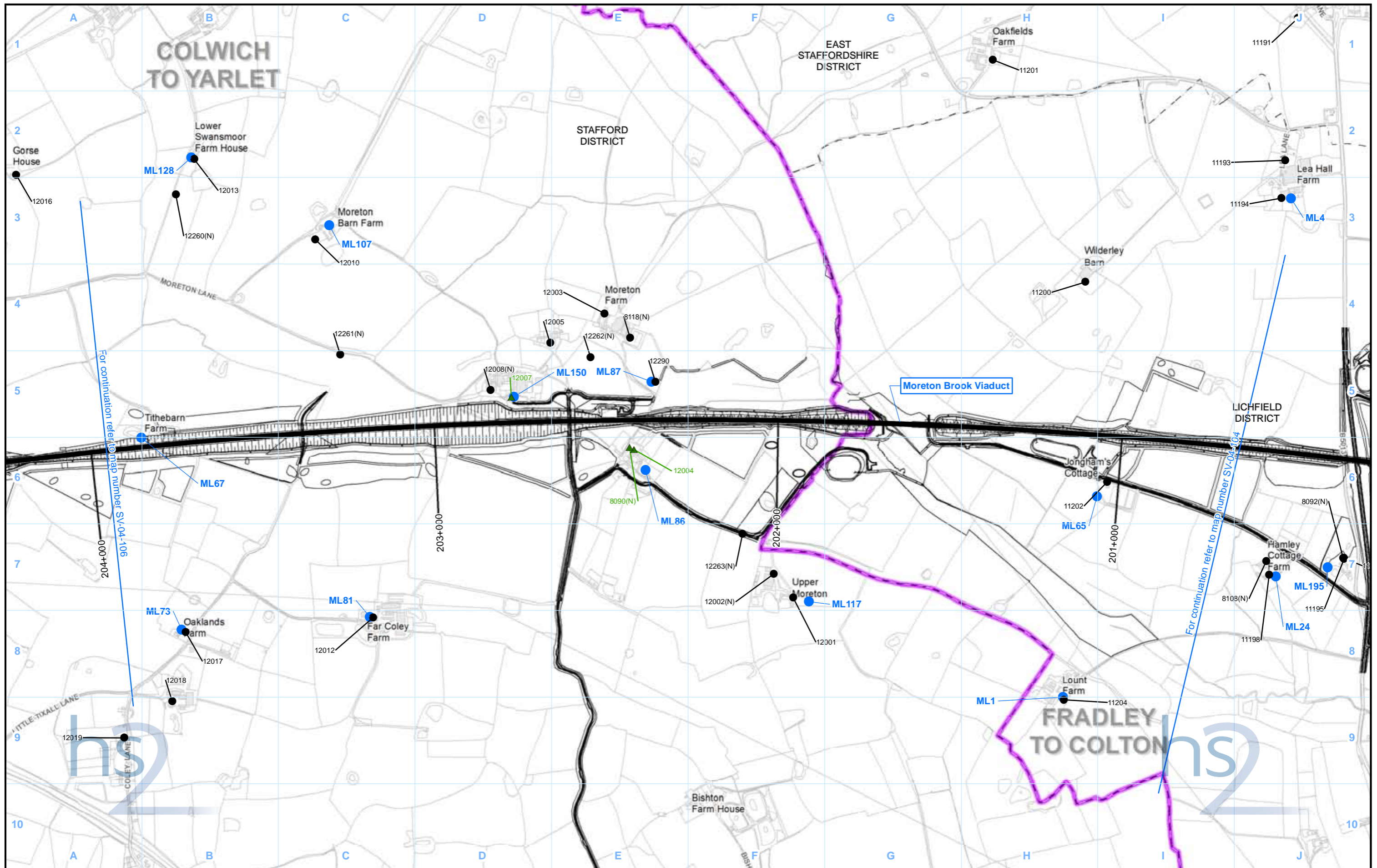
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Date: 07/06/17

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Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

- Engineering earthworks:**
- Embankment
 - Cutting
- Non engineering earthworks:**
- Embankment
 - Cutting

Legend - Sound related features

- 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
- Baseline measurement locations

labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV-002-0XX)

(labelled with Measurement Location reference code)

Map Number
SV-04-105a

Map Name
Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments

Community Area 1:
Fradley to Colton

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Doc Number: C861-ARP-EV-MAP-000-134105-P03

Date: 07/06/17

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High Speed Rail (West Midlands-Crewe)

Environmental Statement

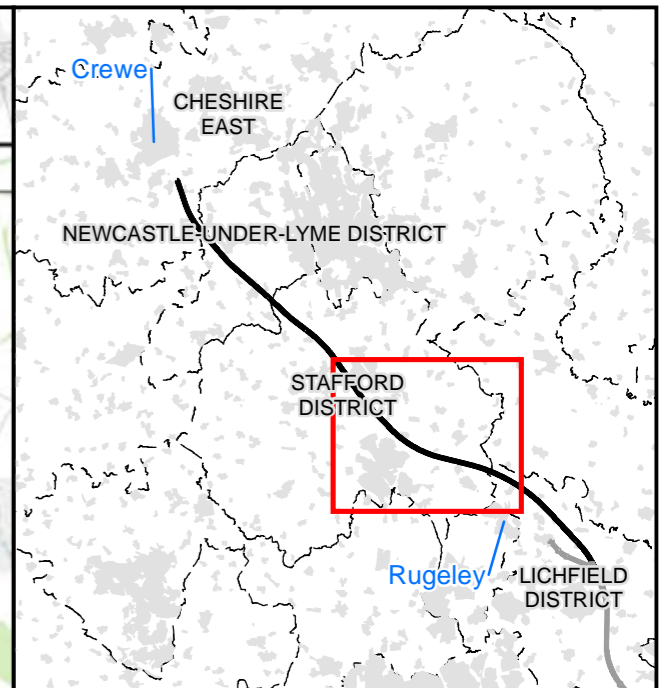
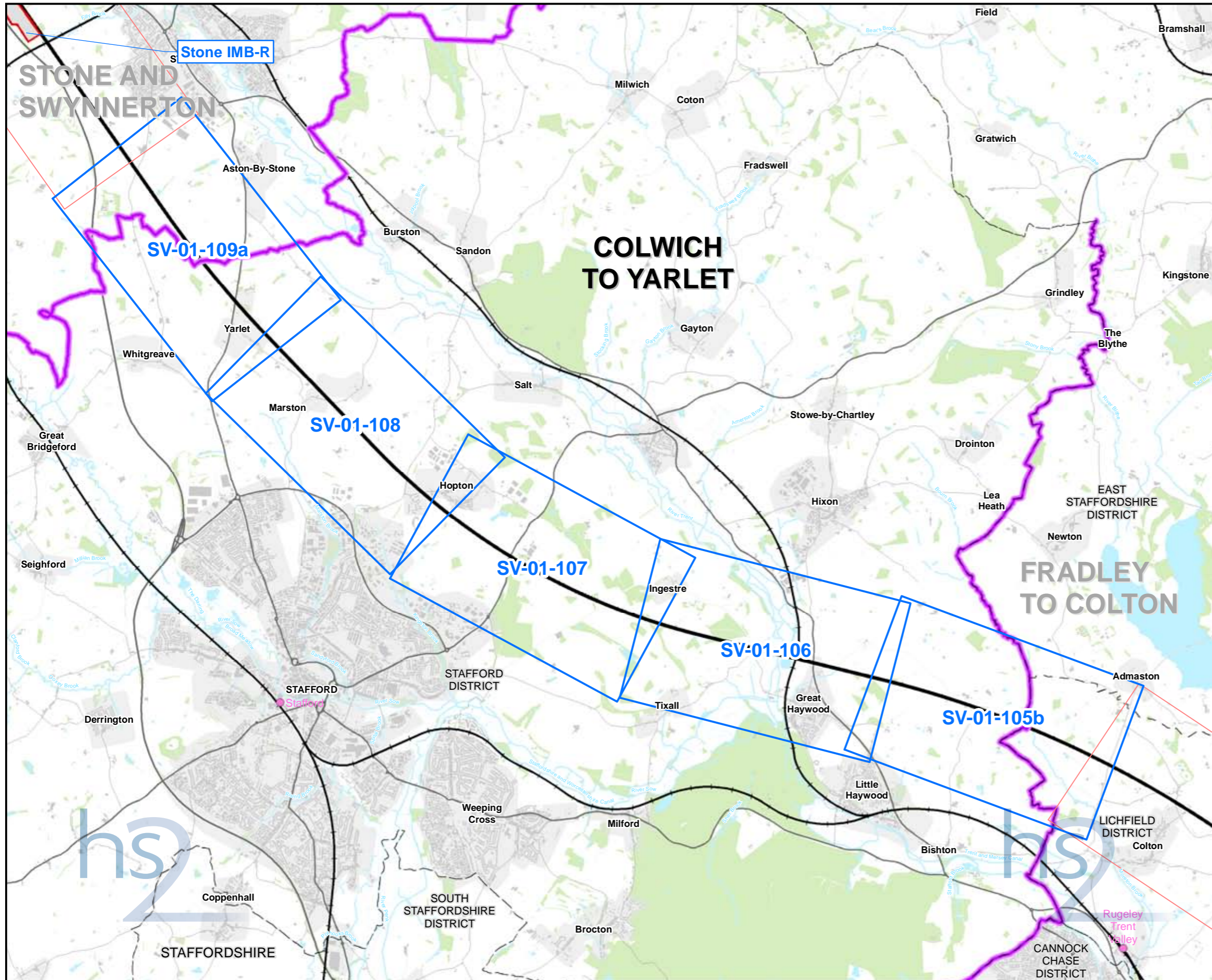
CA2 Colwich to Yarlet

**SV-01 - Operational Sound Contour Maps
and Likely Significant Effects**

**SV-02 - Operational Noise and Vibration Impacts
and Likely Significant Effects (with Assessment Locations)**

**SV-03 - Assessment and Monitoring Locations for Construction Sound,
Noise & Vibration Assessments**

**SV-04 - Assessment and Monitoring Locations for Operational Sound,
Noise & Vibration Assessments**



Map Series Information:

SV-01 presents the predicted operational sound from the new railway.

The sound levels from the new railway (expressed as $L_{pAeq,T}$) are presented in typical noise mapping colours in 5 dB steps. There is a panel at the top right of the figure; the left-hand section of this panel contains a key communicating the night-time and daytime sound levels represented by the various colours. The right-hand part of the same panel contains text explaining how the sound levels presented on the figure inform the assessment of direct noise impacts and likely significant effects. A corresponding and similar panel is found on SV-02, along with the key sound contours that were used within the environmental assessment.

Also presented on SV-01 are the following (which are also included on SV-02):

- A representation of the Proposed Scheme, including the railway alignment (indicating whether it is on the surface or in tunnel), any new and altered roads and all associated engineering and environmental mitigation earthworks;
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- symbols representing buildings that would potentially qualify for noise insulation;
- labels identifying the residual likely significant noise effects of the Proposed Scheme, and
- the extent of the study area within which the direct impacts and effects of the scheme have been quantitatively assessed.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

| | |
|--|--|
| Route in tunnel | Map sheets included in this community area |
| Route on surface | Map sheets not included in this community area |
| Depot, station, headhouse or portal building | Existing railway station |
| Community area boundary | County boundary |
| Existing railway station | District/Borough boundary |

| | |
|-------------------|--|
| Map Number | SV-01-INDEX-CA2 |
| Map Name | Index Map of: Operational Sound Contour Maps and Likely Significant Effects |
| Community Area 2: | Colwich to Yarlet |

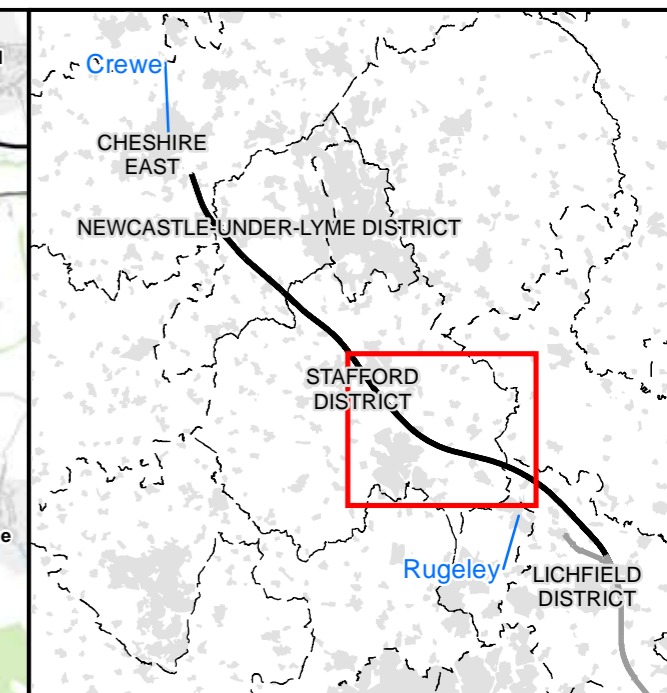
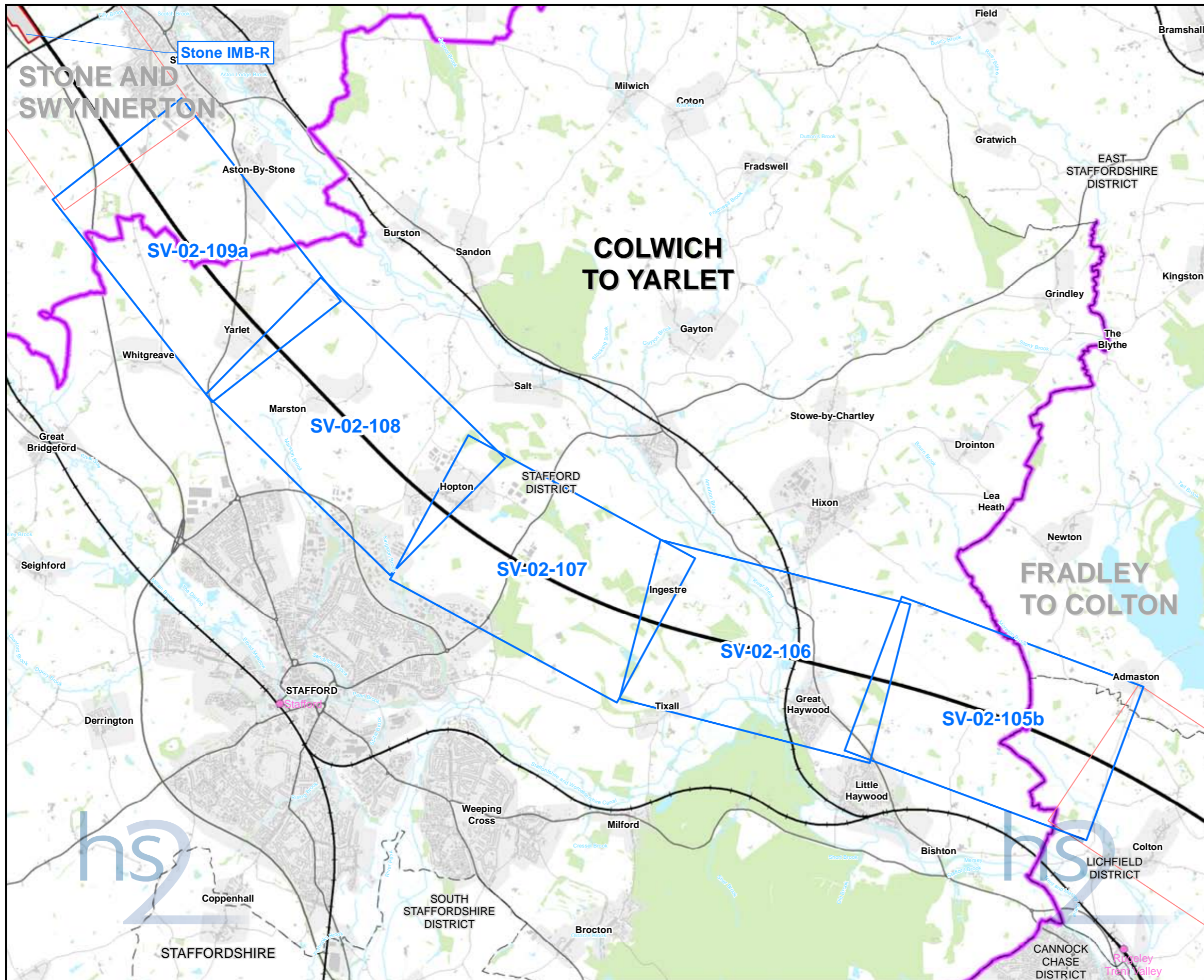
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Doc Number: C861-ARP-EV-MAP-000-131002-P03 Date: 06/06/17



Map Series Information:

SV-02 presents the direct operational noise impacts and likely significant effects of the Proposed Scheme.

The SV-02 figure series necessarily contains a large amount of information relating to the operational noise and vibration assessment. It is designed to communicate visually the assessment process from the prediction of impacts to the determination of likely residual significant effects. The corresponding text is included in Vol2 and Vol5.

- Key items on the map include the following:
- The Proposed Scheme (the proposed railway alignments and surrounding associated earthworks/roads);
 - blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
 - the study areas, which indicate the areas within which direct sound and vibration impacts of the scheme have been quantitatively assessed;
 - the calculated direct operational impacts of the scheme, displayed as colour-coded buildings and symbols representing buildings that would potentially qualify for noise insulation;
 - sound contours representing sound produced by the new railway displayed in a simpler manner than on SV-01 in order not to obscure the features on the map series);
 - the assessment locations at which a quantitative prediction of sound and impacts have been carried out (representing a number of nearby buildings). These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004; and
 - labels indicating where the likely residual direct noise or vibration significant effects have been identified. These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- Existing railway station
- County boundary
- District/Borough boundary
- Map sheets included in this community area
- Map sheets not included in this community area

Map Number: **SV-02-INDEX-CA2**

Map Name: **Index Map of: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)**

Community Area 2: **Colwich to Yarlet**

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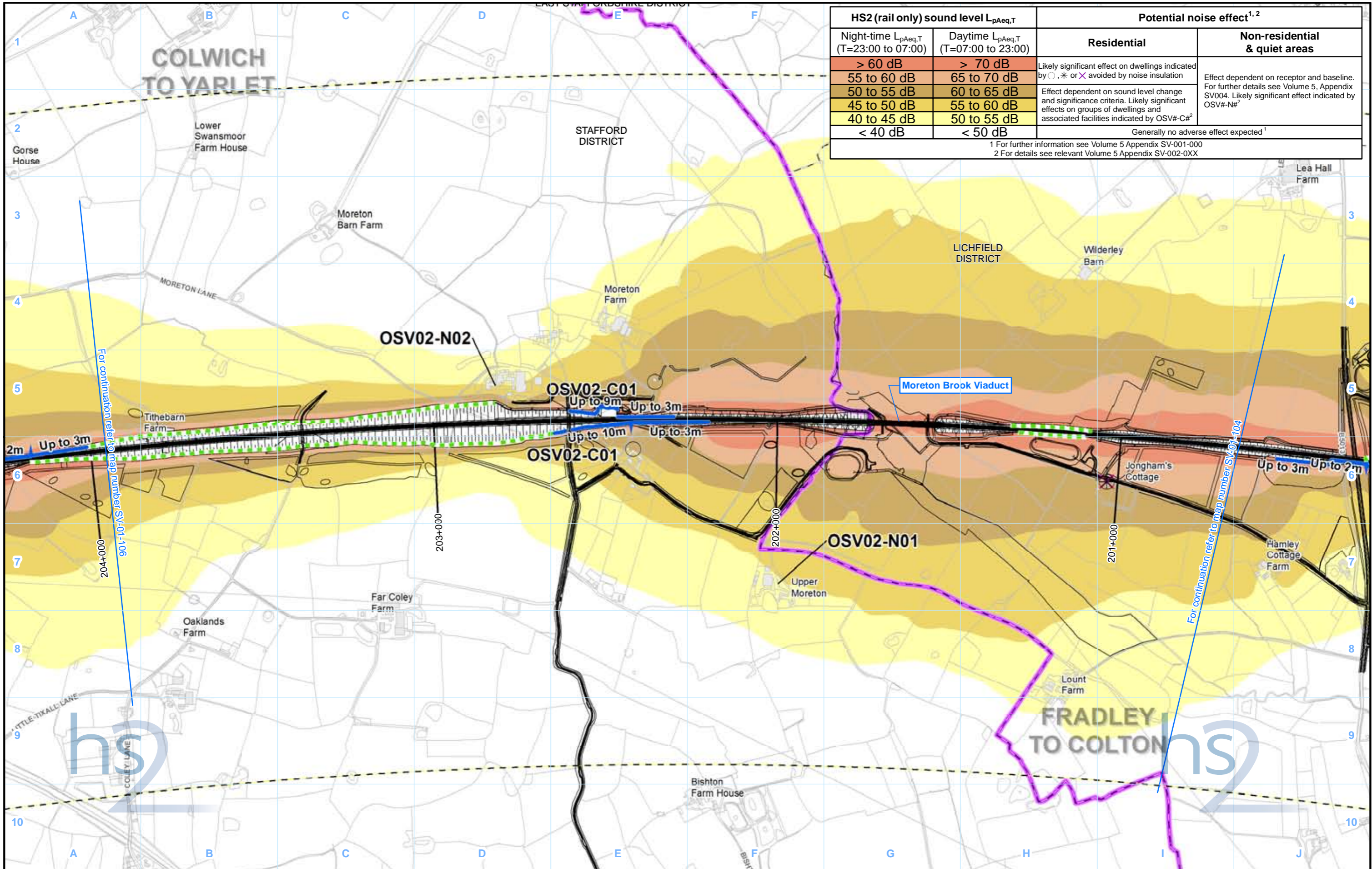
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Date: 06/06/17



| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | Generally no adverse effect expected ¹ |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 40 dB | < 50 dB | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

- Legend - General features**
- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Legend - Sound related features**
- Engineering earthworks:
- Embankment
 - Cutting
- Non engineering earthworks:
- Embankment
 - Cutting

- Legend - Sound related features**
- Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
 - Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged features further reducing noise effects:
- Other environmental e.g. landscaping
 - Engineering e.g. cuttings

- 1km Airborne sound study area
 - 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
- * Labelled with total barrier height above rail level

Map Number: SV-01-105b

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 2: Colwich to Yarlet

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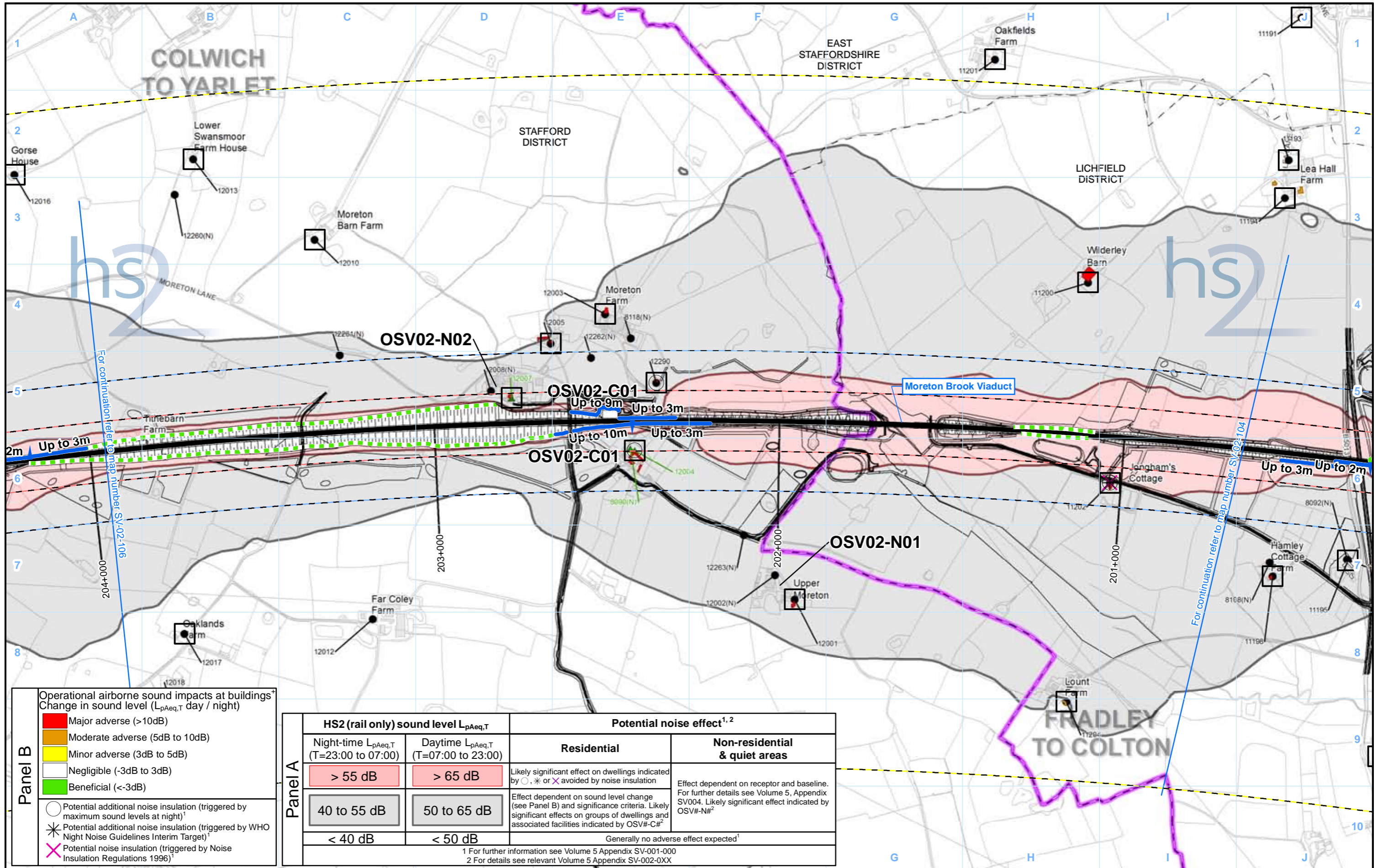
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Date: 07/06/17



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

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-002-0XX

- Legend - General features**
- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Engineering earthworks:**
- Embankment
 - Cutting
 - L_{pAFmax} exceeds 60dB façade**
- Non engineering earthworks:**
- Embankment
 - Cutting
- * Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

- Legend - Sound related features**
- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-105b

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 2: Colwich to Yarlet

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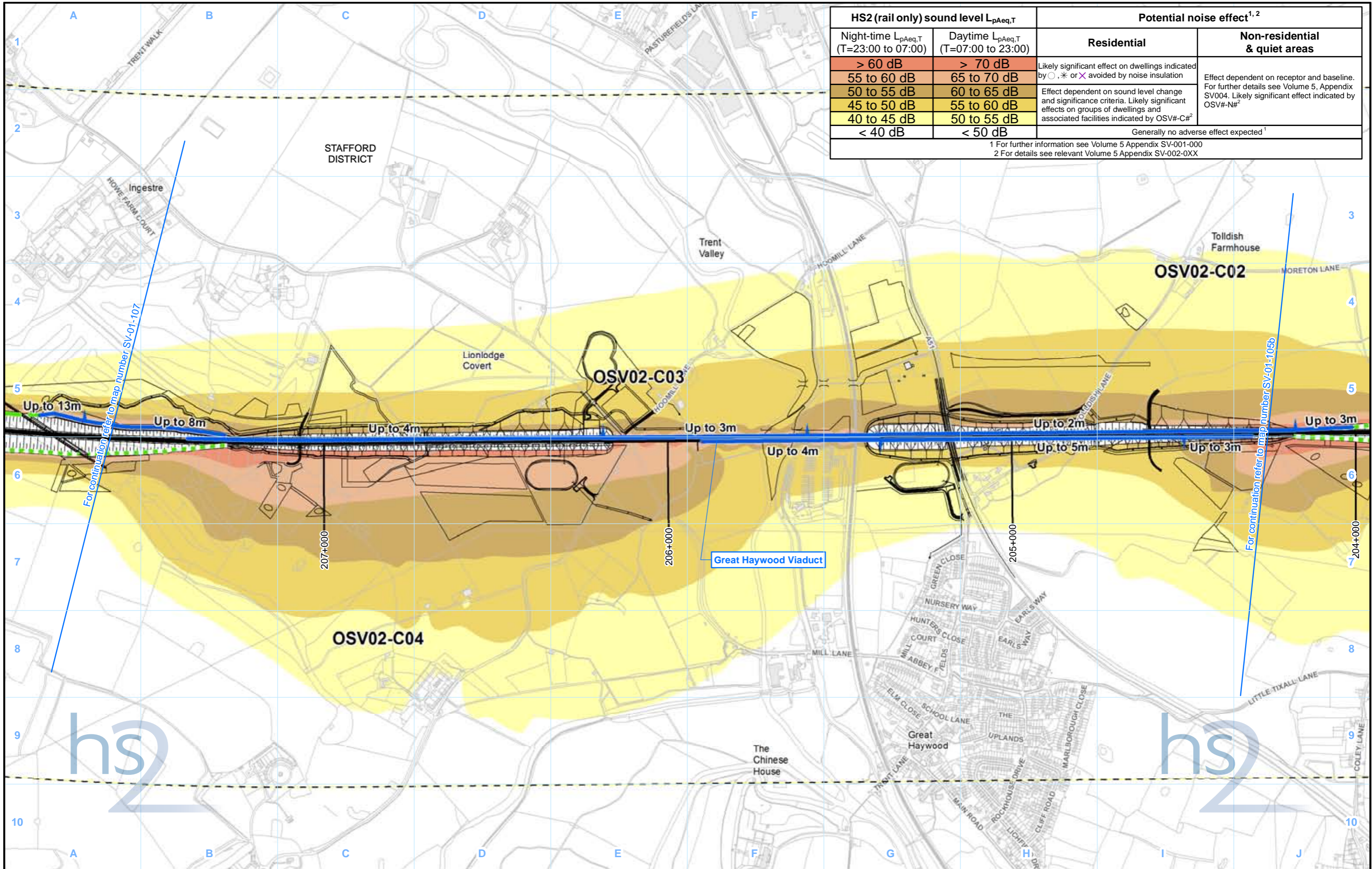
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Date: 07/06/17



| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | Generally no adverse effect expected ¹ |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 40 dB | < 50 dB | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

| | | | | | |
|---|--|---|--|---|--|
| Legend - General features Route in bored tunnel Route in cut and cover tunnel Route on surface Depot, station, headhouse or portal building Community area boundary County boundary District/Borough boundary | | Legend - Sound related features Envisaged mitigation to avoid / reduce significant noise effects: Landscaping and/or fence barriers* Engineering e.g. cuttings (green tunnels separately marked) Other environmental e.g. landscaping Engineering e.g. cuttings Envisaged features further reducing noise effects: Other environmental e.g. landscaping Engineering e.g. cuttings | | Legend - Sound related features 1km Airborne sound study area 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 <p>* Labelled with total barrier height above rail level</p> | |
|---|--|---|--|---|--|

Map Number: SV-01-106

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 2: Colwich to Yarlet

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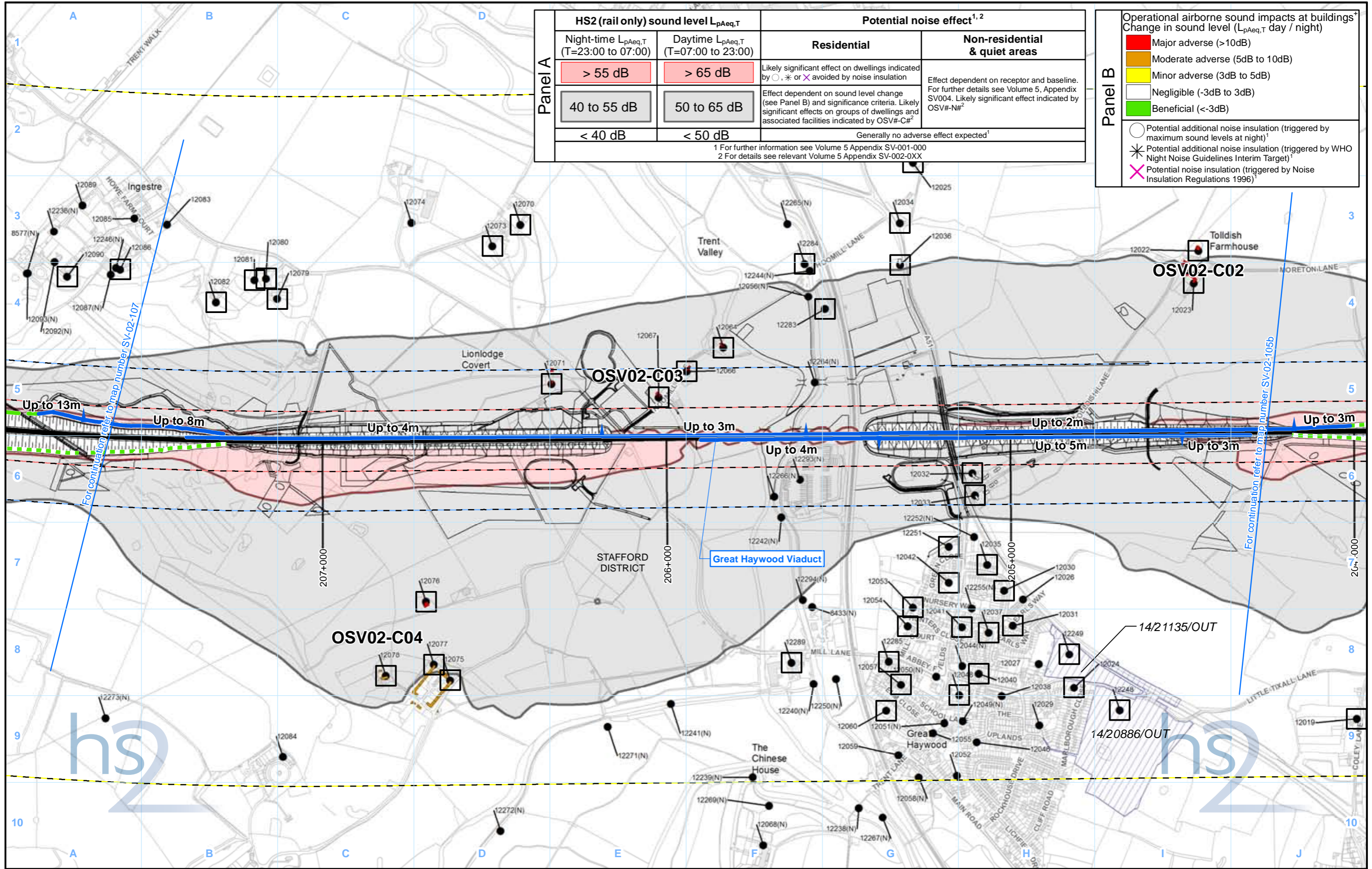
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Date: 06/06/17



| 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-002-0XX

| 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 cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Embankment
- Cutting
- L_{pAFmax} exceeds 60dB façade**

Non engineering earthworks:

- Embankment
- Cutting

* Residential buildings only
** Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

Legend - Sound related features

- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-106

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 2: Colwich to Yarlet

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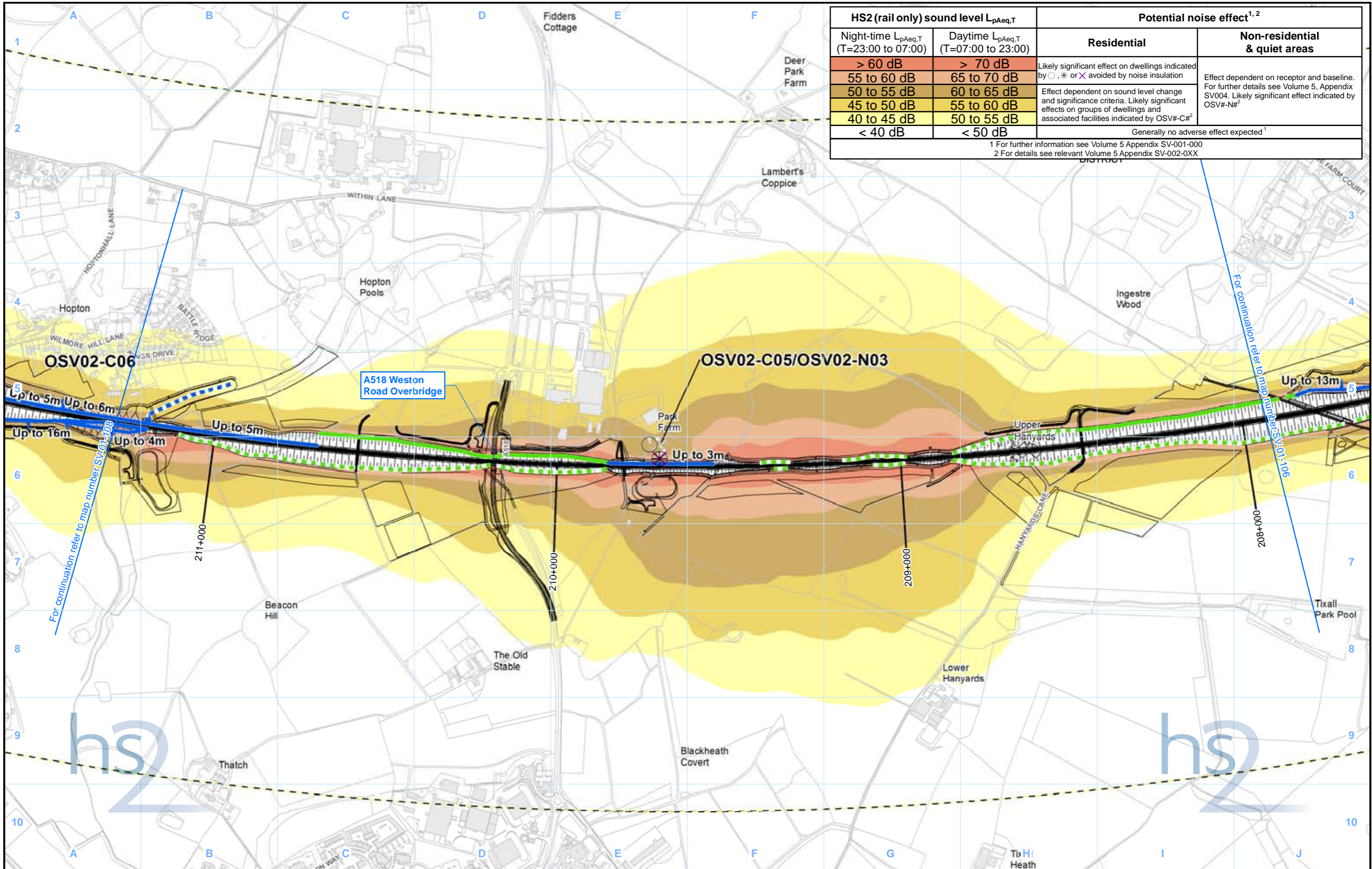
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Date: 07/06/17



| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 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-002-0XX

Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

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

Legend - Sound related features

- 1km Airborne sound study area
- 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

* Labelled with total barrier height above rail level

Map Number: SV-01-107

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 2: Colwich to Yarlet

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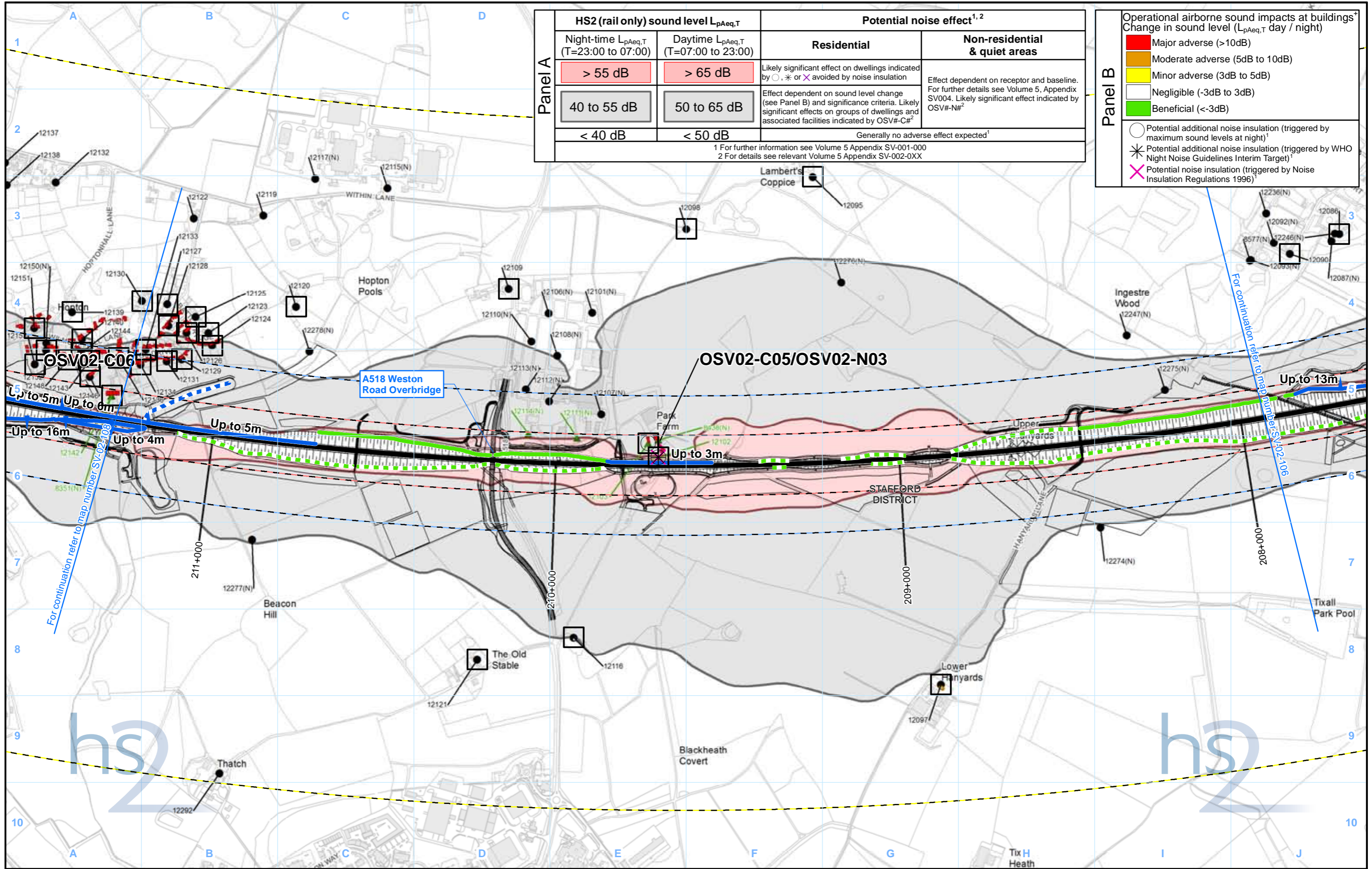
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Doc Number: C861-ARP-EV-MAP-000-131107-P03

Date: 06/06/17



| 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 | Generally no adverse effect expected ¹ |
| < 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-002-0XX

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 cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks: Non engineering earthworks:

- Embankment
- Cutting
- L_{pAFmax} exceeds 60dB façade**

* Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

Legend - Sound related features

- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-107

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 2: Colwich to Yarlet

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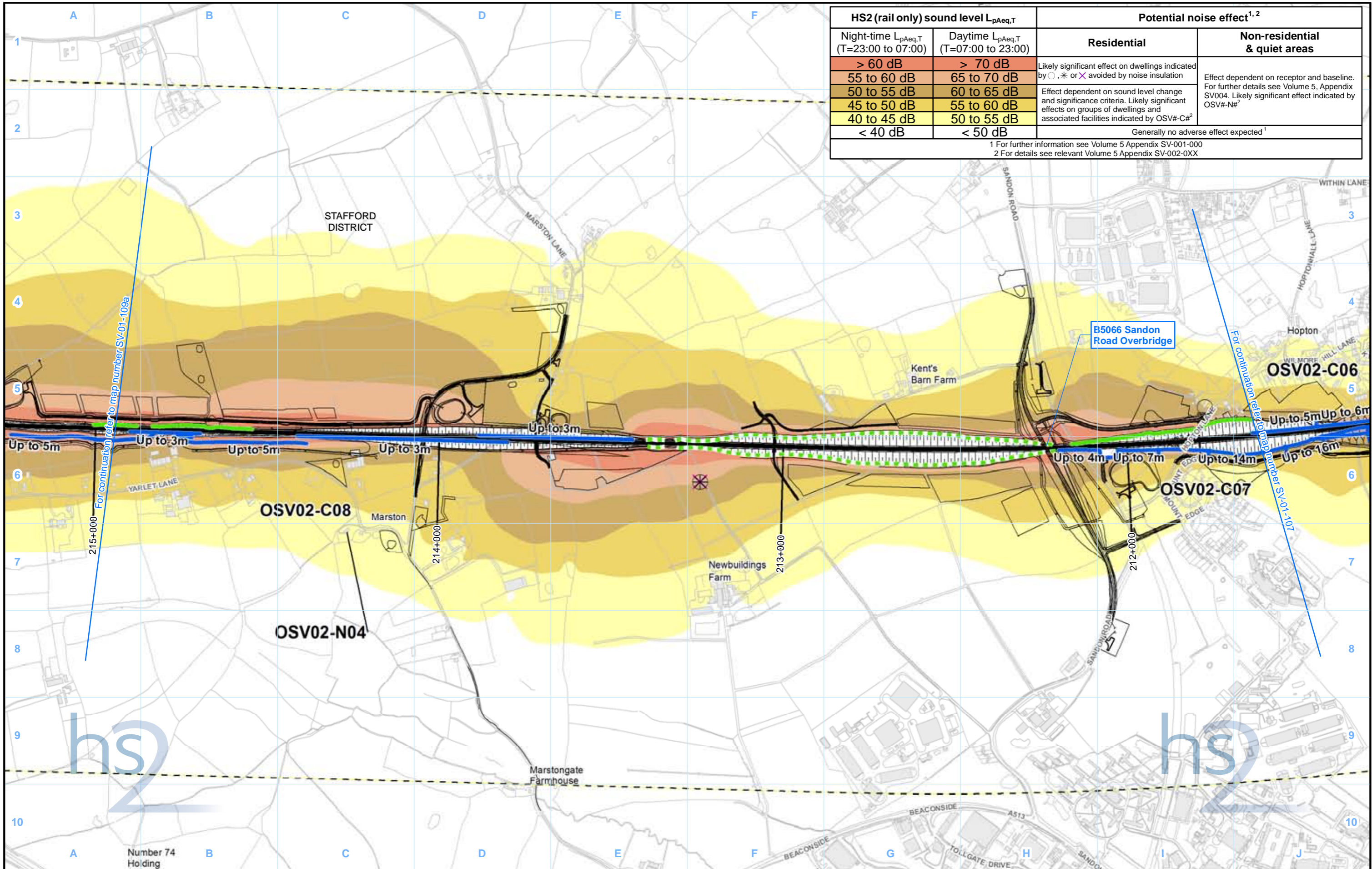
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| HS2 (rail only) sound level $L_{pAeq,T}$ | | Potential noise effect ^{1,2} | |
|---|--|---|--|
| Night-time $L_{pAeq,T}$ (T=23:00 to 07:00) | Daytime $L_{pAeq,T}$ (T=07:00 to 23:00) | Residential | Non-residential & quiet areas |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 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-002-0XX



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

Envisaged mitigation to avoid / reduce significant noise effects:

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

Envisaged features further reducing noise effects:

- Other environmental e.g. landscaping
- Engineering e.g. cuttings

1km Airborne sound study area

- 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

* Labelled with total barrier height above rail level

Map Number: SV-01-108

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 2: Colwich to Yarlet

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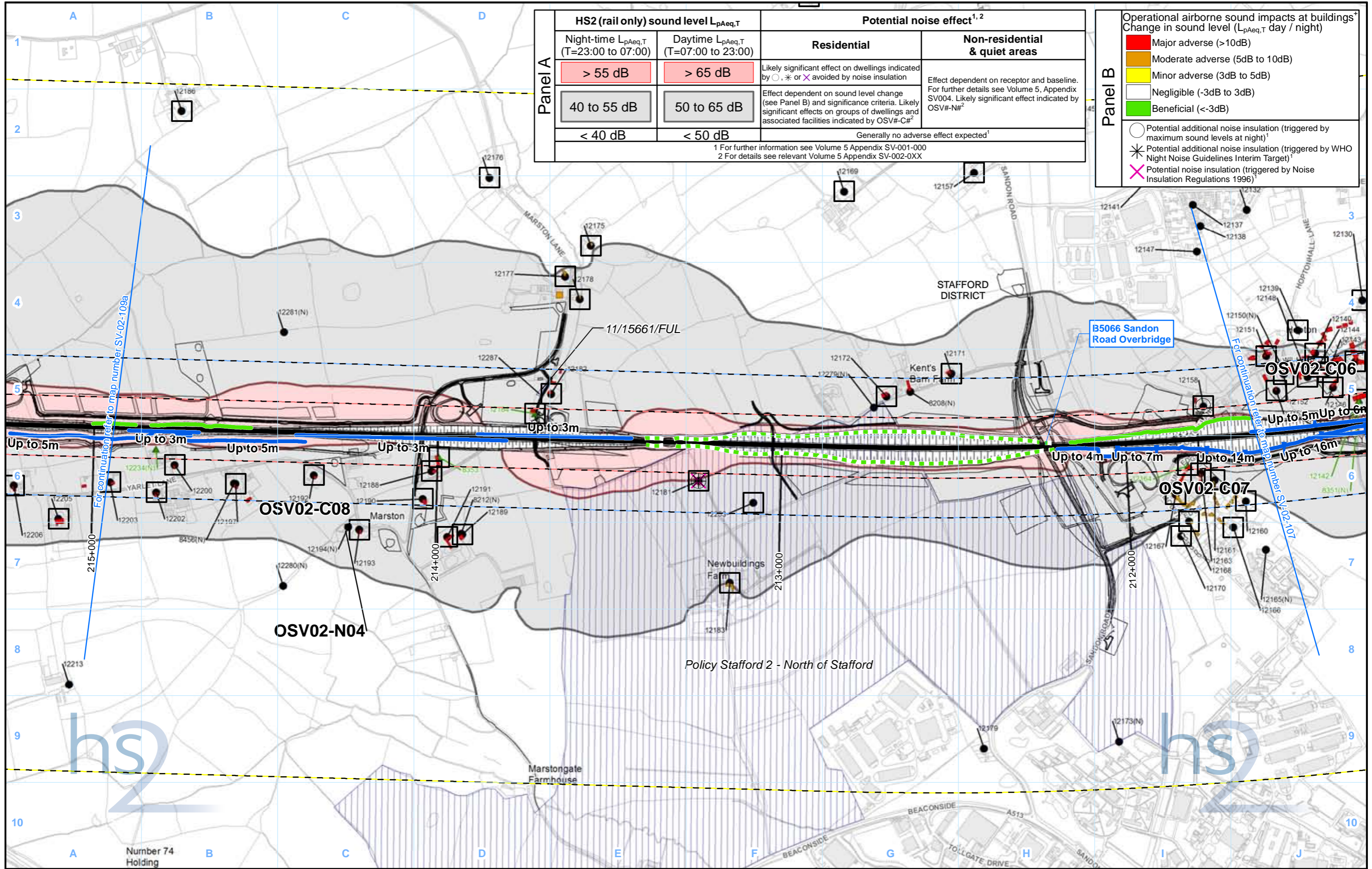
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Doc Number: C861-ARP-EV-MAP-000-131108-P04

Date: 14/06/17



| 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 | Generally no adverse effect expected ¹ |
| < 40 dB | < 50 dB | | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

| Panel B | Operational airborne sound impacts at buildings ⁺ Change in sound level ($L_{pAeq,T}$ day / night) |
|-----------------|---|
| Red square | Major adverse (>10dB) |
| Orange square | Moderate adverse (5dB to 10dB) |
| Yellow square | Minor adverse (3dB to 5dB) |
| White square | Negligible (-3dB to 3dB) |
| Green square | Beneficial (<-3dB) |
| Circle with dot | Potential additional noise insulation (triggered by maximum sound levels at night) ¹ |
| Star | Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target) ¹ |
| Cross | Potential noise insulation (triggered by Noise Insulation Regulations 1996) ¹ |

- Legend - General features**
- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Engineering earthworks:**
- Embankment
 - Cutting
 - L_{pAFmax} exceeds 60dB façade**
- Non engineering earthworks:**
- Embankment
 - Cutting
- * Residential buildings only
** Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

- Legend - Sound related features**
- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-108

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 2: Colwich to Yarlet

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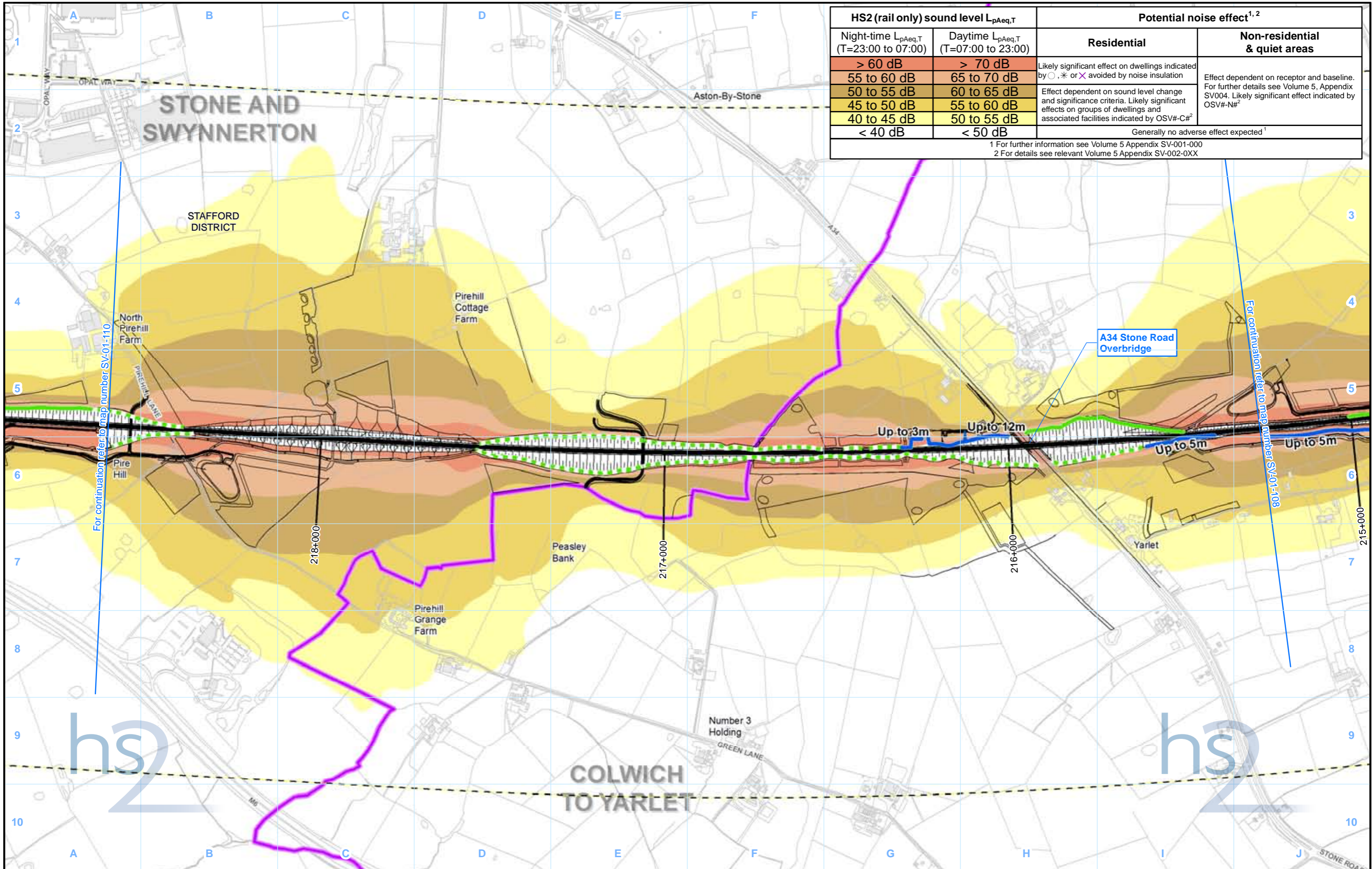
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Doc Number: C861-ARP-EV-MAP-000-132108-P04

Date: 14/06/17

| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | Generally no adverse effect expected ¹ |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 40 dB | < 50 dB | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

Envisaged mitigation to avoid / reduce significant noise effects:

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

Envisaged features further reducing noise effects:

- Other environmental e.g. landscaping
- Engineering e.g. cuttings

Legend - Sound related features

- 1km Airborne sound study area
- 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

* Labelled with total barrier height above rail level

Map Number: SV-01-109a

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 2: Colwich to Yarlet

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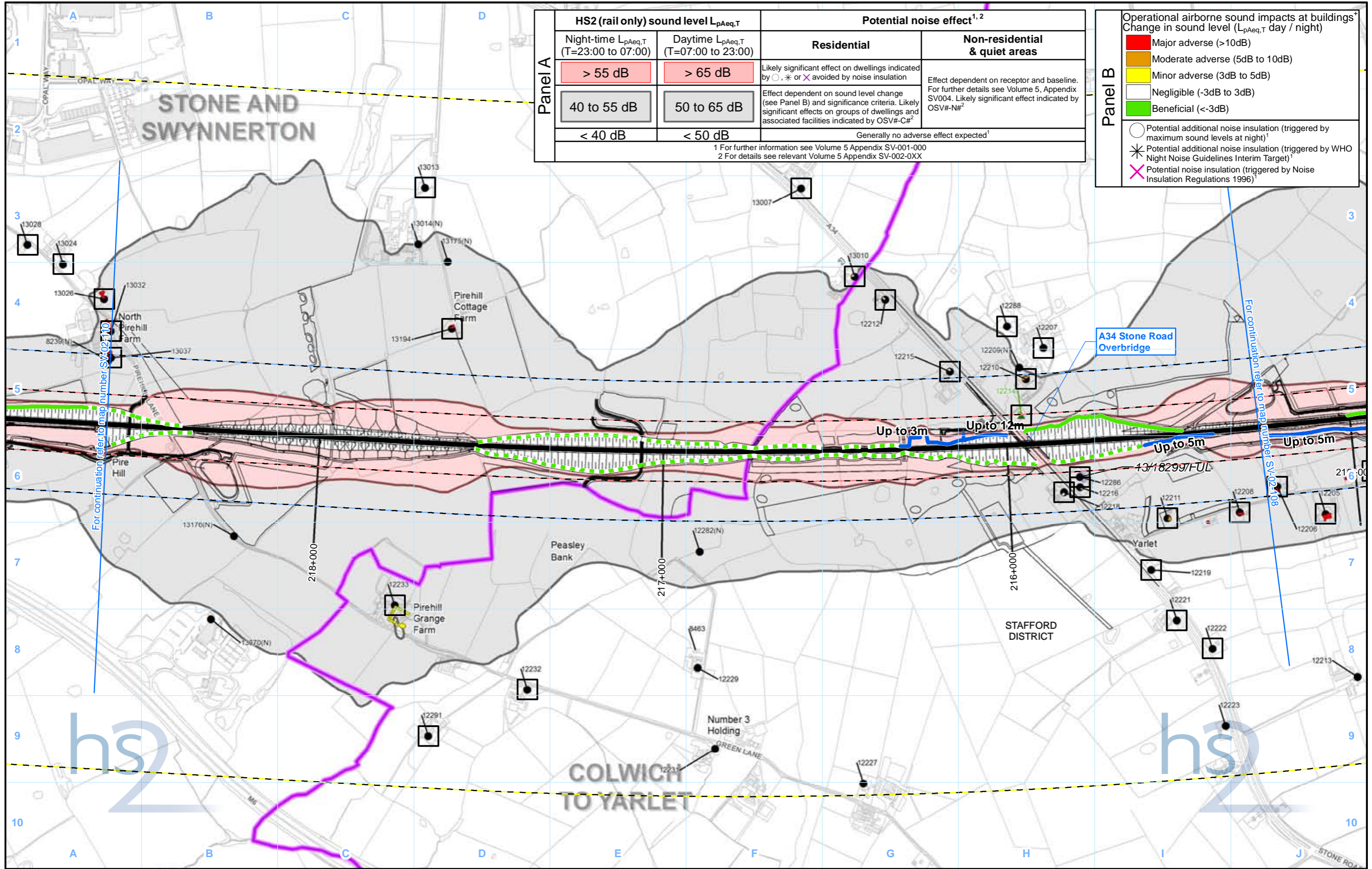
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Date: 07/06/17



| 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 | Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# 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-002-0XX

| Operational airborne sound impacts at buildings* Change in sound level ($L_{pAeq,T}$ day / night) | |
|---|---|
| Major adverse (>10dB) | ○ Potential additional noise insulation (triggered by maximum sound levels at night) ¹ |
| Moderate adverse (5dB to 10dB) | * Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target) ¹ |
| Minor adverse (3dB to 5dB) | ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996) ¹ |
| Negligible (-3dB to 3dB) | |
| Beneficial (<-3dB) | |

- Legend - General features**
- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Engineering earthworks:**
- Embankment
 - Cutting
 - L_{pAFmax} exceeds 60dB façade**
- Non engineering earthworks:**
- Embankment
 - Cutting
- * Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

- Legend - Sound related features**
- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-109a

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

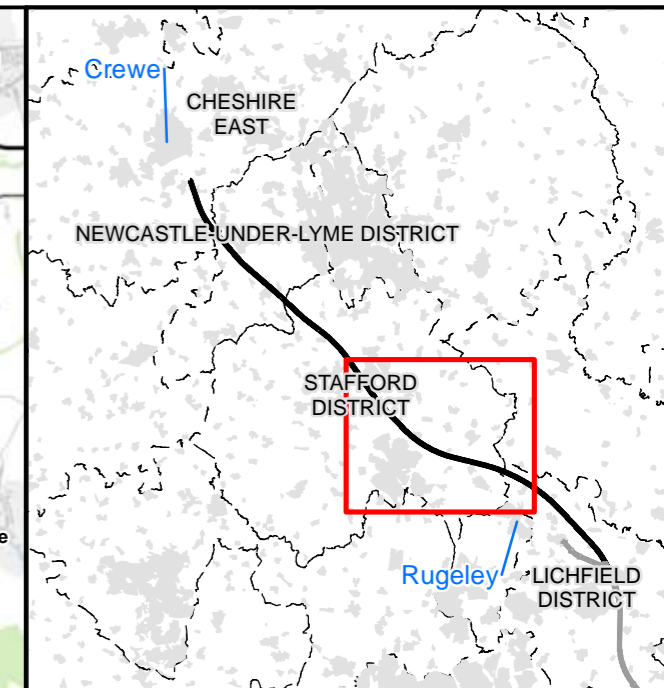
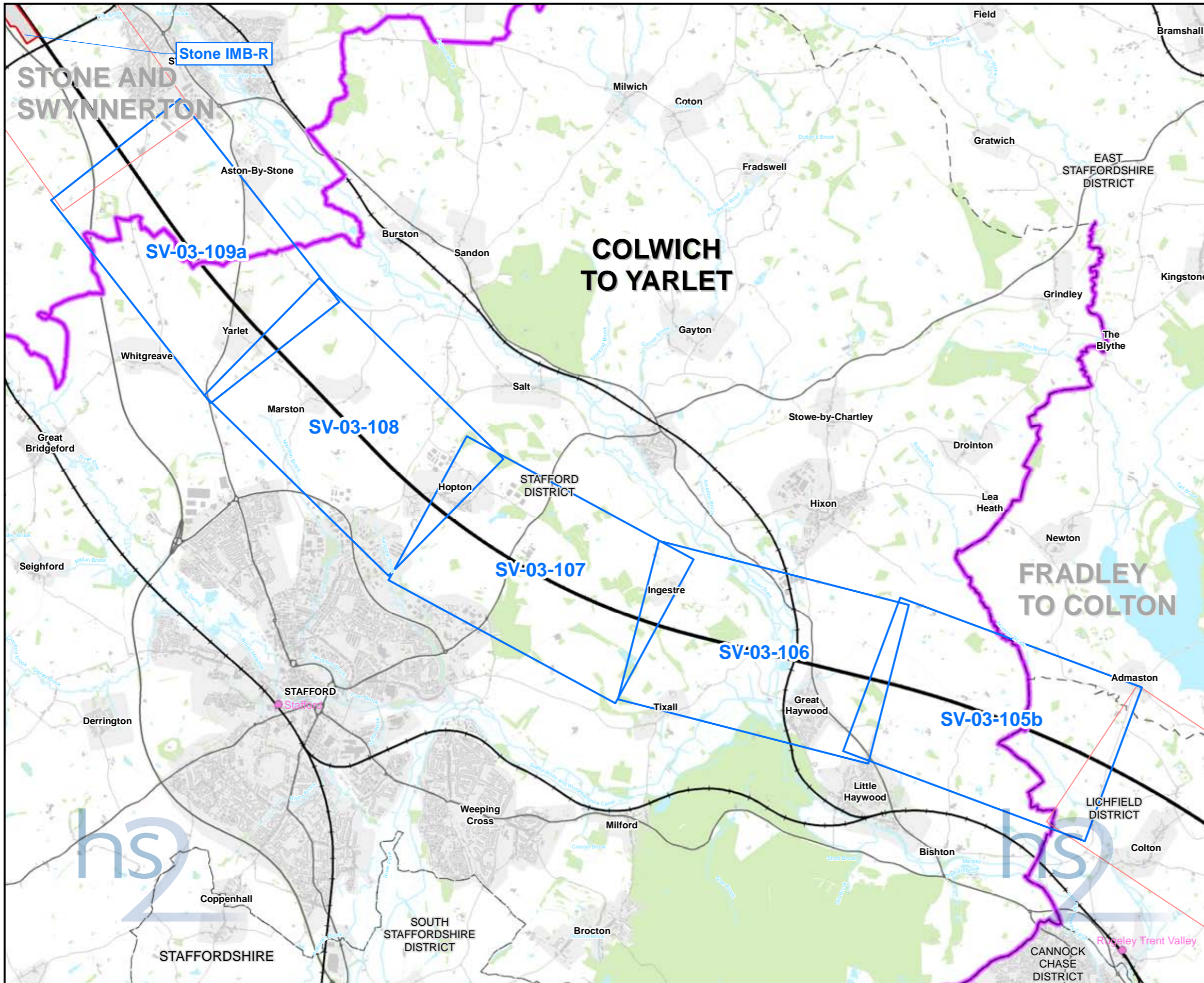
Community Area 2: Colwich to Yarlet

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Map Series Information:

The SV-03 figure series accompanies the construction noise & vibration assessments. It shows the locations at which a quantitative assessment of the direct effects of construction noise and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the construction noise and vibration reports contained in Volume 5: Appendix SV-002-0XX

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002-0XX.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Main Map Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- Existing railway station
- County boundary
- District/Borough boundary
- Map sheets included in this community area
- Map sheets not included in this community area

Map Number: **SV-03-INDEX-CA2**

Map Name: **Index Map of:
Assessment and Monitoring Locations for
Construction Sound, Noise & Vibration
Assessments**

Community Area 2:
Colwich to Yarlet

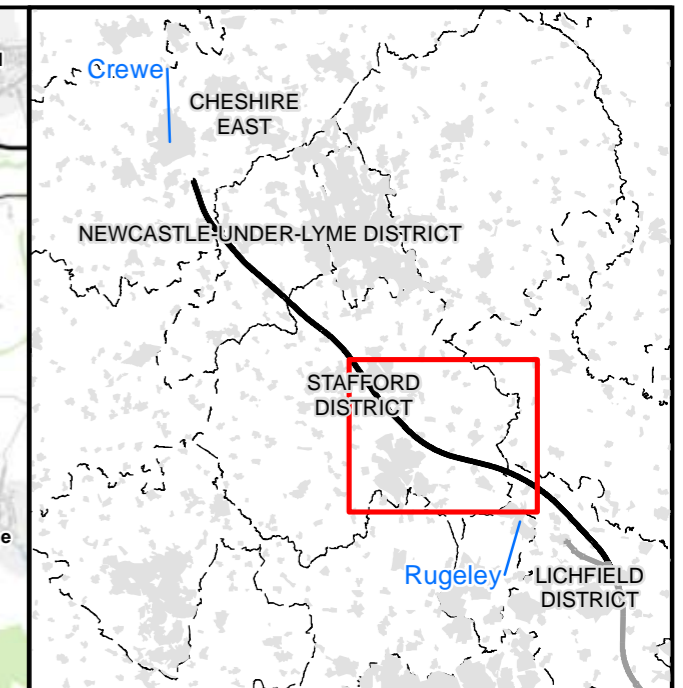
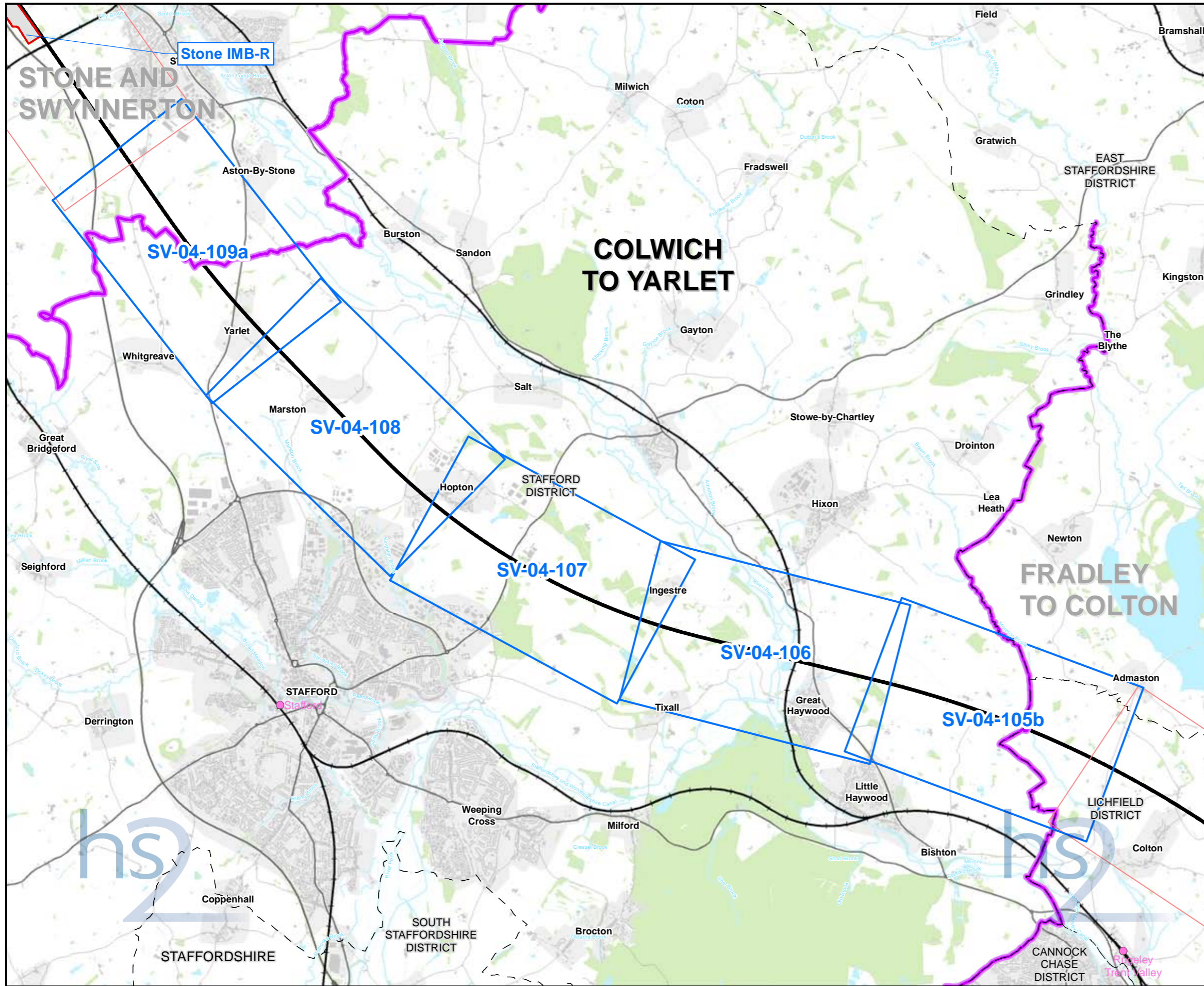
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Map Series Information:

The SV-04 figure series shows the locations at which a quantitative assessment of the direct effects of operational sound and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-002-0XX

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002-0XX

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Main Map Legend

| | |
|--|--|
| Route in tunnel | Map sheets included in this community area |
| Route on surface | Map sheets not included in this community area |
| Depot, station, headhouse or portal building | Existing railway station |
| Community area boundary | County boundary |
| District/Borough boundary | |

| | |
|-------------------|---|
| Map Number | SV-04-INDEX-CA2 |
| Map Name | Index Map of: Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments |
| Community Area 2: | Colwich to Yarlet |

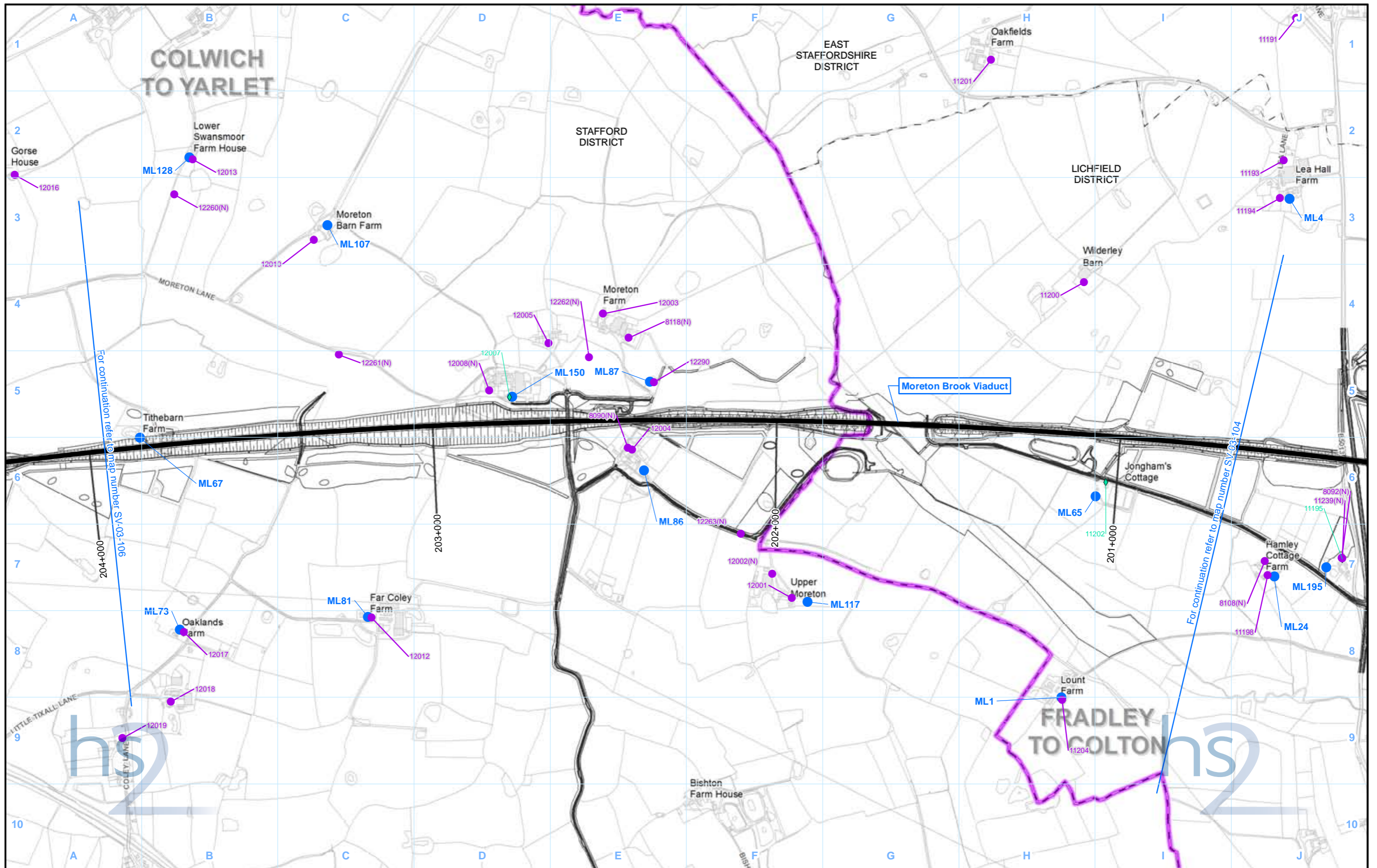
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Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

| | |
|-------------------|---|
| Map Number | SV-03-105b |
| Map Name | Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments |
| Community Area 2: | Colwich to Yarlet |

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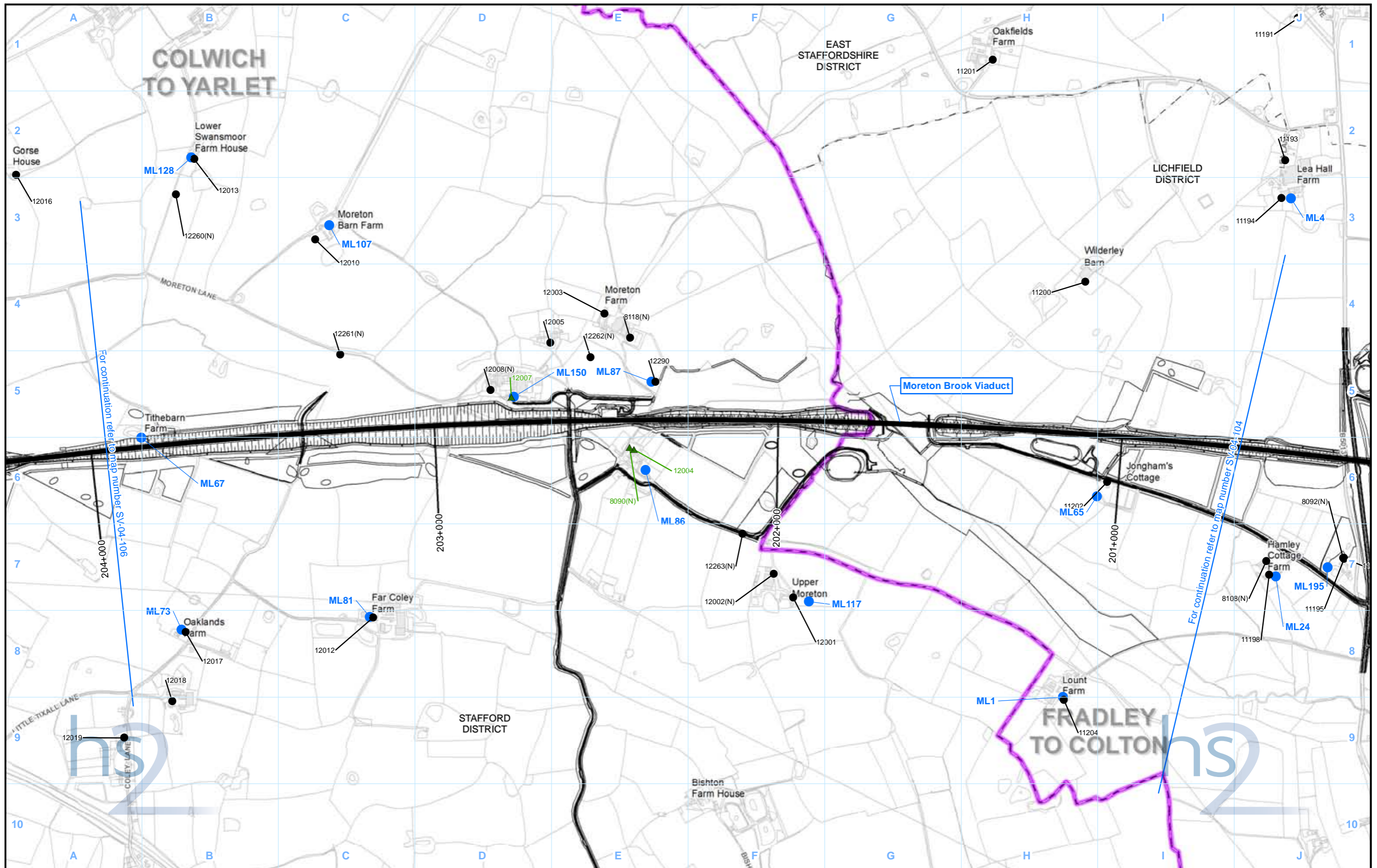
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Date: 07/06/17

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Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

- | | |
|--|---|
| <ul style="list-style-type: none"> 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 Baseline measurement locations | <p>Engineering earthworks:</p> <ul style="list-style-type: none"> Embankment Cutting <p>Non engineering earthworks:</p> <ul style="list-style-type: none"> Embankment Cutting |
|--|---|

labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)

(labelled with Measurement Location reference code)

| |
|---|
| Map Number SV-04-105b |
| Map Name Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments |
| Community Area 2: Colwich to Yarlet |

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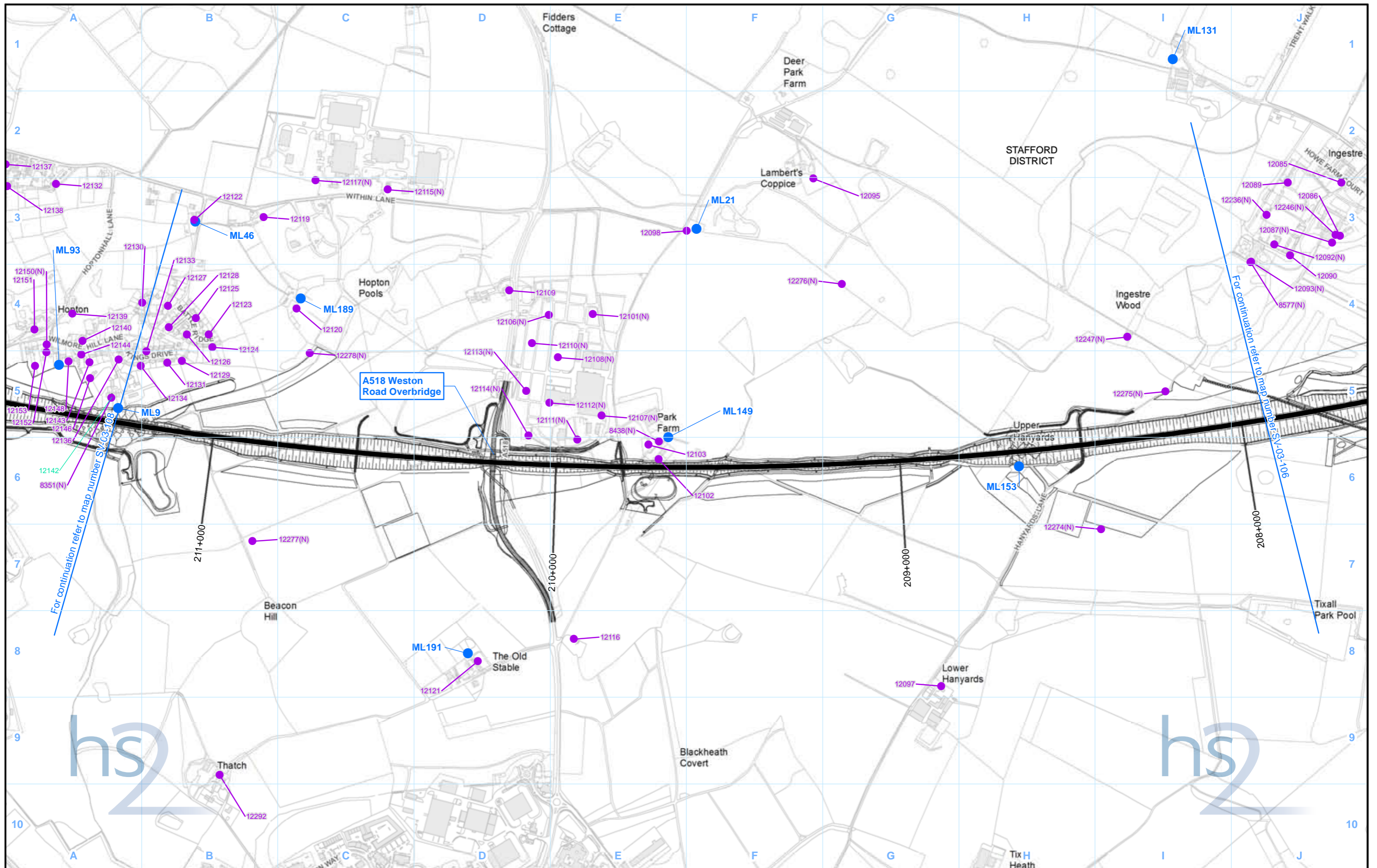
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Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks: Non engineering earthworks:

- Embankment
- Cutting
- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

Map Number **SV-03-107**

Map Name
Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments

Community Area 2:
Colwich to Yarlet

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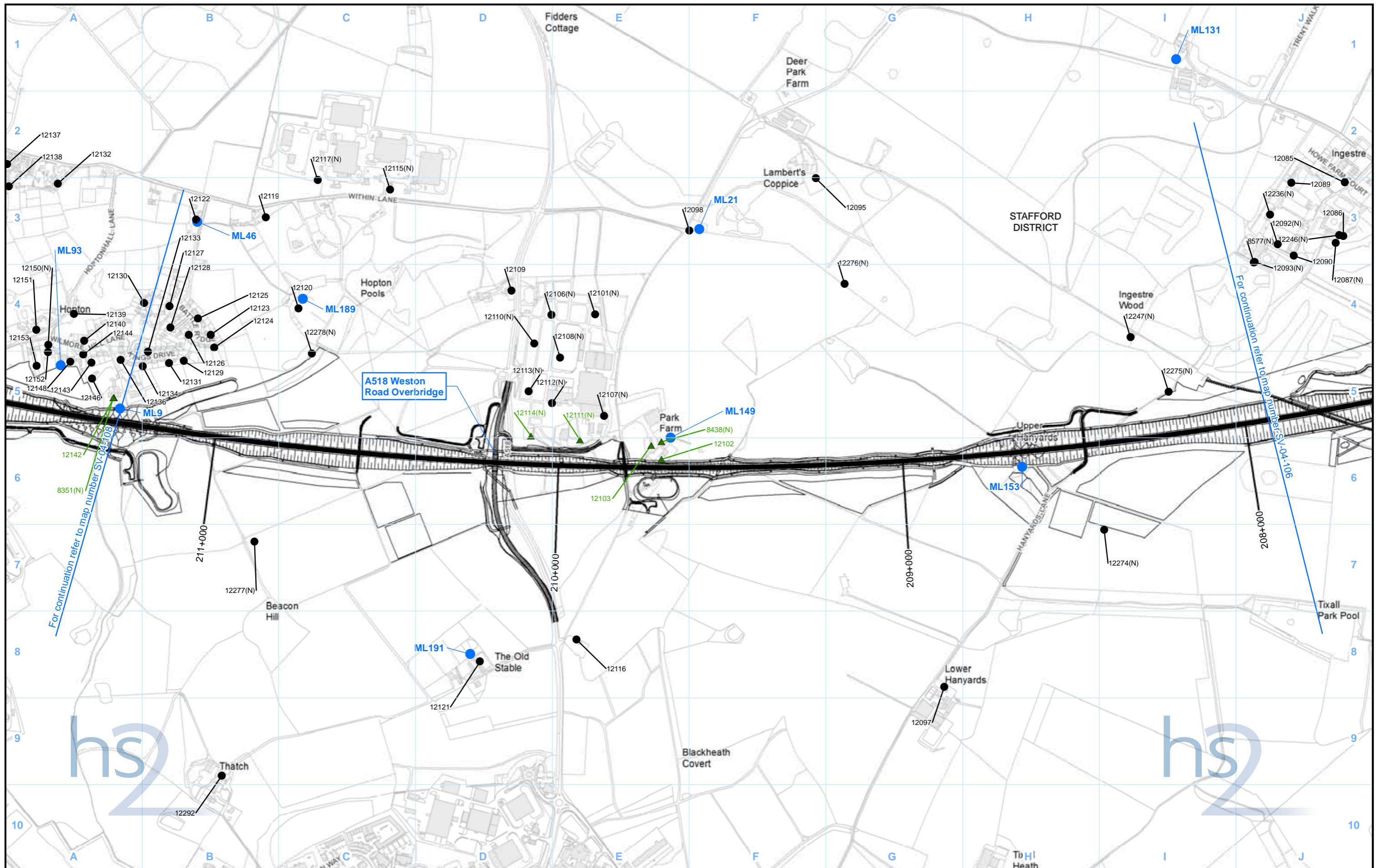
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Metres

Date: 07/06/17



Legend - General features

- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary
- Engineering earthworks:
- Non engineering earthworks: Embankment
 - Non engineering earthworks: Cutting

Legend - Sound related features

- 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
 - Baseline measurement locations
- labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- labelled with Measurement Location reference code

Map Number
SV-04-107

Map Name
Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments

Community Area 2:
Colwich to Yarlet

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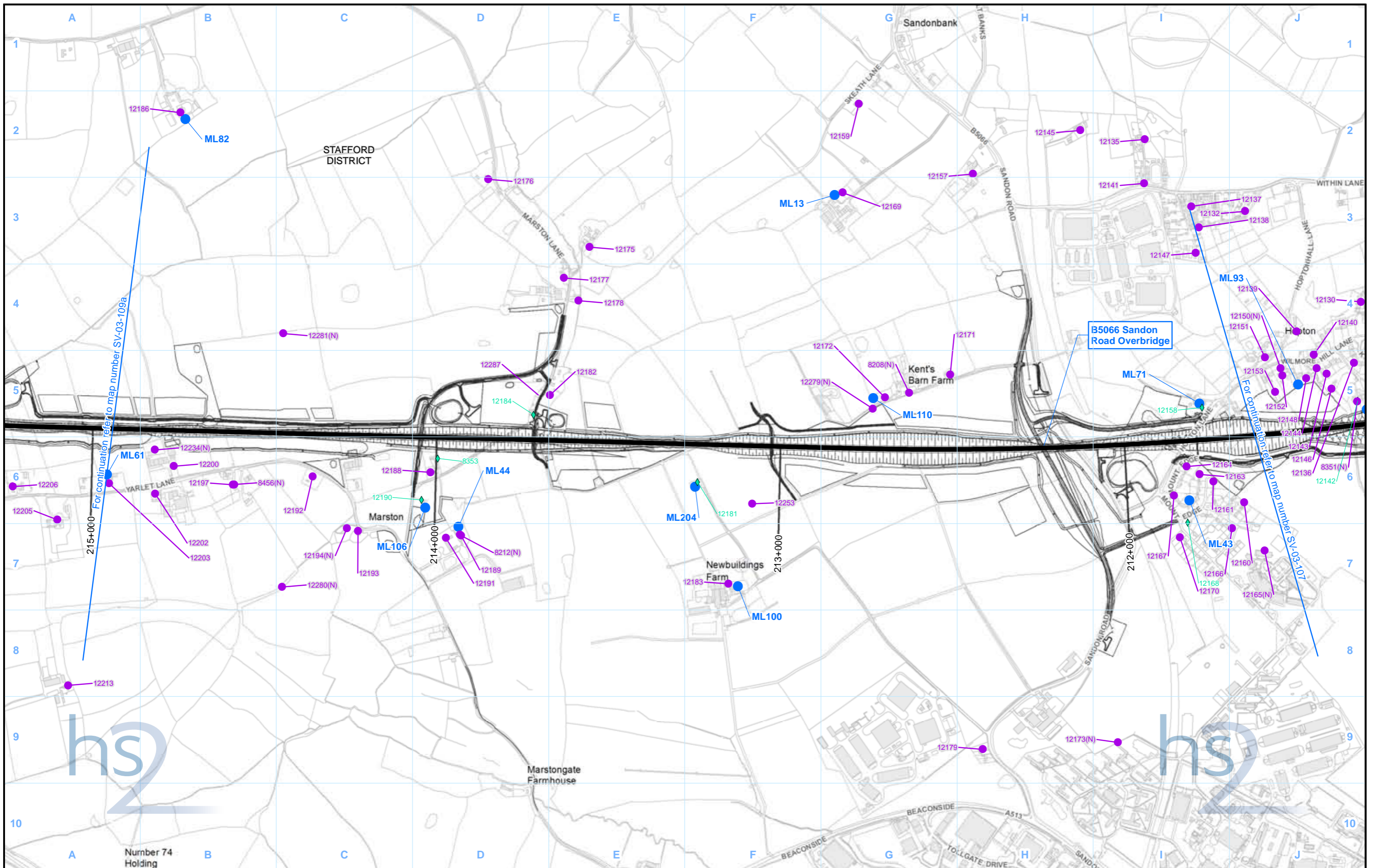
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Doc Number: C861-ARP-EV-MAP-000-134107-P03

Date: 07/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks: Non engineering earthworks:

- Embankment
- Cutting
- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- labelled with Measurement Location reference code

Map Number **SV-03-108**

Map Name
Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments

Community Area 2:
Colwich to Yarlet

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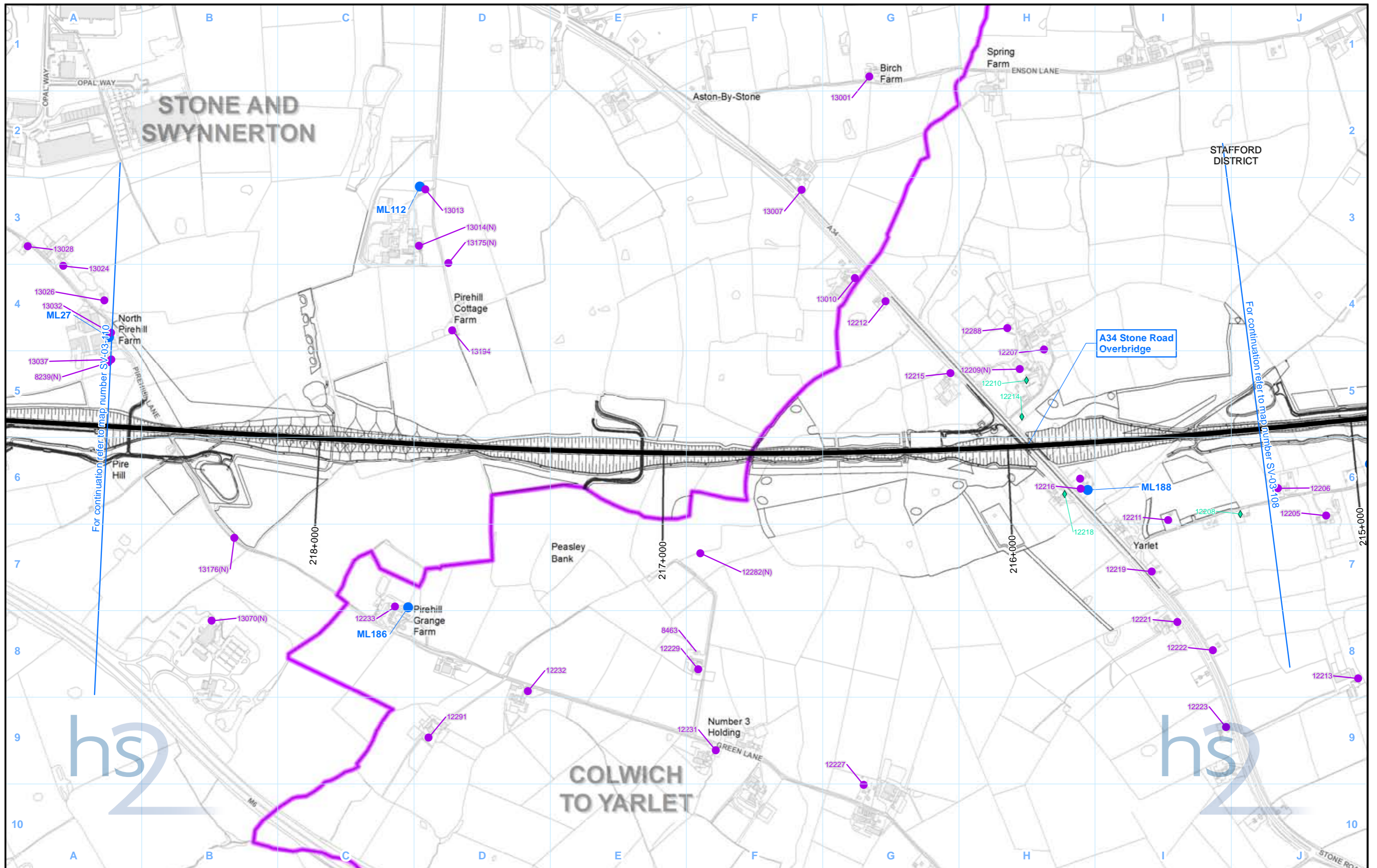
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Date: 14/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks: Non engineering earthworks:

- Embankment
- Cutting
- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

Map Number: SV-03-109a

Map Name: Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments

Community Area 2: Colwich to Yarlet

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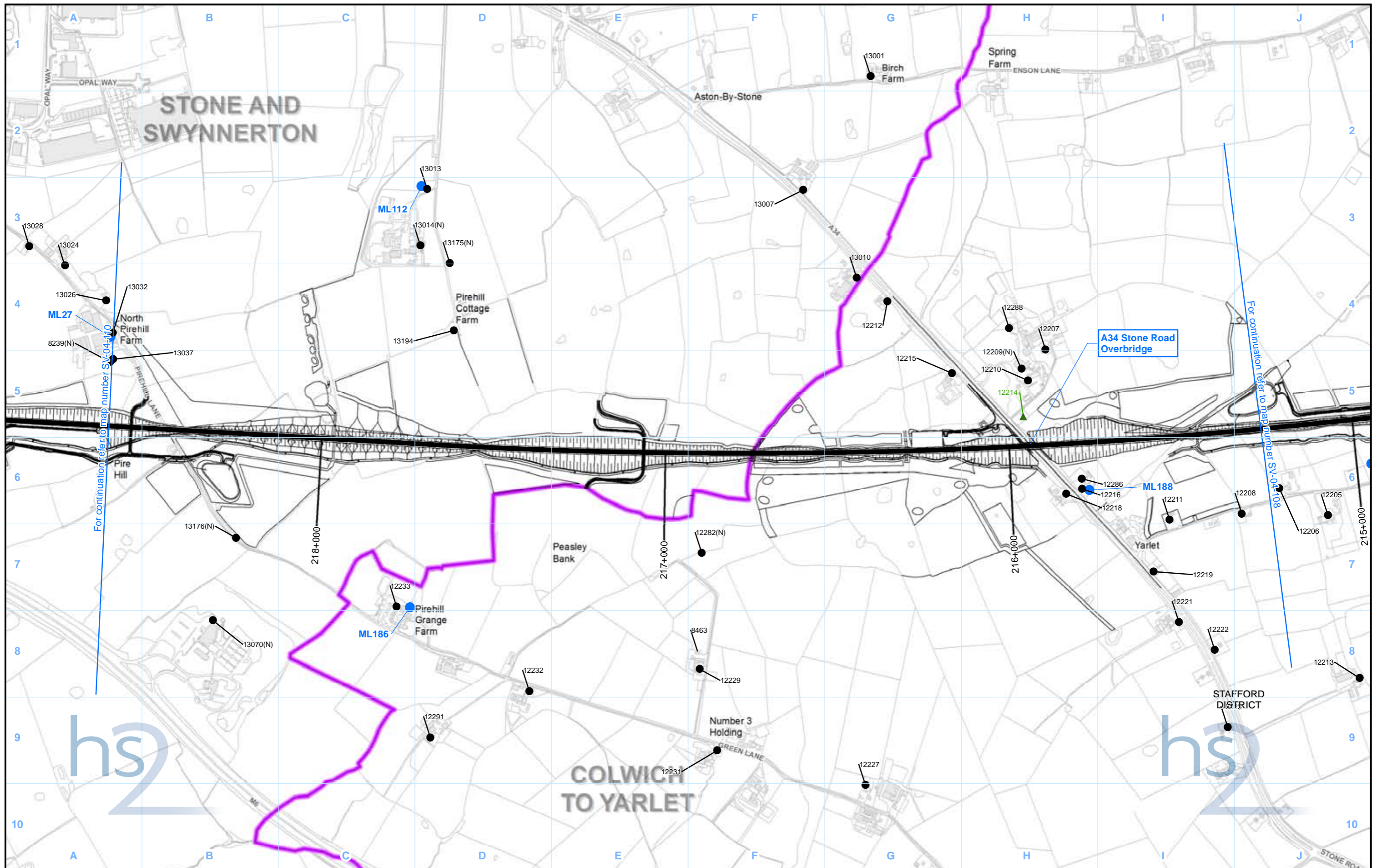
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Date: 07/06/17



Legend - General features

- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary
- Engineering earthworks:
- Embankment
 - Cutting
- Non engineering earthworks:
- Embankment
 - Cutting

Legend - Sound related features

- 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
 - Baseline measurement locations
- } labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- { labelled with Measurement Location reference code

Map Number
SV-04-109a

Map Name
Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments

Community Area 2:
Colwich to Yarlet

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Date: 07/06/17

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High Speed Rail (West Midlands-Crewe)

Environmental Statement

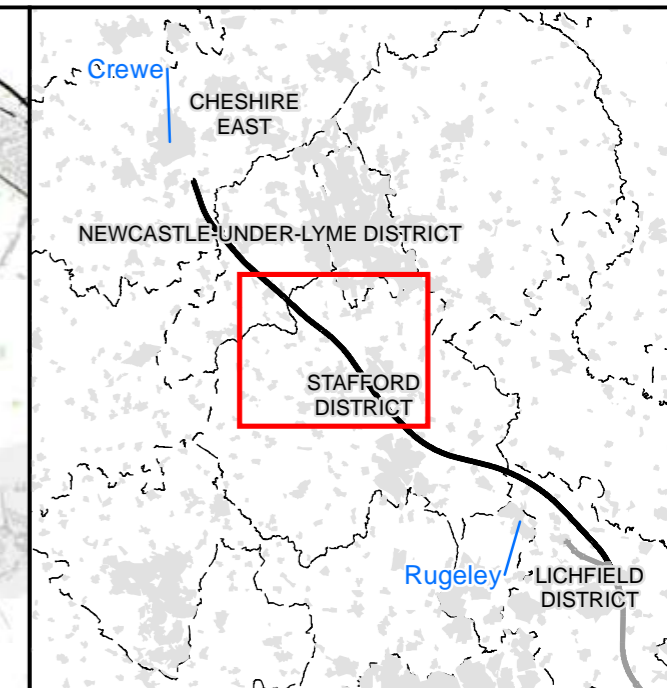
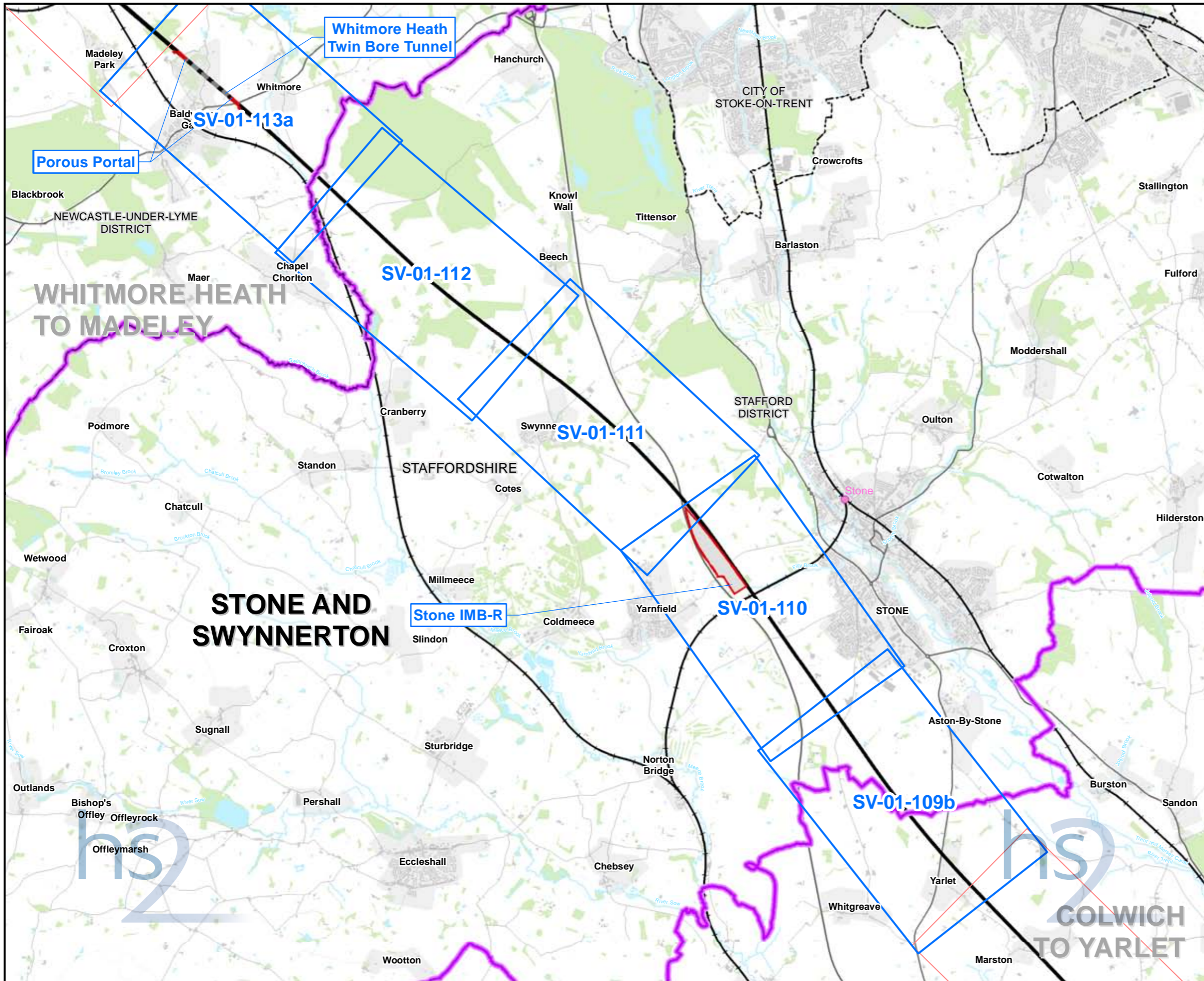
CA3 Stone and Swynnerton

**SV-01 - Operational Sound Contour Maps
and Likely Significant Effects**

**SV-02 - Operational Noise and Vibration Impacts
and Likely Significant Effects (with Assessment Locations)**

**SV-03 - Assessment and Monitoring Locations for Construction Sound,
Noise & Vibration Assessments**

**SV-04 - Assessment and Monitoring Locations for Operational Sound,
Noise & Vibration Assessments**



Map Series Information:

SV-01 presents the predicted operational sound from the new railway.

The sound levels from the new railway (expressed as $L_{pAeq,T}$) are presented in typical noise mapping colours in 5 dB steps. There is a panel at the top right of the figure; the left-hand section of this panel contains a key communicating the night-time and daytime sound levels represented by the various colours. The right-hand part of the same panel contains text explaining how the sound levels presented on the figure inform the assessment of direct noise impacts and likely significant effects. A corresponding and similar panel is found on SV-02, along with the key sound contours that were used within the environmental assessment.

Also presented on SV-01 are the following (which are also included on SV-02):

- A representation of the Proposed Scheme, including the railway alignment (indicating whether it is on the surface or in tunnel), any new and altered roads and all associated engineering and environmental mitigation earthworks;
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- symbols representing buildings that would potentially qualify for noise insulation;
- labels identifying the residual likely significant noise effects of the Proposed Scheme, and
- the extent of the study area within which the direct impacts and effects of the scheme have been quantitatively assessed.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

| | | | |
|--|--|--|--|
| | Route in tunnel | | Map sheets included in this community area |
| | Route on surface | | Map sheets not included in this community area |
| | Depot, station, headhouse or portal building | | |
| | Community area boundary | | |
| | Existing railway station | | |
| | County boundary | | |
| | District/Borough boundary | | |

| | |
|-------------------|--|
| Map Number | SV-01-INDEX-CA3 |
| Map Name | Index Map of: Operational Sound Contour Maps and Likely Significant Effects |
| Community Area 3: | Stone and Swynnerton |

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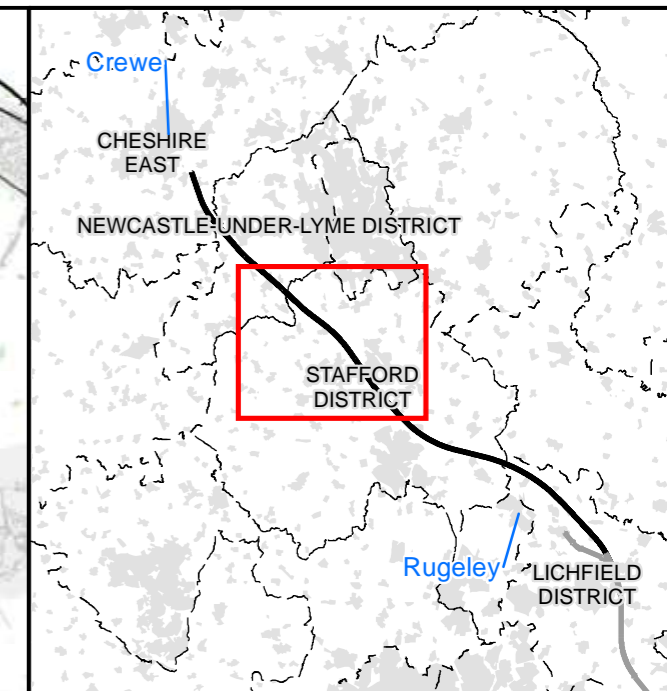
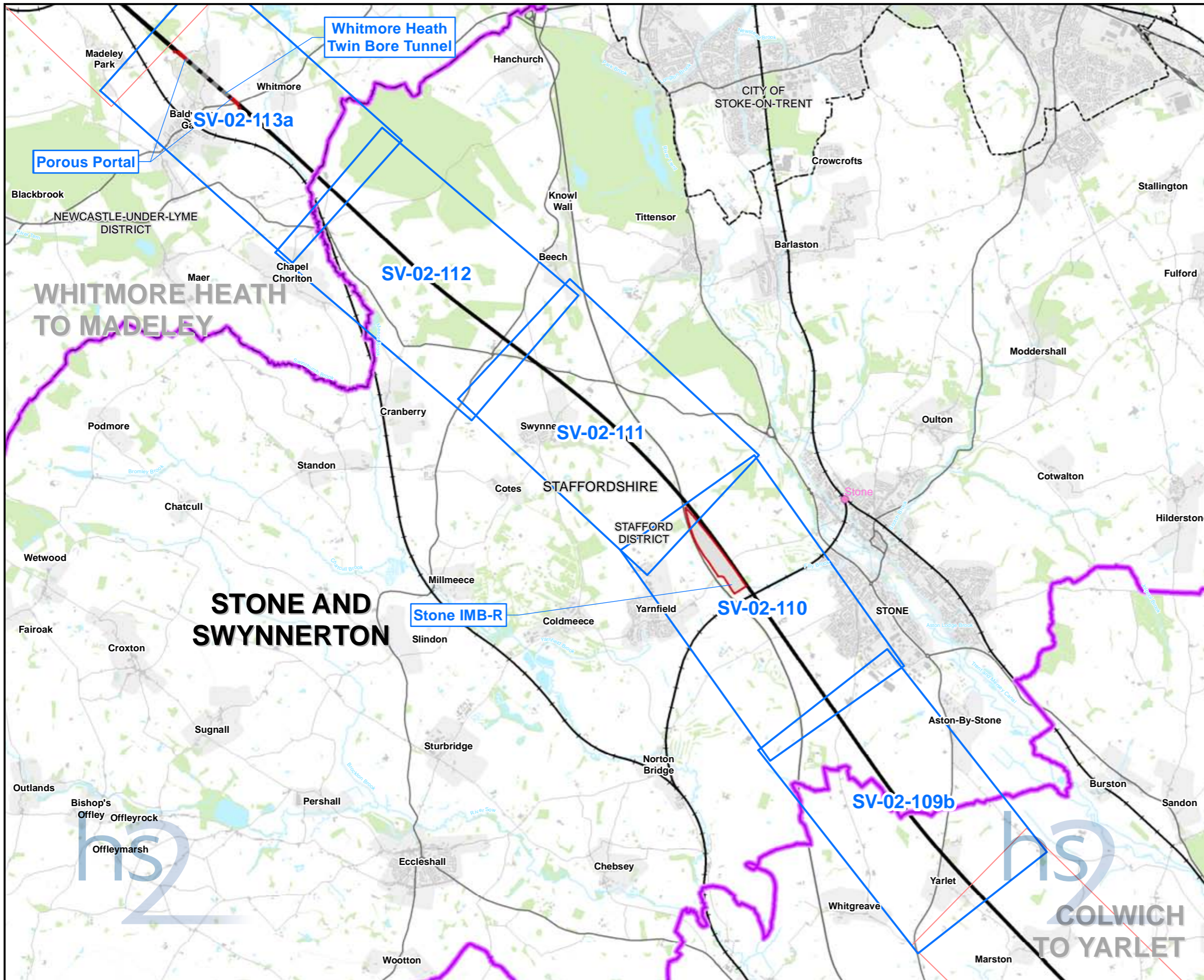
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Date: 06/06/17



Map Series Information:

SV-02 presents the direct operational noise impacts and likely significant effects of the Proposed Scheme.

The SV-02 figure series necessarily contains a large amount of information relating to the operational noise and vibration assessment. It is designed to communicate visually the assessment process from the prediction of impacts to the determination of likely residual significant effects. The corresponding text is included in Vol2 and Vol5.

Key items on the map include the following:

- The Proposed Scheme (the proposed railway alignments and surrounding associated earthworks/roads);
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- the study areas, which indicate the areas within which direct sound and vibration impacts of the scheme have been quantitatively assessed;
- the calculated direct operational impacts of the scheme, displayed as colour-coded buildings and symbols representing buildings that would potentially qualify for noise insulation;
- sound contours representing sound produced by the new railway displayed in a simpler manner than on SV-01 in order not to obscure the features on the map series);
- the assessment locations at which a quantitative prediction of sound and impacts have been carried out (representing a number of nearby buildings). These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004; and
- labels indicating where the likely residual direct noise or vibration significant effects have been identified. These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

| | | | |
|--|--|--|--|
| | Route in tunnel | | Map sheets included in this community area |
| | Route on surface | | Map sheets not included in this community area |
| | Depot, station, headhouse or portal building | | |
| | Community area boundary | | |
| | Existing railway station | | |
| | County boundary | | |
| | District/Borough boundary | | |

| | |
|-------------------|---|
| Map Number | SV-02-INDEX-CA3 |
| Map Name | Index Map of: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations) |
| Community Area 3: | Stone and Swynnerton |

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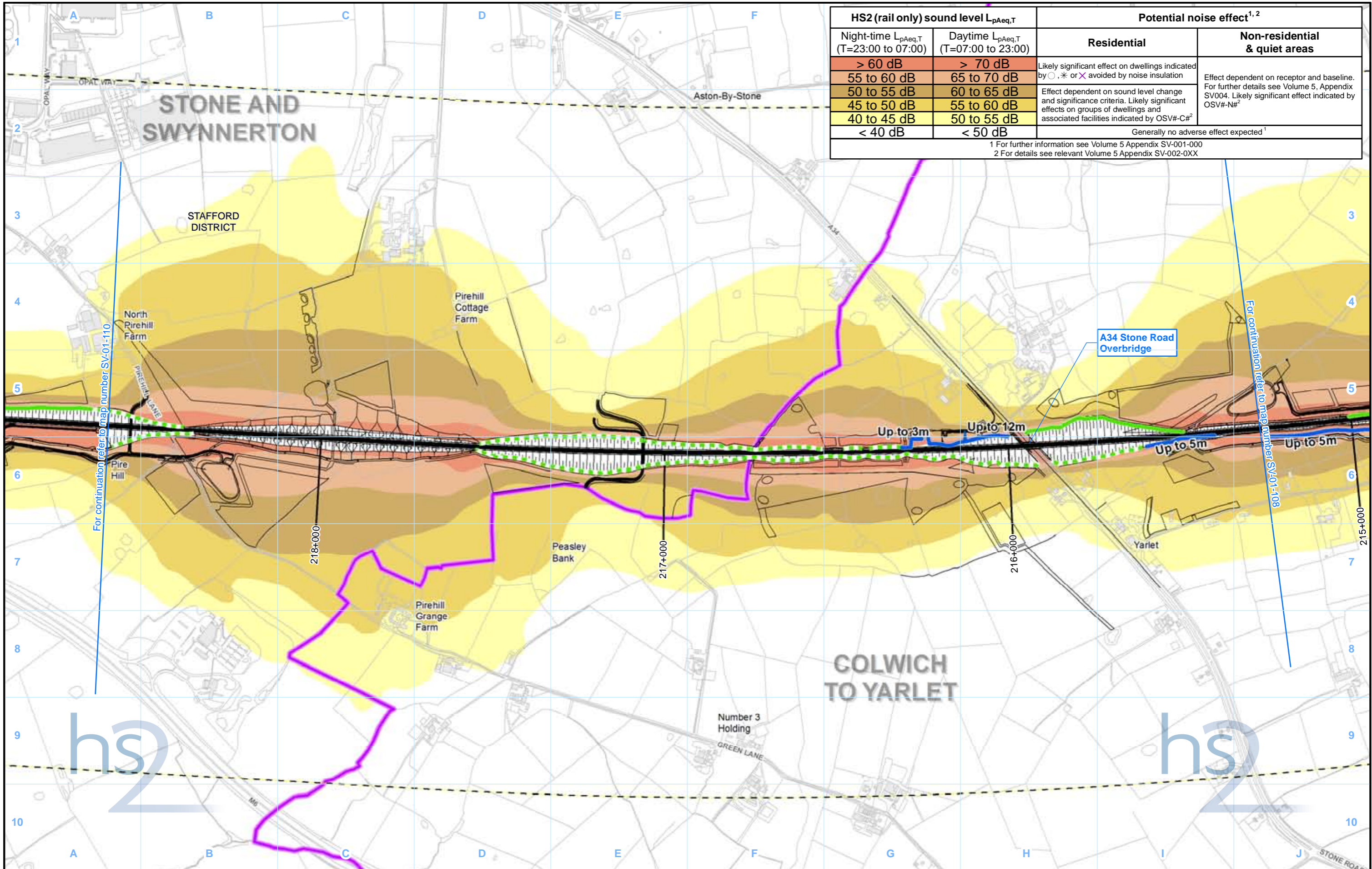
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0 500 1,000 1,500 2,000 2,500 Metres

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Doc Number: C861-ARP-EV-MAP-000-132003-P03 Date: 06/06/17



| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | Generally no adverse effect expected ¹ | |
| < 40 dB | < 50 dB | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

- Legend - General features**
- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Engineering earthworks:**
- Embankment
 - Cutting
- Non engineering earthworks:**
- Embankment
 - Cutting

- Legend - Sound related features**
- Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
 - Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged features further reducing noise effects:
- Other environmental e.g. landscaping
 - Engineering e.g. cuttings

- 1km Airborne sound study area
- 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
- * Labelled with total barrier height above rail level

Map Number: SV-01-109b

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 3: Stone and Swynnerton

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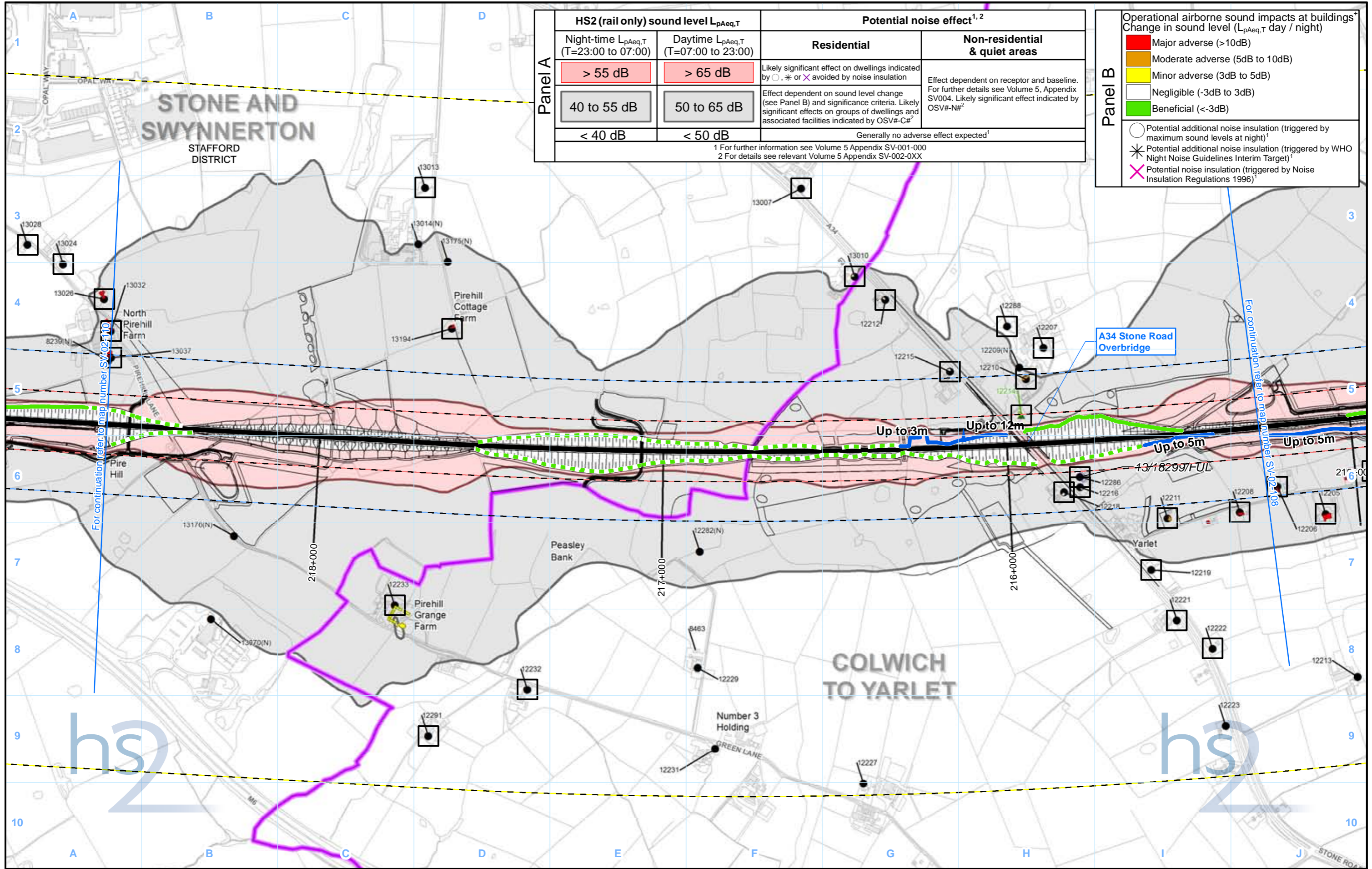
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Date: 07/06/17



| 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 | Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# 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-002-0XX

| Operational airborne sound impacts at buildings* Change in sound level ($L_{pAeq,T}$ day / night) | |
|---|---|
| Major adverse (>10dB) | ○ Potential additional noise insulation (triggered by maximum sound levels at night) ¹ |
| Moderate adverse (5dB to 10dB) | * Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target) ¹ |
| Minor adverse (3dB to 5dB) | ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996) ¹ |
| Negligible (-3dB to 3dB) | |
| Beneficial (<-3dB) | |

Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Embankment
- Cutting
- L_{pAFmax} exceeds 60dB façade**

Non engineering earthworks:

- Embankment
- Cutting

* Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

Legend - Sound related features

- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-109b

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 3: Stone and Swynnerton

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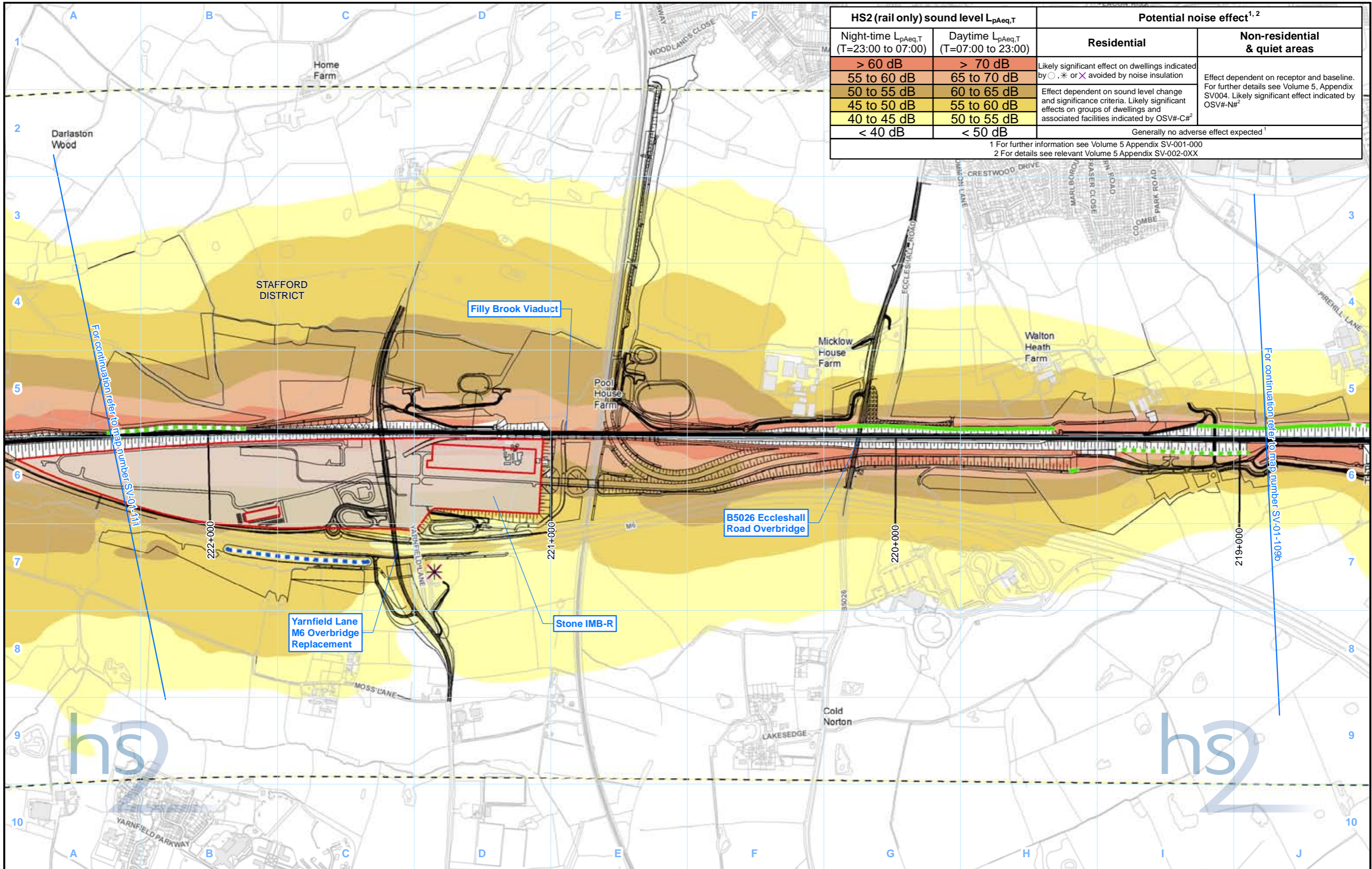
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Doc Number: C861-ARP-EV-MAP-000-132209-P03

Date: 07/06/17

| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 40 dB | < 50 dB | Generally no adverse effect expected ¹ | |
| <p>1 For further information see Volume 5 Appendix SV-001-000</p> <p>2 For details see relevant Volume 5 Appendix SV-002-0XX</p> | | | |



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

Envisaged mitigation to avoid / reduce significant noise effects:

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

Envisaged features further reducing noise effects:

- Other environmental e.g. landscaping
- Engineering e.g. cuttings

Legend - Sound related features

- 1km Airborne sound study area
- 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

* Labelled with total barrier height above rail level

Map Number: SV-01-110

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 3: Stone and Swynnerton

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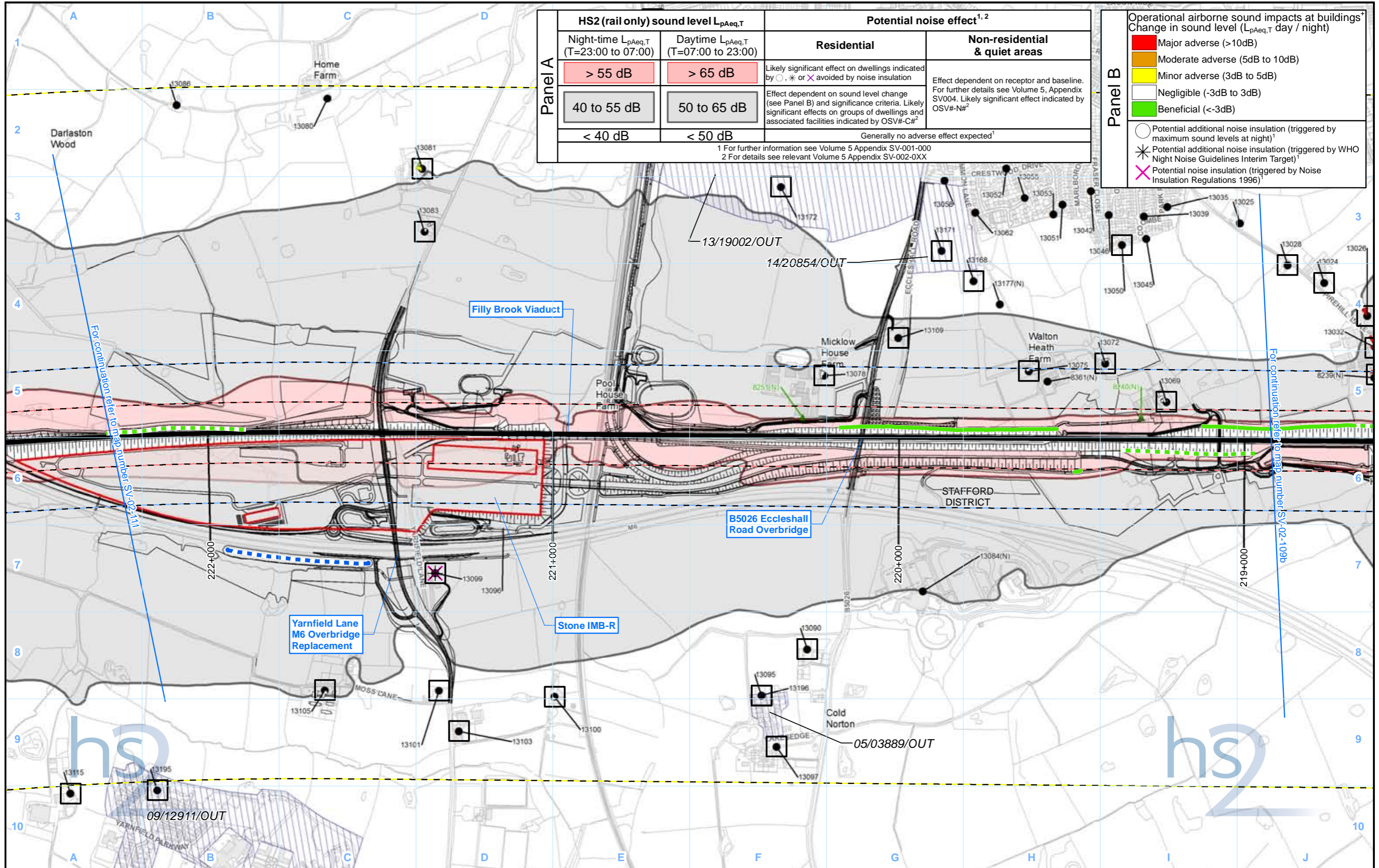
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Date: 06/06/17



| 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 | Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# 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-002-0XX

| Operational airborne sound impacts at buildings ⁺ Change in sound level ($L_{pAeq,T}$ day / night) | |
|---|---|
| Major adverse (>10dB) | ○ Potential additional noise insulation (triggered by maximum sound levels at night) ¹ |
| Moderate adverse (5dB to 10dB) | * Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target) ¹ |
| Minor adverse (3dB to 5dB) | ✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996) ¹ |
| Negligible (-3dB to 3dB) | |
| Beneficial (<-3dB) | |

Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Embankment
- Cutting
- L_{pAFmax} exceeds 60dB façade**

Non engineering earthworks:

- Embankment
- Cutting

* Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

Legend - Sound related features

- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-110

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

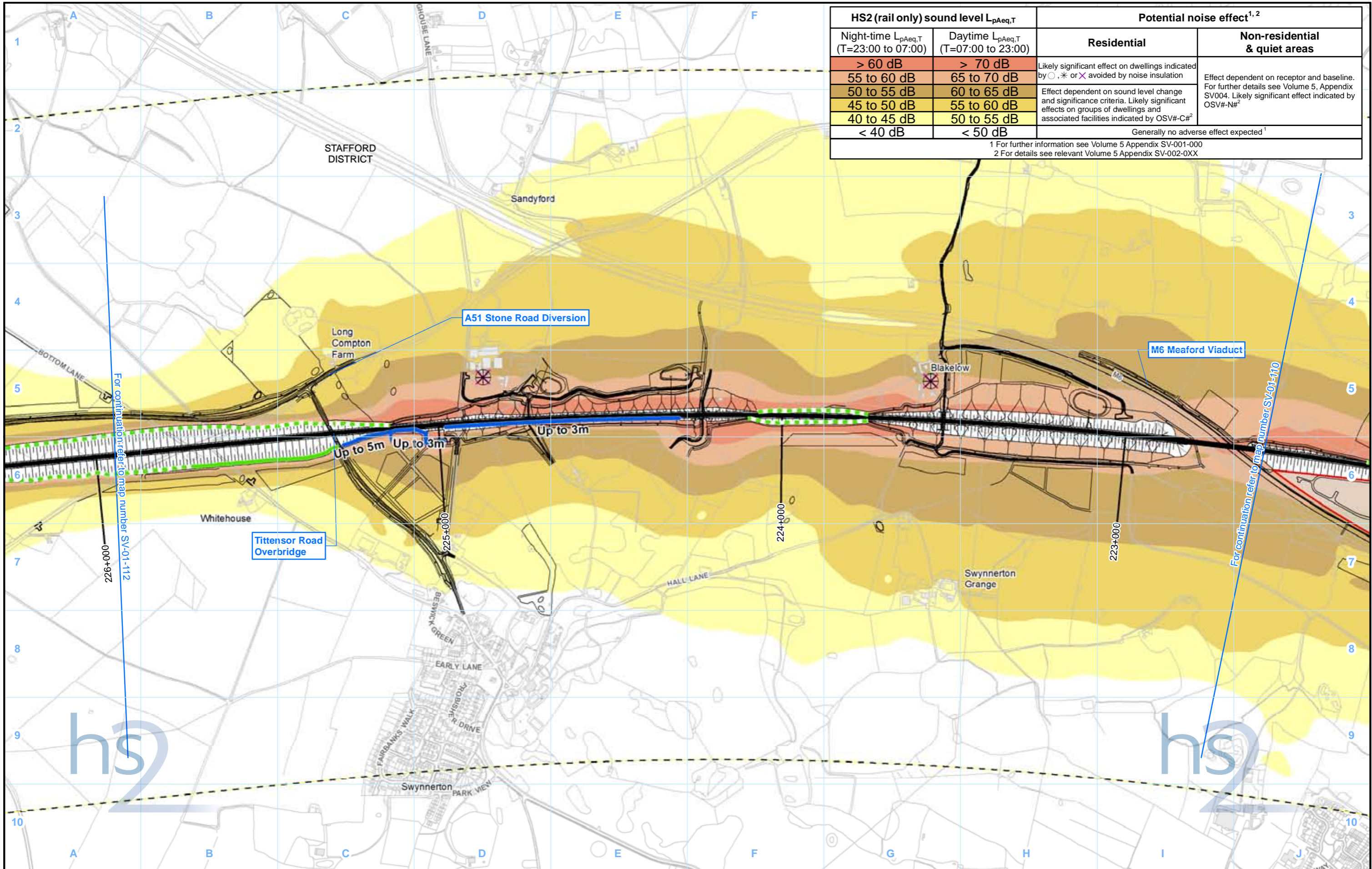
Community Area 3: Stone and Swynnerton

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| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | Generally no adverse effect expected ¹ | |
| < 40 dB | < 50 dB | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

- Legend - General features**
- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Engineering earthworks:**
- Embankment
 - Cutting
- Non engineering earthworks:**
- Embankment
 - Cutting

- Legend - Sound related features**
- Envisaged mitigation to avoid / reduce significant noise effects:
- Landscaping and/or fence barriers*
 - Engineering e.g. cuttings (green tunnels separately marked)
- Envisaged features further reducing noise effects:
- Other environmental e.g. landscaping
 - Engineering e.g. cuttings

- Envisaged mitigation to avoid / reduce significant noise effects:
- 1km Airborne sound study area
 - 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
- * Labelled with total barrier height above rail level

Map Number: SV-01-111

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 3: Stone and Swynnerton

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Date: 06/06/17

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

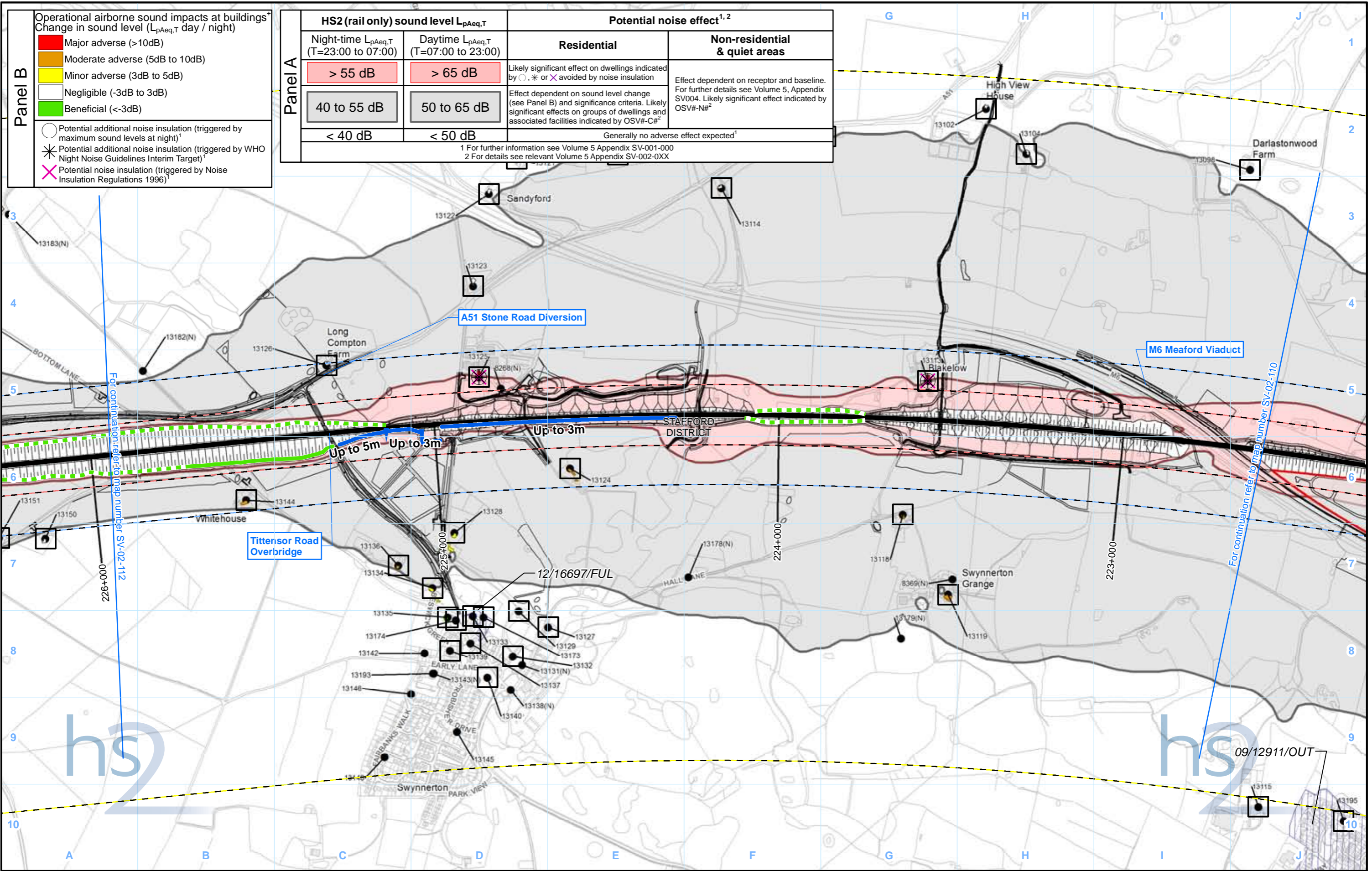
✱ Potential additional noise insulation (triggered by WHO Night Noise Guidelines Interim Target)¹

✕ Potential noise insulation (triggered by Noise Insulation Regulations 1996)

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-002-0XX



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Embankment
- Cutting
- L_{pAFmax} exceeds 60dB façade**

Non engineering earthworks:

- Embankment
- Cutting

* Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only L_{pAFmax} + 2.5dB façade correction

Legend - Sound related features

- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-111

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 3: Stone and Swynnerton

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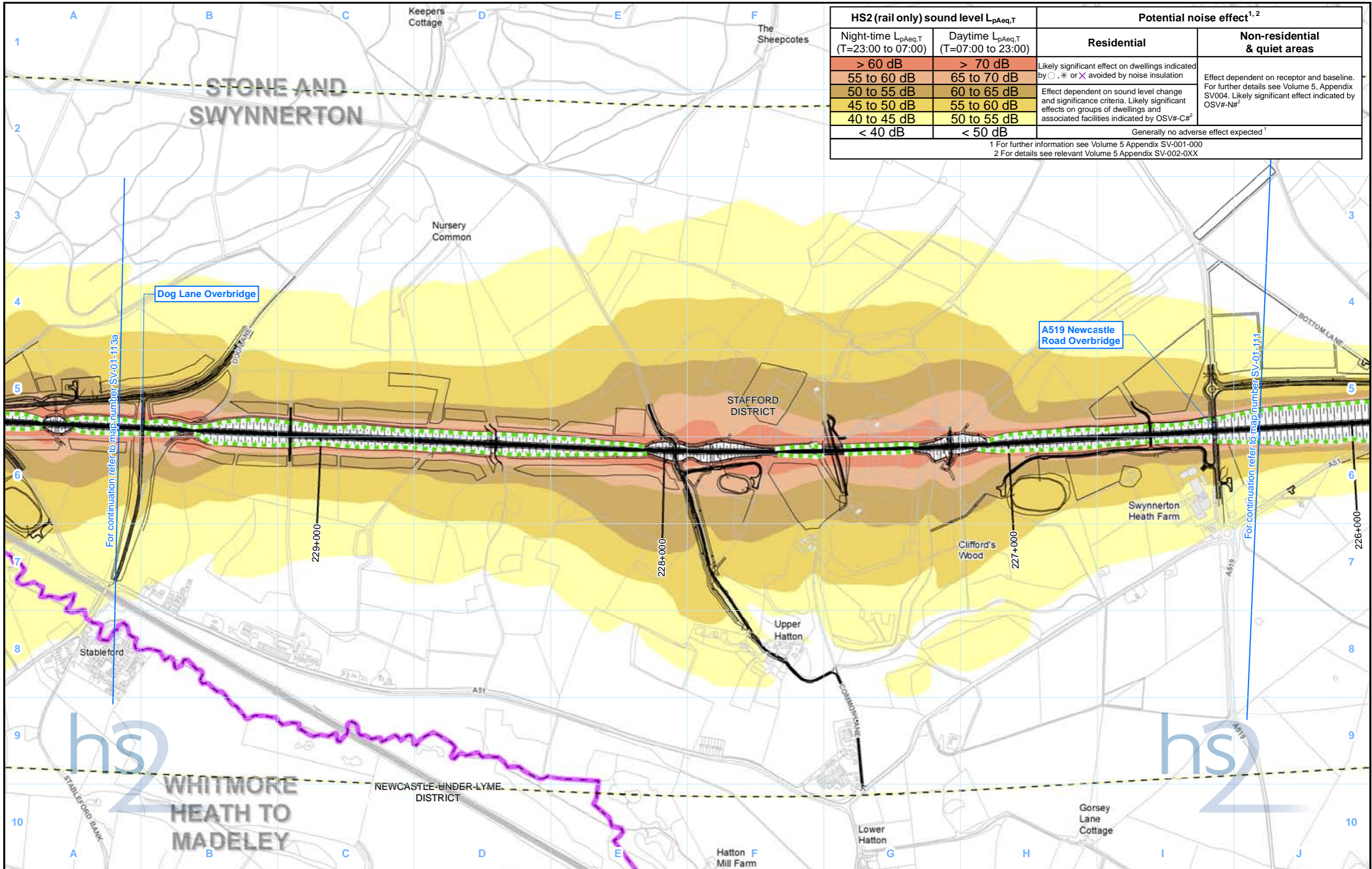
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Date: 07/06/17



| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | Generally no adverse effect expected ¹ |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 40 dB | < 50 dB | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

| | | | | | |
|---|---|---|--|---|--|
| Legend - General features Route in bored tunnel Route in cut and cover tunnel Route on surface Depot, station, headhouse or portal building Community area boundary County boundary District/Borough boundary | | Legend - Sound related features Envisaged mitigation to avoid / reduce significant noise effects: Landscaping and/or fence barriers* Engineering e.g. cuttings (green tunnels separately marked) Envisaged features further reducing noise effects: Other environmental e.g. landscaping Engineering e.g. cuttings | | Legend - Sound related features 1km Airborne sound study area 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 <p>* Labelled with total barrier height above rail level</p> | |
| Engineering earthworks: Embankment Cutting | Non engineering earthworks: Embankment Cutting | | | | |

Map Number: SV-01-112

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 3: Stone and Swynnerton

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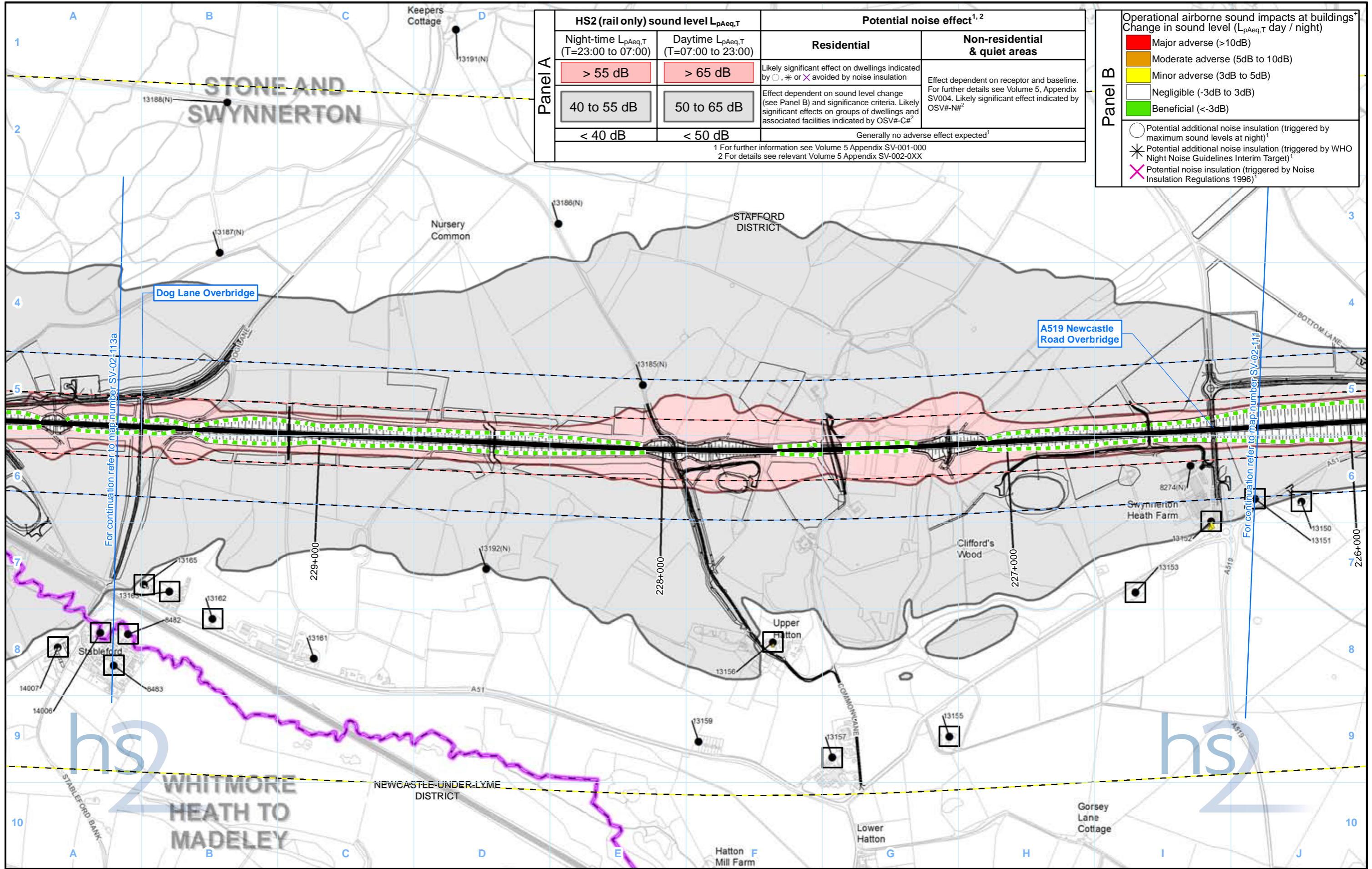
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Scale at A3: 1:10,000

0 100 200 300 400 Metres

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Date: 06/06/17



| 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 | Generally no adverse effect expected ¹ |
| < 40 dB | < 50 dB | | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

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 cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Embankment
- Cutting
- L_{pAFmax} exceeds 60dB façade**

Non engineering earthworks:

- Embankment
- Cutting

* Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

Legend - Sound related features

- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-112

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 3: Stone and Swynnerton

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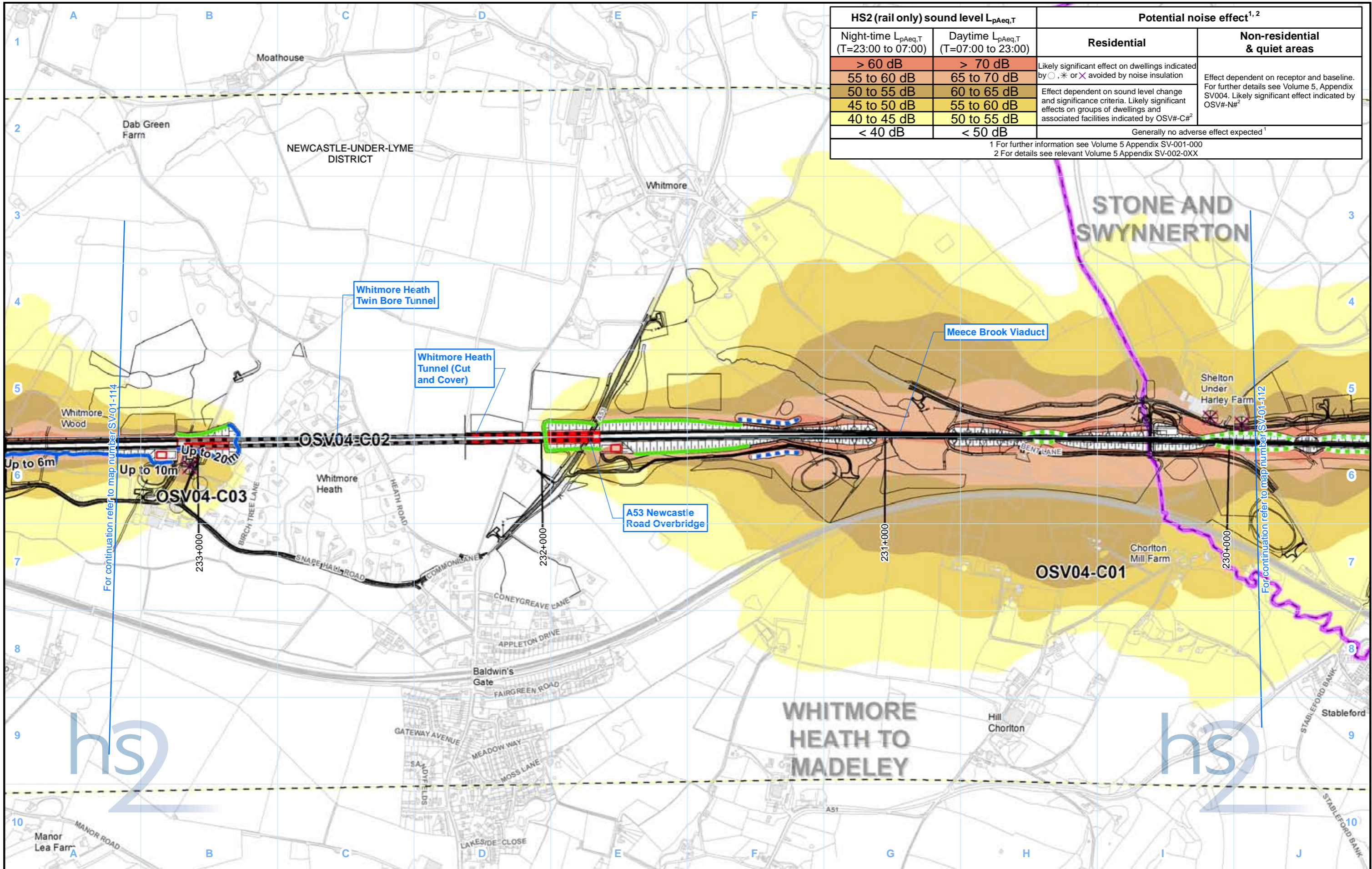
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Date: 07/06/17



| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | Generally no adverse effect expected ¹ | |
| < 40 dB | < 50 dB | 1 For further information see Volume 5 Appendix SV-001-000 2 For details see relevant Volume 5 Appendix SV-002-0XX | |

Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

Envisaged mitigation to avoid / reduce significant noise effects:

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

Envisaged features further reducing noise effects:

- Other environmental e.g. landscaping
- Engineering e.g. cuttings

Map Number: SV-01-113a

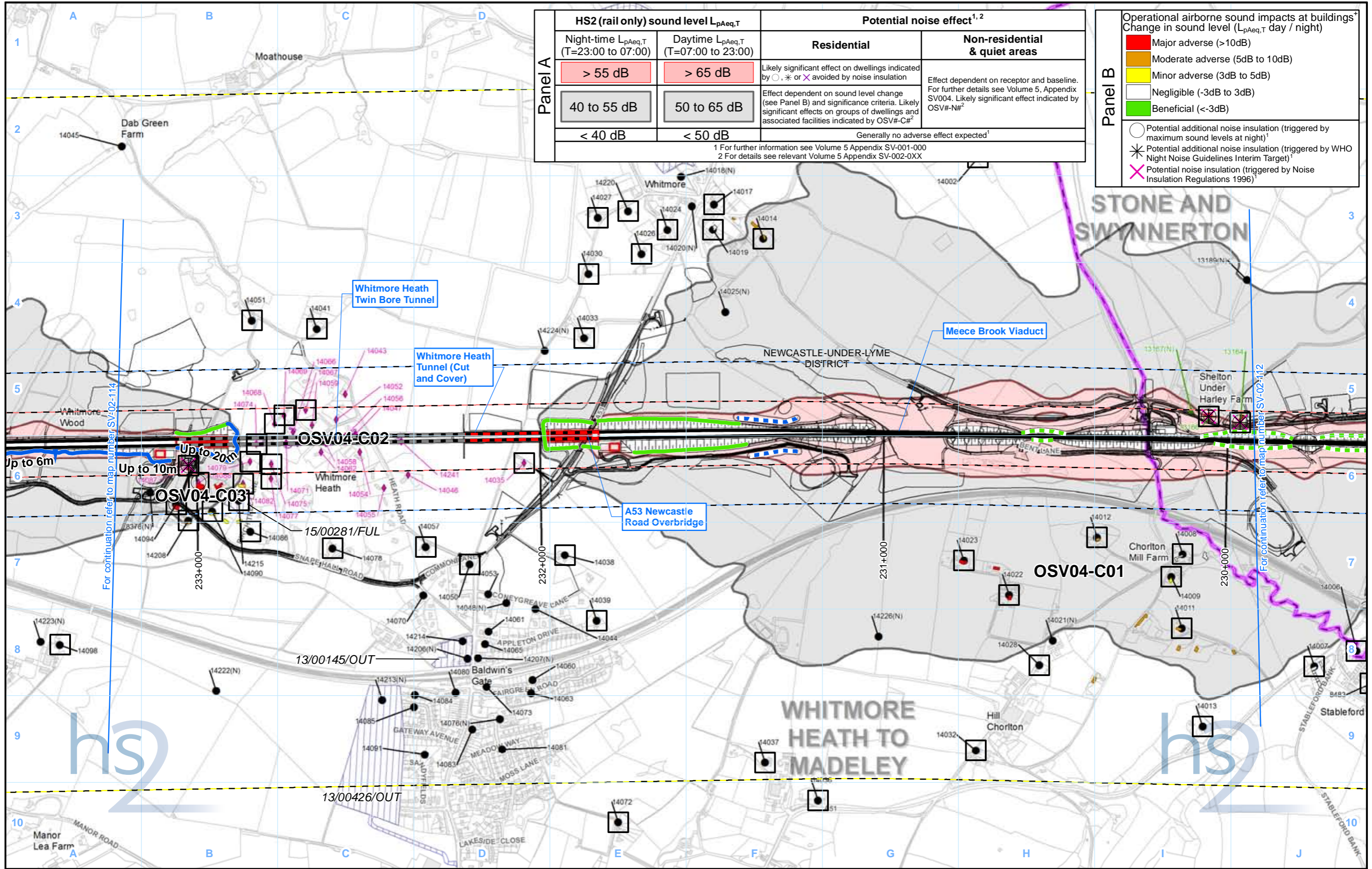
Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 3: Stone and Swynnerton

Scale at A3: 1:10,000

Doc Number: C861-ARP-EV-MAP-000-131113-P03

Date: 06/06/17



| 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 | Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# 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-002-0XX

| Panel B | Operational airborne sound impacts at buildings ⁺ Change in sound level ($L_{pAeq,T}$ day / night) |
|---------|---|
| Red | Major adverse (>10dB) |
| Orange | Moderate adverse (5dB to 10dB) |
| Yellow | Minor adverse (3dB to 5dB) |
| White | Negligible (-3dB to 3dB) |
| Green | 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 cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Embankment
- Cutting
- L_{pAFmax} exceeds 60dB façade**

Non engineering earthworks:

- Embankment
- Cutting

* Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

Legend - Sound related features

- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-113a

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 3: Stone and Swynnerton

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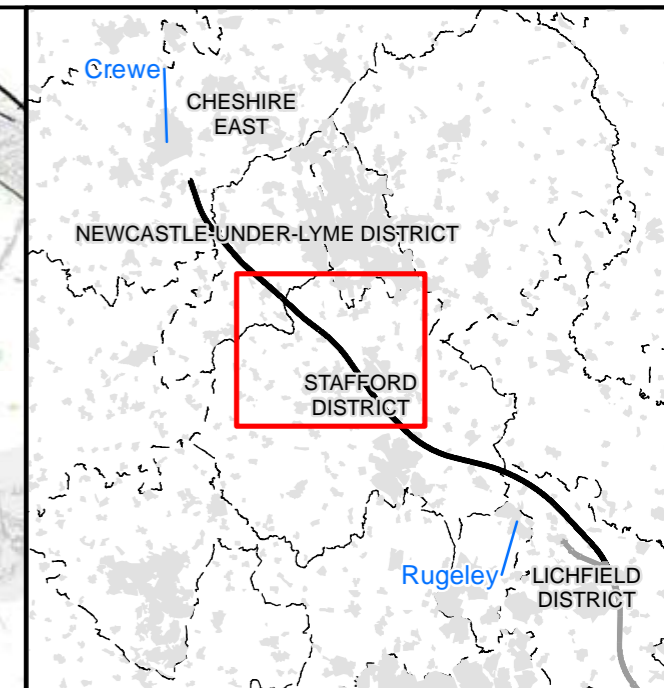
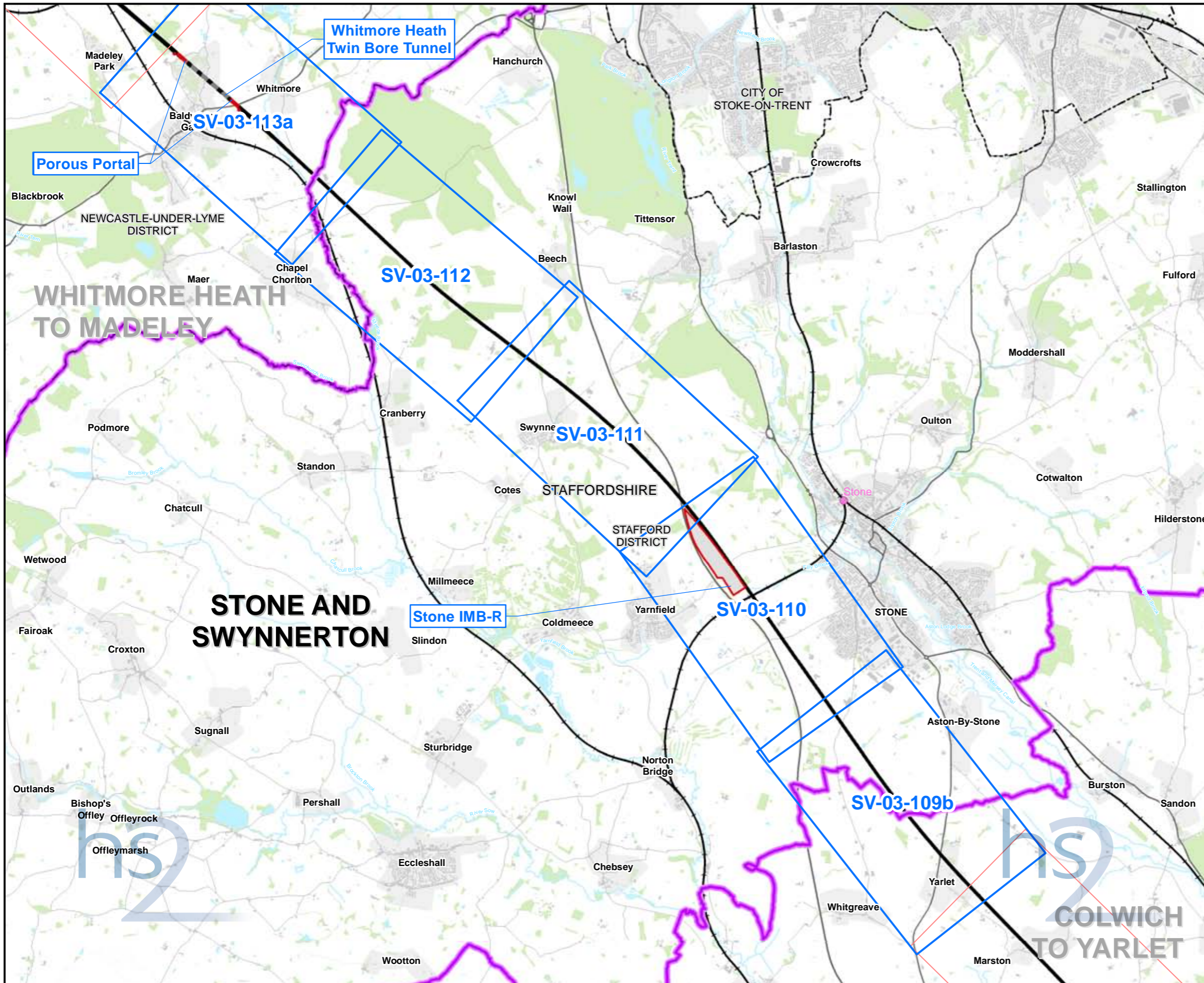
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Doc Number: C861-ARP-EV-MAP-000-132113-P03

Date: 07/06/17



Map Series Information:

The SV-03 figure series accompanies the construction noise & vibration assessments. It shows the locations at which a quantitative assessment of the direct effects of construction noise and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the construction noise and vibration reports contained in Volume 5: Appendix SV-002-0XX


The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002-0XX.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

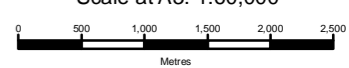
| Main Map Legend | |
|-----------------|--|
| | Route in tunnel |
| | Route on surface |
| | Depot, station, headhouse or portal building |
| | Community area boundary |
| | Existing railway station |
| | County boundary |
| | District/Borough boundary |
| | Map sheets included in this community area |
| | Map sheets not included in this community area |

| | |
|------------|--|
| Map Number | SV-03-INDEX-CA3 |
| Map Name | Index Map of: Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments |
| | Community Area 3: Stone and Swynnerton |


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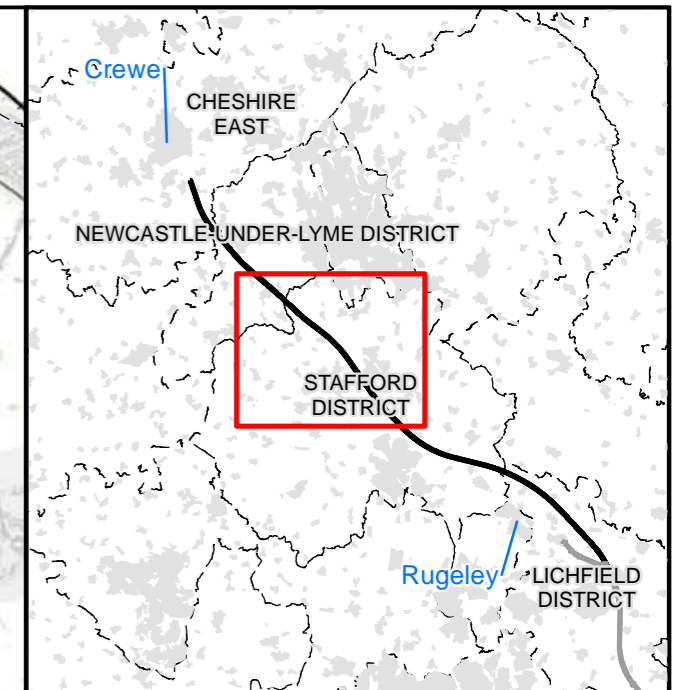
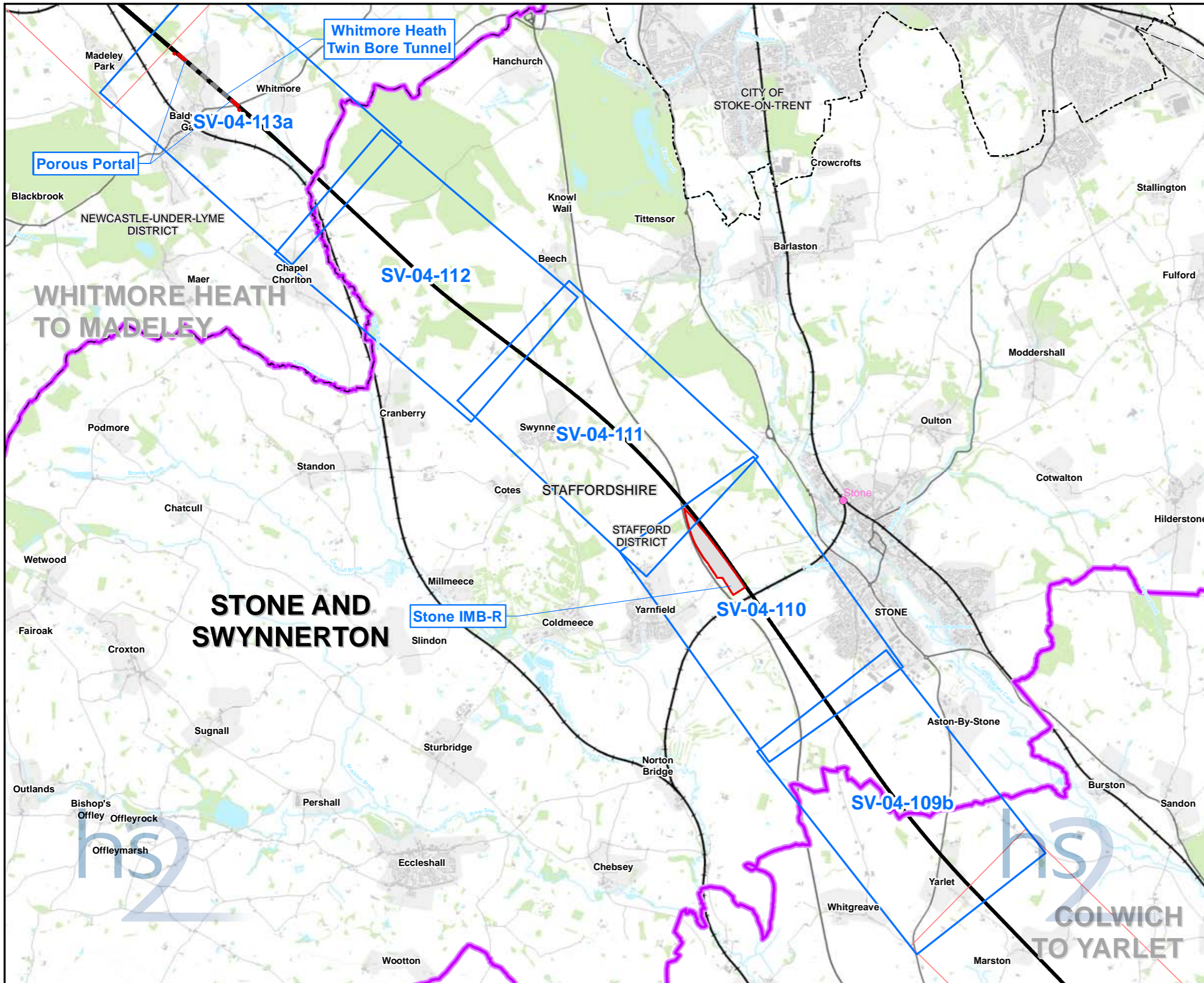
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Doc Number: C861-ARP-EV-MAP-000-133003-P03 Date: 06/06/17



Map Series Information:

The SV-04 figure series shows the locations at which a quantitative assessment of the direct effects of operational sound and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-002-0XX


The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002-0XX

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.


| Main Map Legend | |
|-----------------|--|
| | Route in tunnel |
| | Route on surface |
| | Depot, station, headhouse or portal building |
| | Community area boundary |
| | Existing railway station |
| | County boundary |
| | District/Borough boundary |
| | Map sheets included in this community area |
| | Map sheets not included in this community area |

| | |
|------------|---|
| Map Number | SV-04-INDEX-CA3 |
| Map Name | Index Map of: Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments |
| | Community Area 3: Stone and Swynnerton |


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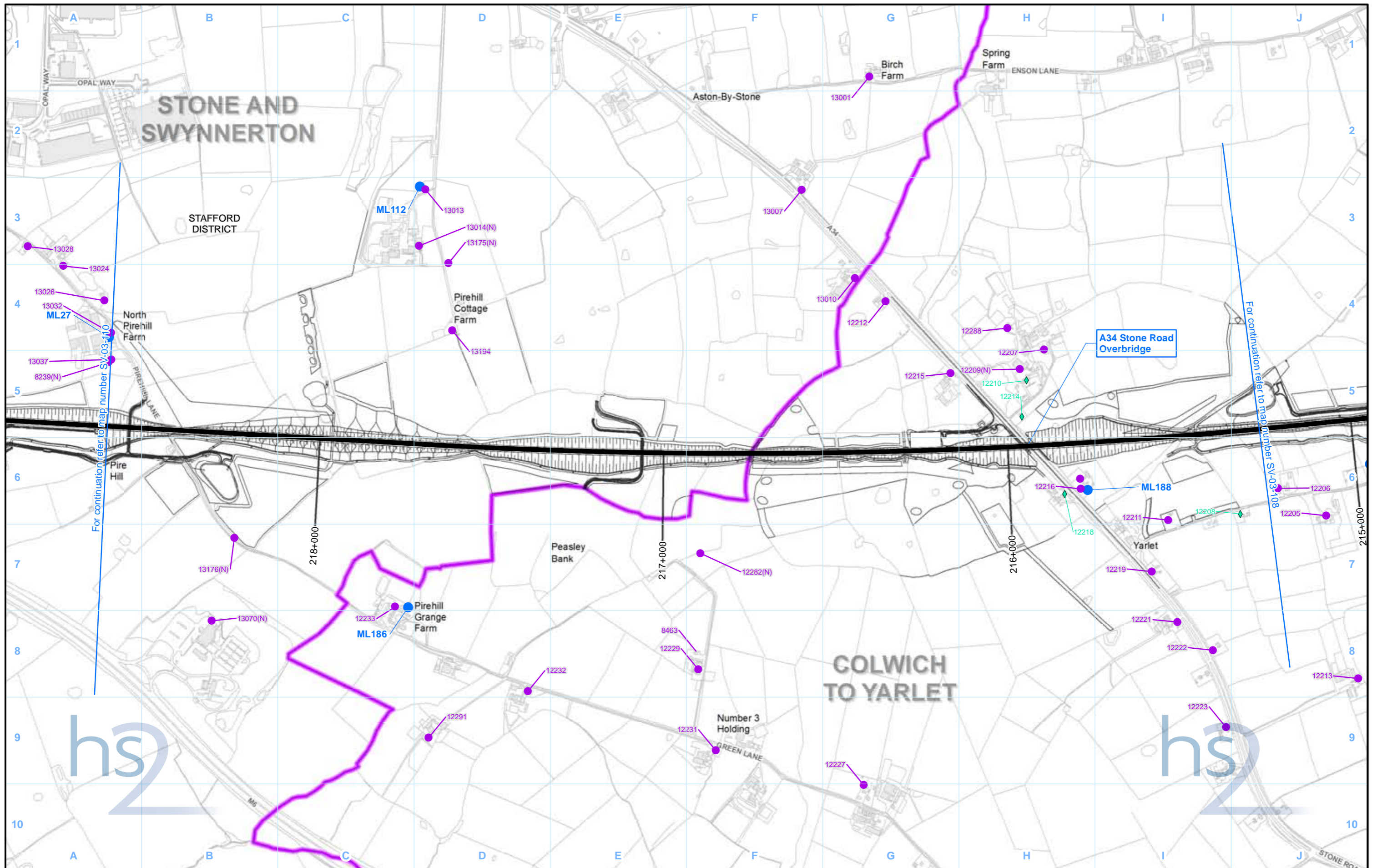
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Doc Number: C861-ARP-EV-MAP-000-134003-P03 Date: 06/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks: Non engineering earthworks:

- Embankment
- Cutting
- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

Map Number: SV-03-109b

Map Name: Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments

Community Area 3: Stone and Swynnerton

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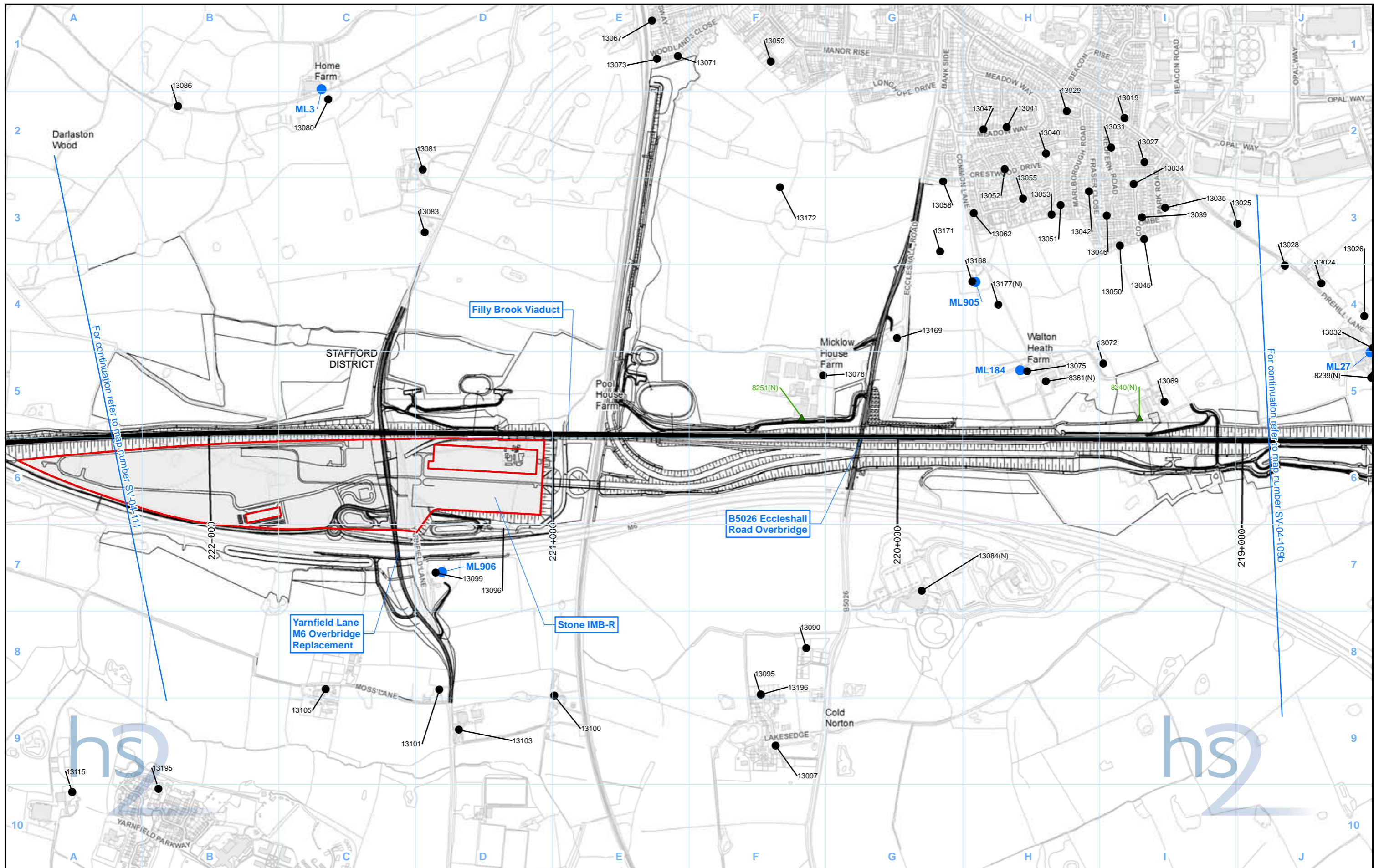
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Doc Number: C861-ARP-EV-MAP-000-133209-P03

Date: 07/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

- Engineering earthworks:**
- Embankment
 - Cutting
- Non engineering earthworks:**
- Embankment
 - Cutting

Legend - Sound related features

- 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
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

| | |
|---|--|
| Map Number | SV-04-110 |
| Map Name | Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments |
| Community Area 3: Stone and Swynnerton | |

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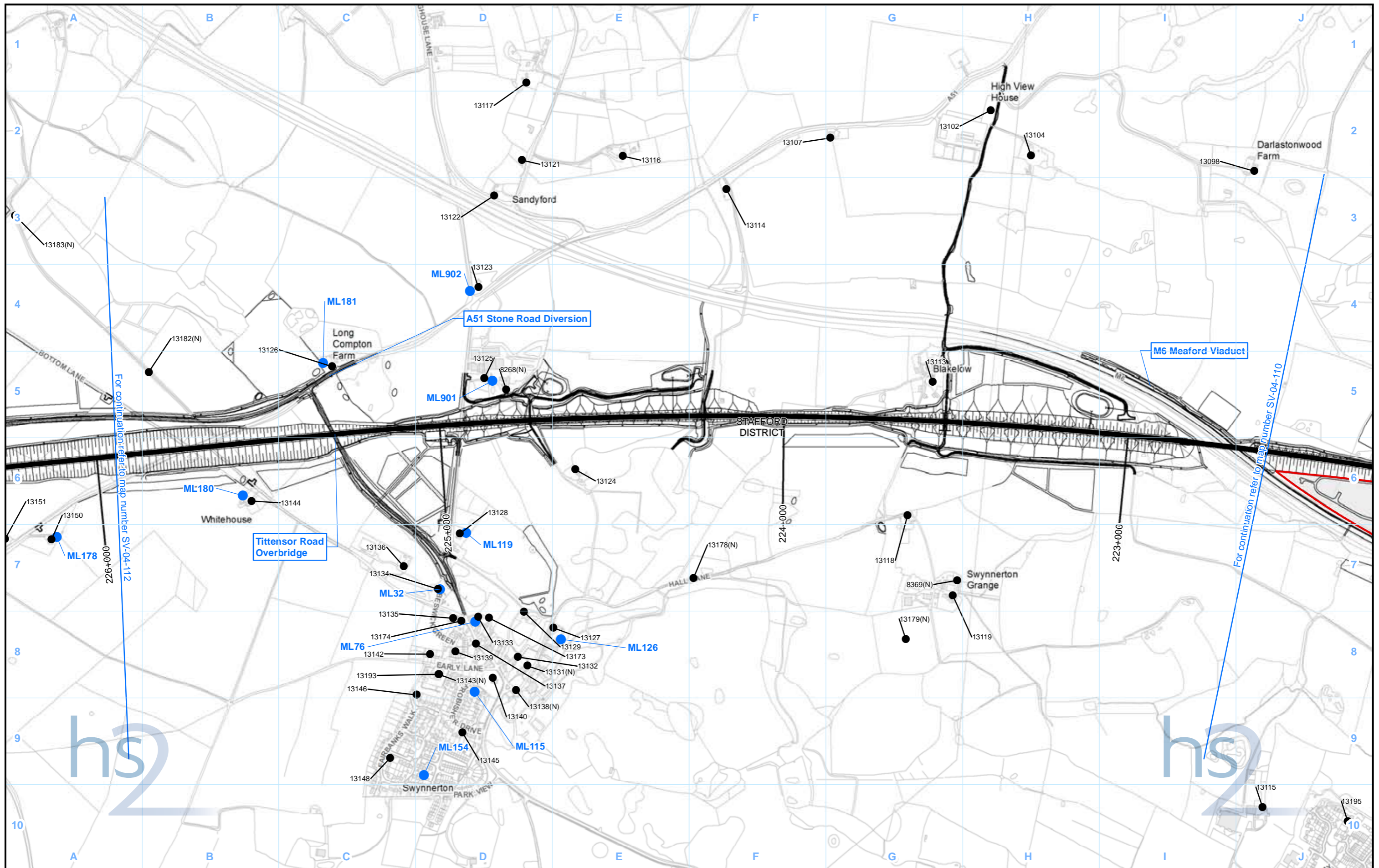
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Doc Number: C861-ARP-EV-MAP-000-134110-P03

Date: 07/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

- Engineering earthworks:
- Embankment
 - Cutting
- Non engineering earthworks:
- Embankment
 - Cutting

Legend - Sound related features

- 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
 - Baseline measurement locations
- labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

| | |
|------------|---|
| Map Number | SV-04-111 |
| Map Name | Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments |
| | Community Area 3: Stone and Swynnerton |

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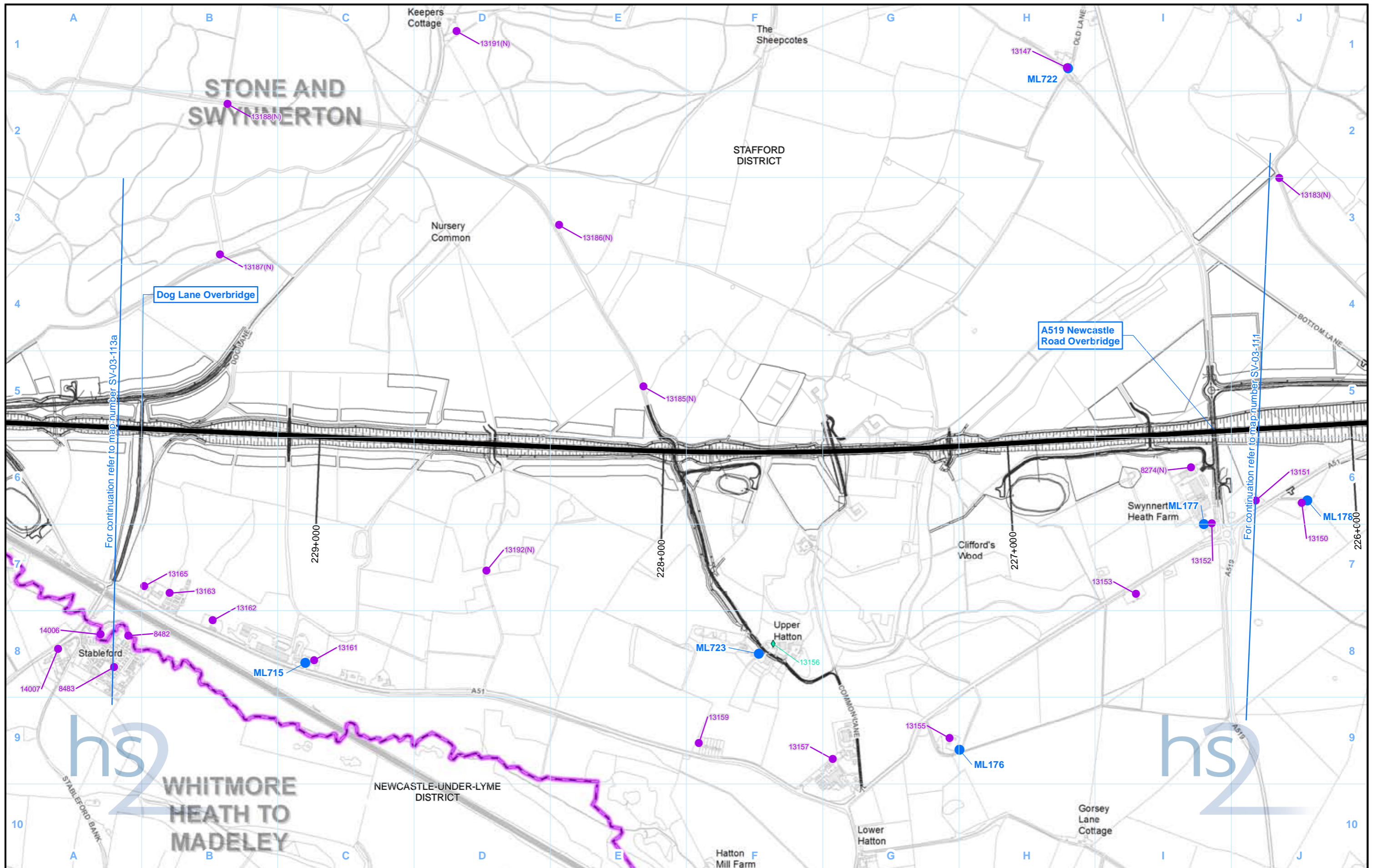
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Date: 07/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting
- Non engineering earthworks: Embankment
- Non engineering earthworks: Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

| | |
|---|---|
| Map Number | SV-03-112 |
| Map Name | Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments |
| Community Area 3: Stone and Swynnerton | |

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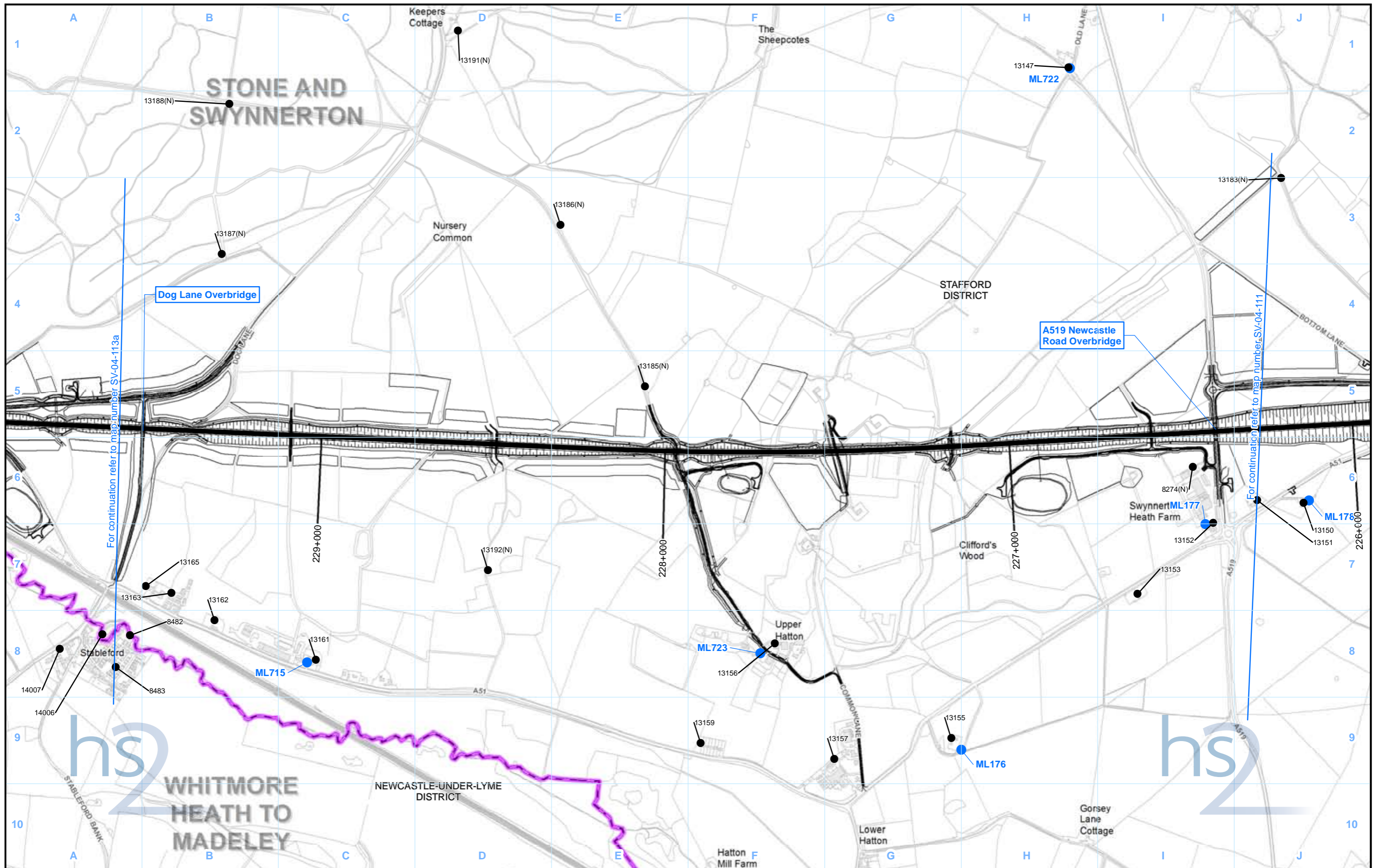
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Doc Number: C861-ARP-EV-MAP-000-133112-P03

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Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Non engineering earthworks: Embankment
- Non engineering earthworks: Cutting

Legend - Sound related features

- 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
- Baseline measurement locations

labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV-002-0XX)

labelled with Measurement Location reference code

Map Number: SV-04-112

Map Name: Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments

Community Area 3: Stone and Swynnerton

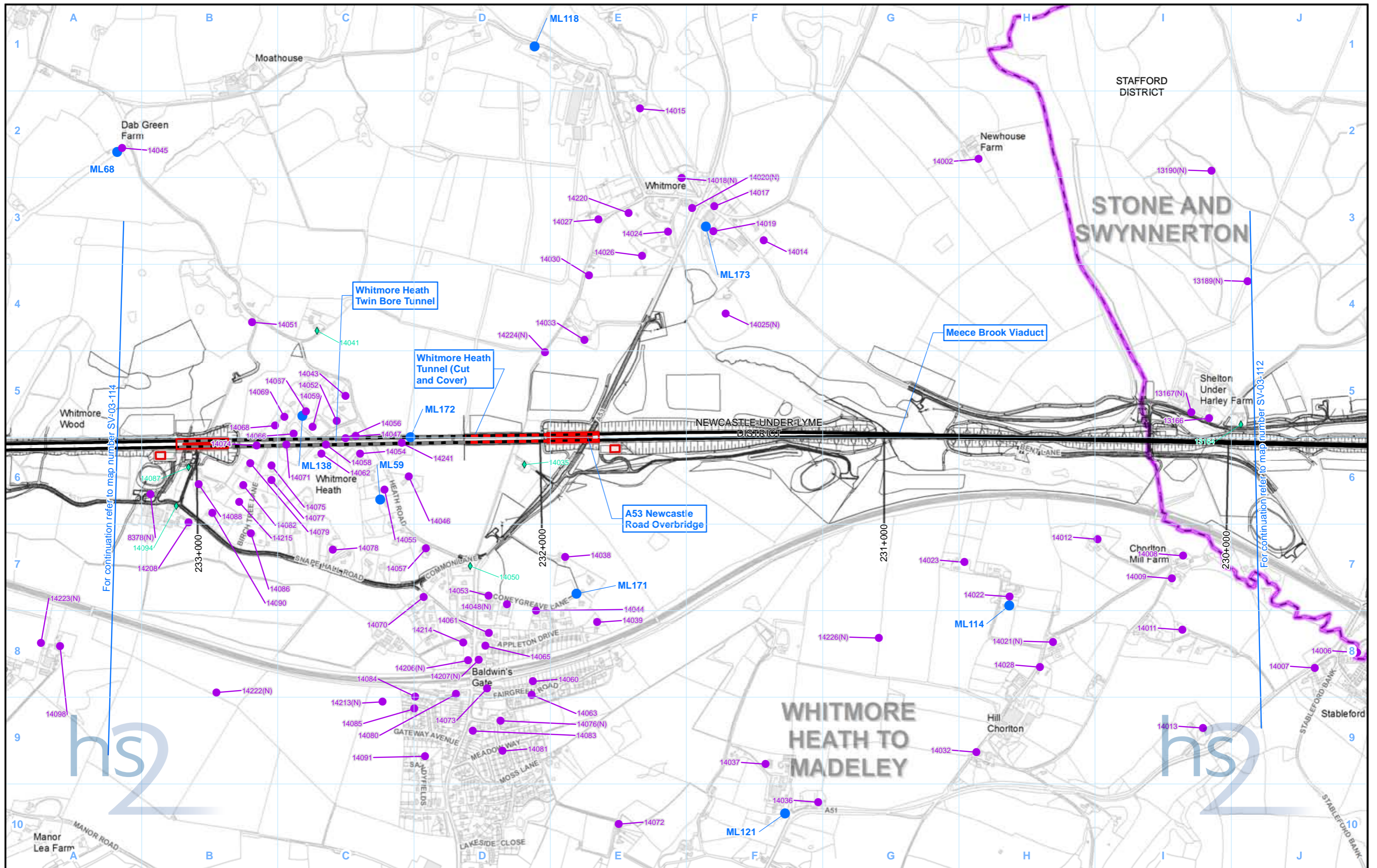
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Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting
- Non engineering earthworks: Embankment
- Non engineering earthworks: Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

Map Number: SV-03-113a

Map Name: Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments

Community Area 3: Stone and Swynnerton

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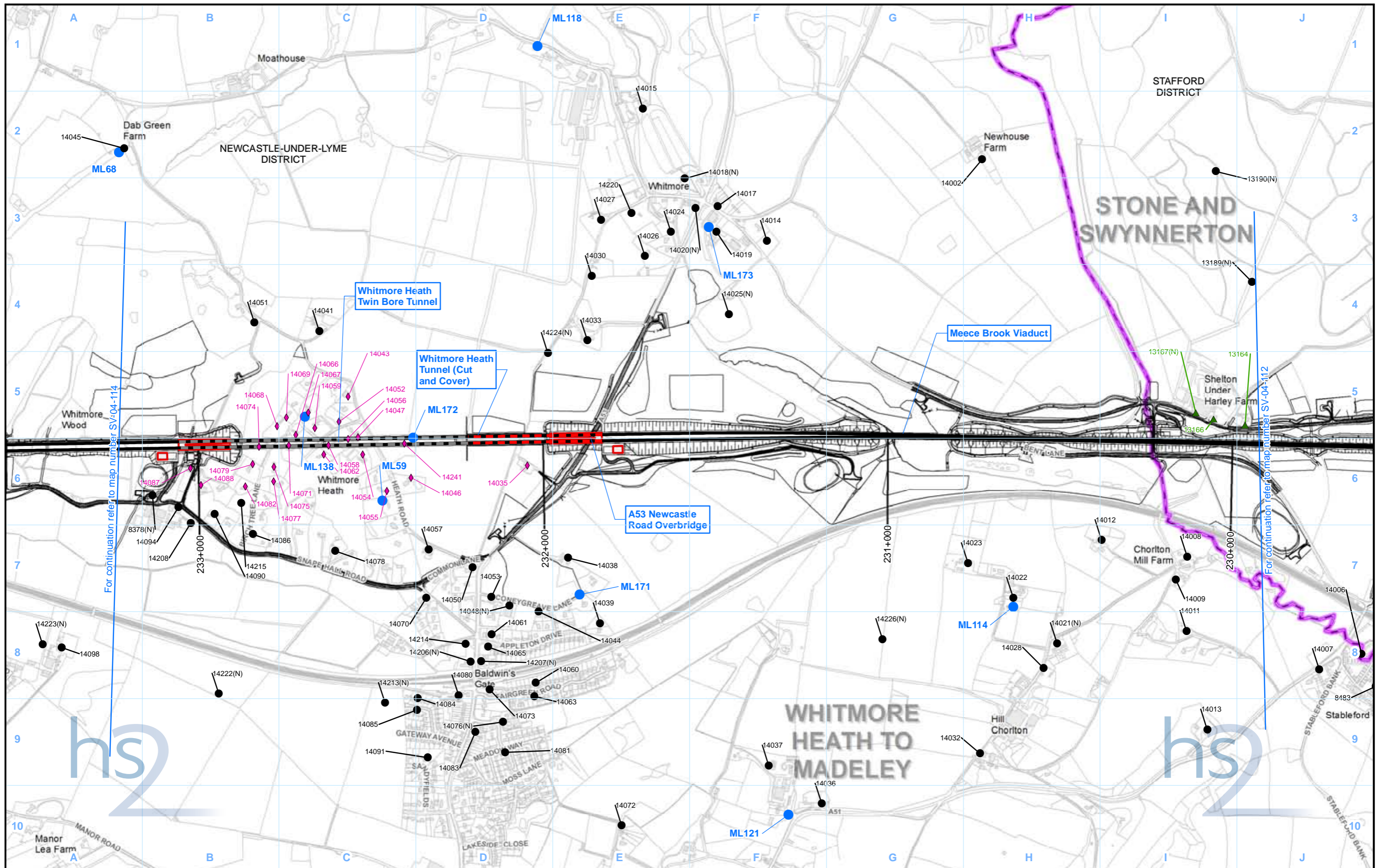
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Date: 07/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

- | | |
|---|---|
| <ul style="list-style-type: none"> Embankment Cutting | <ul style="list-style-type: none"> Embankment Cutting |
|---|---|

- 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
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
 (labelled with Measurement Location reference code)

| | |
|----------------|---|
| Map Number | SV-04-113a |
| Map Name | Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments |
| Community Area | Community Area 3: Stone and Swynnerton |

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High Speed Rail (West Midlands-Crewe)

Environmental Statement

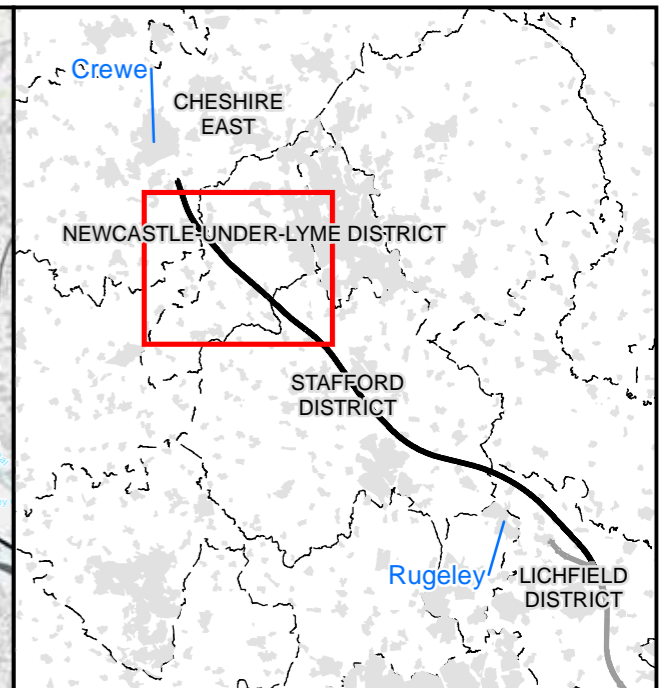
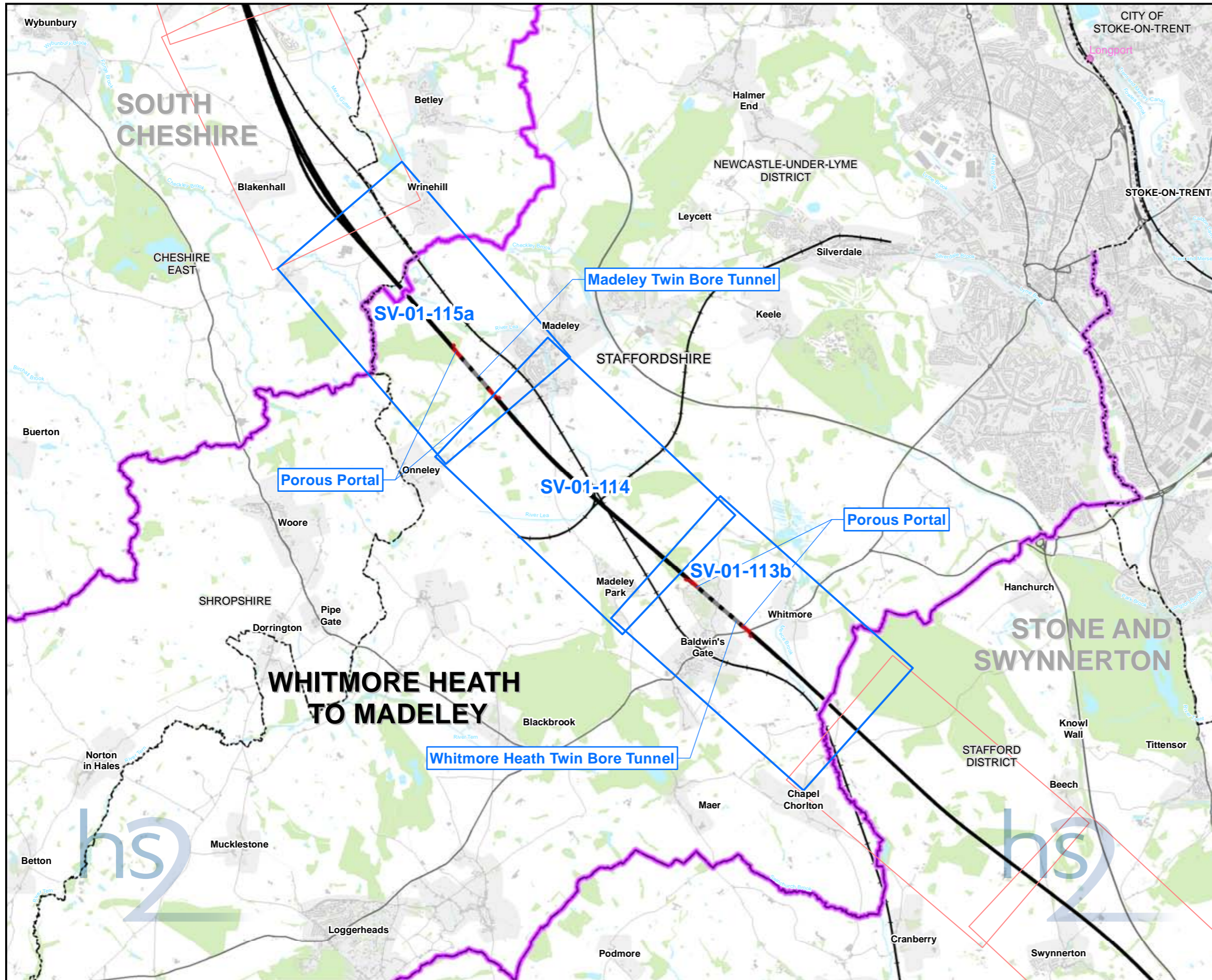
CA4 Whitmore Heath to Madeley

**SV-01 - Operational Sound Contour Maps
and Likely Significant Effects**

**SV-02 - Operational Noise and Vibration Impacts
and Likely Significant Effects (with Assessment Locations)**

**SV-03 - Assessment and Monitoring Locations for Construction Sound,
Noise & Vibration Assessments**

**SV-04 - Assessment and Monitoring Locations for Operational Sound,
Noise & Vibration Assessments**



Map Series Information:

SV-01 presents the predicted operational sound from the new railway.

The sound levels from the new railway (expressed as $L_{pAeq,T}$) are presented in typical noise mapping colours in 5 dB steps. There is a panel at the top right of the figure; the left-hand section of this panel contains a key communicating the night-time and daytime sound levels represented by the various colours. The right-hand part of the same panel contains text explaining how the sound levels presented on the figure inform the assessment of direct noise impacts and likely significant effects. A corresponding and similar panel is found on SV-02, along with the key sound contours that were used within the environmental assessment.

Also presented on SV-01 are the following (which are also included on SV-02):

- A representation of the Proposed Scheme, including the railway alignment (indicating whether it is on the surface or in tunnel), any new and altered roads and all associated engineering and environmental mitigation earthworks;
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- symbols representing buildings that would potentially qualify for noise insulation;
- labels identifying the residual likely significant noise effects of the Proposed Scheme, and
- the extent of the study area within which the direct impacts and effects of the scheme have been quantitatively assessed.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

| | |
|--|--|
| Route in tunnel | Map sheets included in this community area |
| Route on surface | Map sheets not included in this community area |
| Depot, station, headhouse or portal building | County boundary |
| Community area boundary | District/Borough boundary |
| Existing railway station | |

| | |
|-------------------|--|
| Map Number | SV-01-INDEX-CA4 |
| Map Name | Index Map of: Operational Sound Contour Maps and Likely Significant Effects |
| Community Area 4: | Whitmore Heath to Madeley |

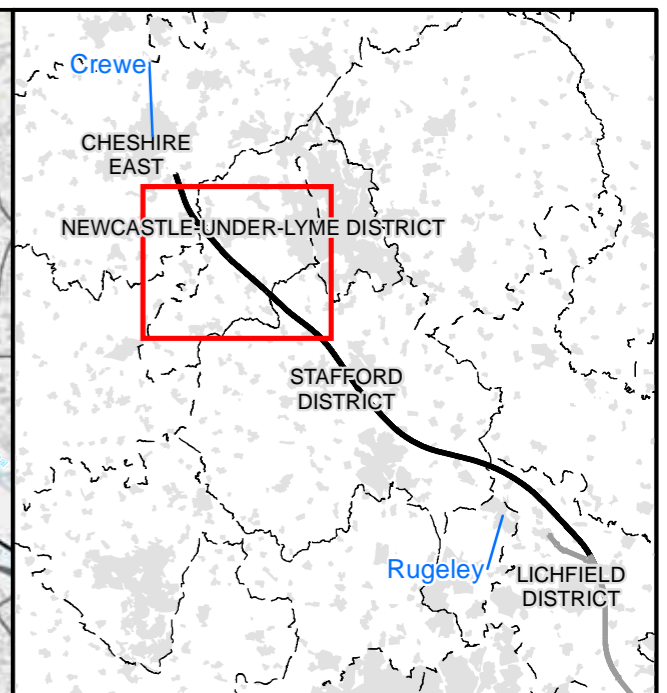
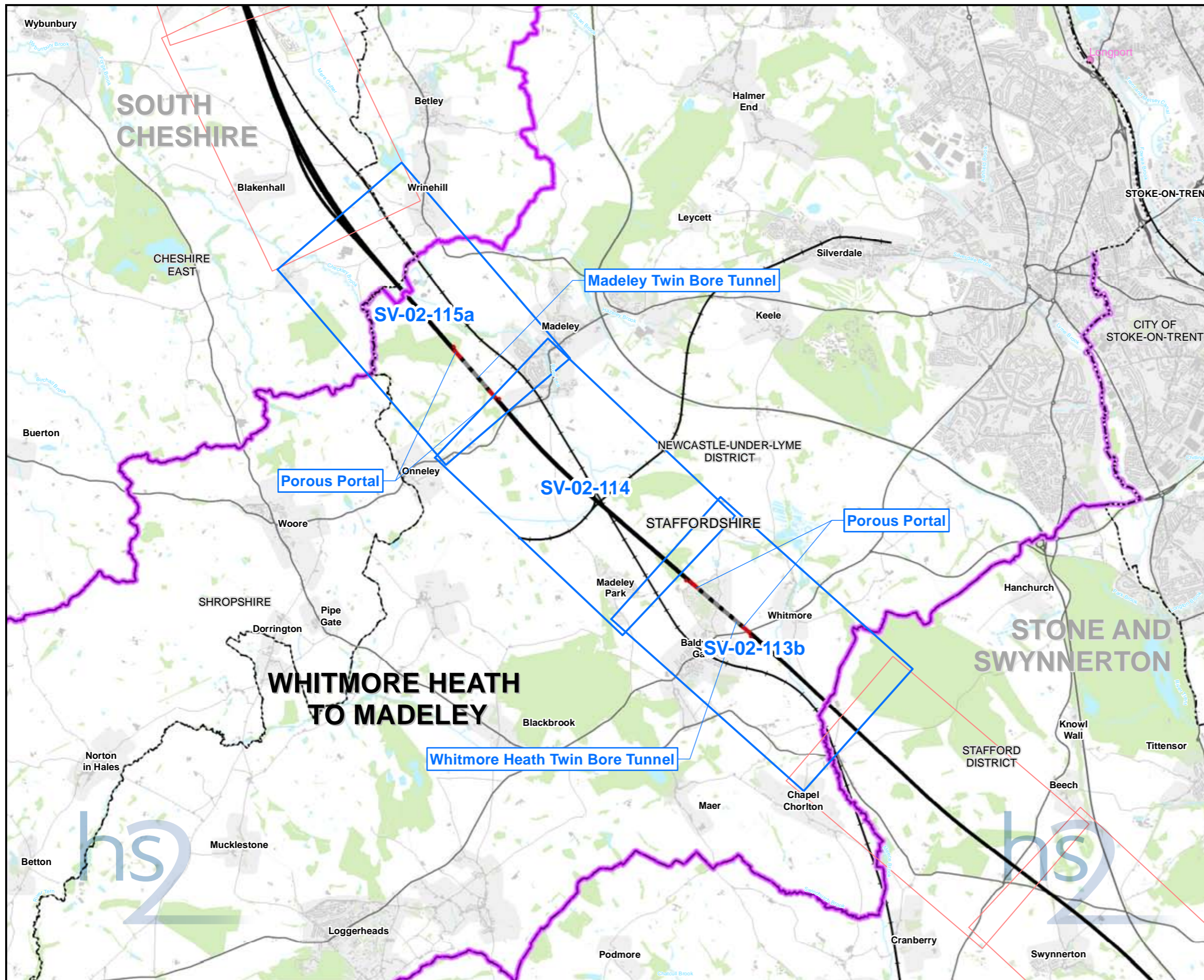
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Doc Number: C861-ARP-EV-MAP-000-131004-P03 Date: 06/06/17



Map Series Information:

SV-02 presents the direct operational noise impacts and likely significant effects of the Proposed Scheme.

The SV-02 figure series necessarily contains a large amount of information relating to the operational noise and vibration assessment. It is designed to communicate visually the assessment process from the prediction of impacts to the determination of likely residual significant effects. The corresponding text is included in Vol2 and Vol5.

- Key items on the map include the following:
- The Proposed Scheme (the proposed railway alignments and surrounding associated earthworks/roads);
 - blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
 - the study areas, which indicate the areas within which direct sound and vibration impacts of the scheme have been quantitatively assessed;
 - the calculated direct operational impacts of the scheme, displayed as colour-coded buildings and symbols representing buildings that would potentially qualify for noise insulation;
 - sound contours representing sound produced by the new railway displayed in a simpler manner than on SV-01 in order not to obscure the features on the map series);
 - the assessment locations at which a quantitative prediction of sound and impacts have been carried out (representing a number of nearby buildings). These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004; and
 - labels indicating where the likely residual direct noise or vibration significant effects have been identified. These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

- #### Main Map Legend
- Route in tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - Existing railway station
 - County boundary
 - District/Borough boundary
 - Map sheets included in this community area
 - Map sheets not included in this community area

Map Number
SV-02-INDEX-CA4

Map Name
**Index Map of:
Operational Noise and Vibration Impacts and
Likely Significant Effects (with Assessment
Locations)**

Community Area 4:
Whitmore Heath to Madeley

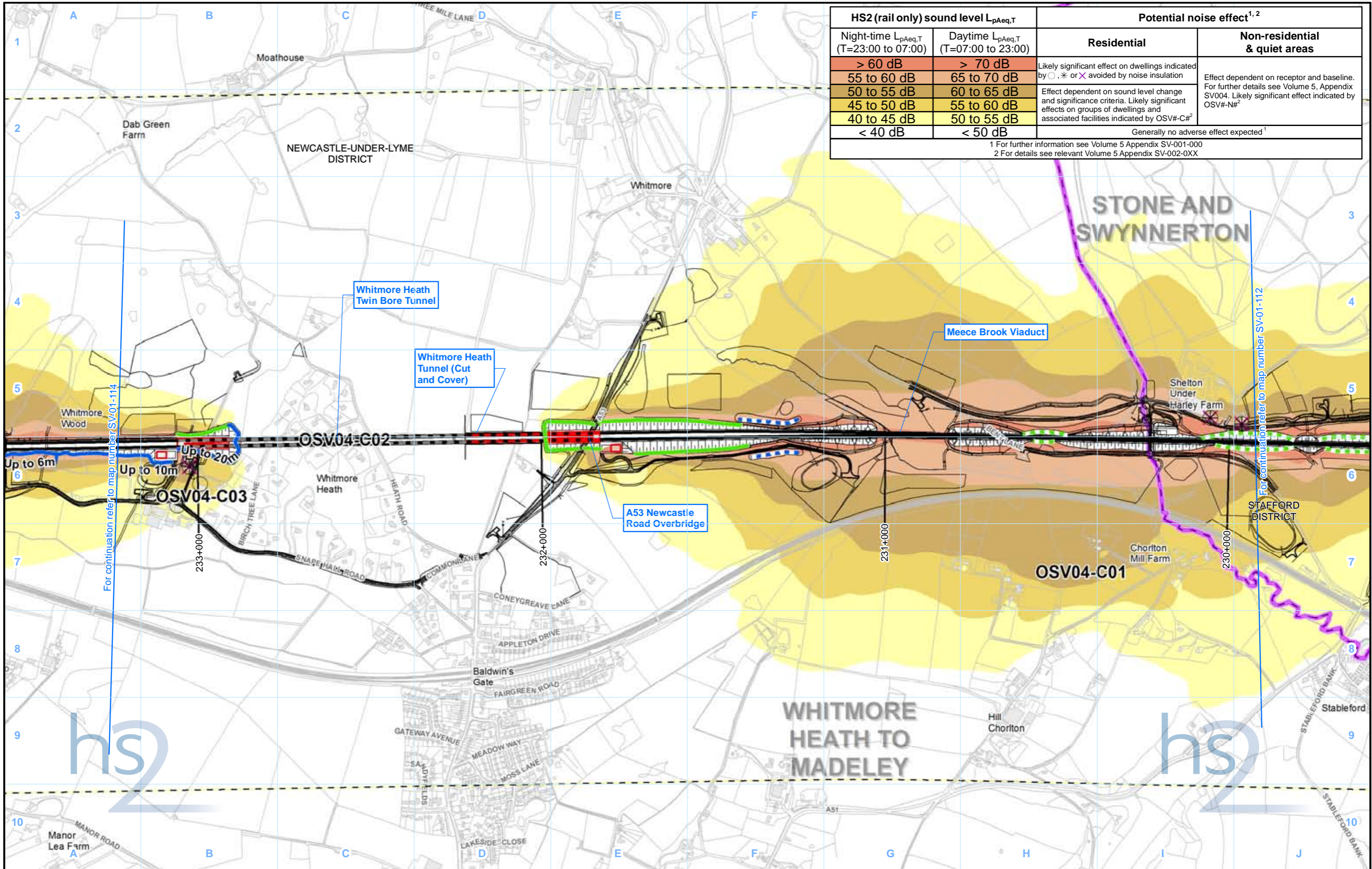
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| HS2 (rail only) sound level $L_{pAeq,T}$ | | Potential noise effect ^{1,2} | |
|---|--|---|--|
| Night-time $L_{pAeq,T}$ (T=23:00 to 07:00) | Daytime $L_{pAeq,T}$ (T=07:00 to 23:00) | Residential | Non-residential & quiet areas |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 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-002-0XX

| | | | | | |
|---|--|---|--|---|--|
| Legend - General features Route in bored tunnel Route in cut and cover tunnel Route on surface Depot, station, headhouse or portal building Community area boundary County boundary District/Borough boundary | | Legend - Sound related features Envisaged mitigation to avoid / reduce significant noise effects: Landscaping and/or fence barriers* Engineering e.g. cuttings (green tunnels separately marked) Envisaged features further reducing noise effects: Other environmental e.g. landscaping Engineering e.g. cuttings | | Legend - Sound related features Envisaged mitigation to avoid / reduce significant noise effects: 1km Airborne sound study area 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 <p>* Labelled with total barrier height above rail level</p> | |
| Engineering earthworks: Embankment Cutting | | Non engineering earthworks: Embankment Cutting | | | |

Map Number: SV-01-113b

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 4: Whitmore Heath to Madeley

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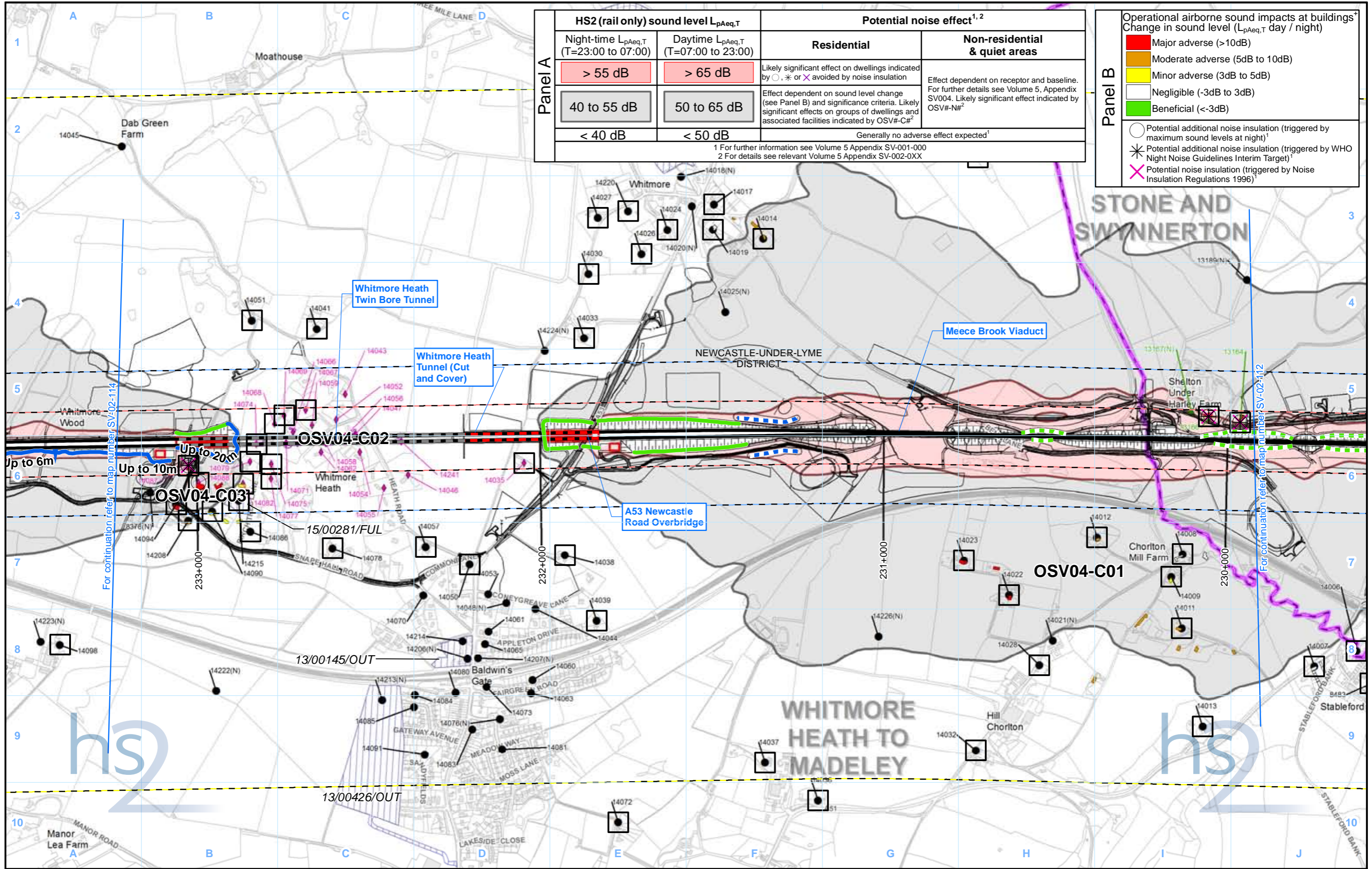
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Date: 06/06/17



| 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 | Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# 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-002-0XX

| Panel B | Operational airborne sound impacts at buildings ⁺ Change in sound level ($L_{pAeq,T}$ day / night) |
|---------|---|
| Red | Major adverse (>10dB) |
| Orange | Moderate adverse (5dB to 10dB) |
| Yellow | Minor adverse (3dB to 5dB) |
| White | Negligible (-3dB to 3dB) |
| Green | 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 cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Embankment
- Cutting
- L_{pAFmax} exceeds 60dB façade**

Non engineering earthworks:

- Embankment
- Cutting

* Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

Legend - Sound related features

- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-113b

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 4: Whitmore Heath to Madeley

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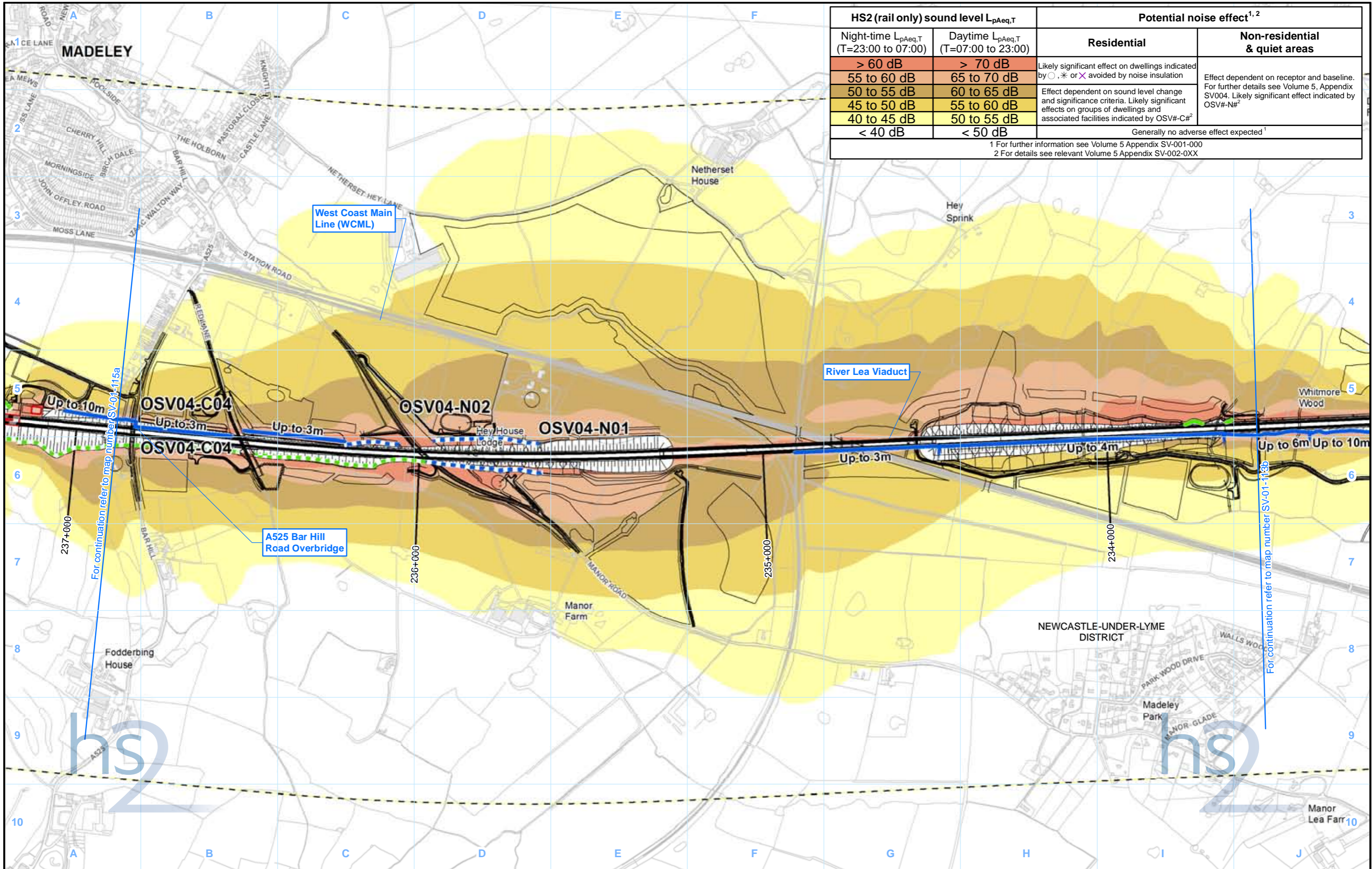
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| HS2 (rail only) sound level $L_{pAeq,T}$ | | Potential noise effect ^{1,2} | |
|---|--|---|--|
| Night-time $L_{pAeq,T}$ (T=23:00 to 07:00) | Daytime $L_{pAeq,T}$ (T=07:00 to 23:00) | Residential | Non-residential & quiet areas |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | Generally no adverse effect expected ¹ |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 40 dB | < 50 dB | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

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

- 1km Airborne sound study area
- 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

* Labelled with total barrier height above rail level

Map Number: SV-01-114

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 4: Whitmore Heath to Madeley

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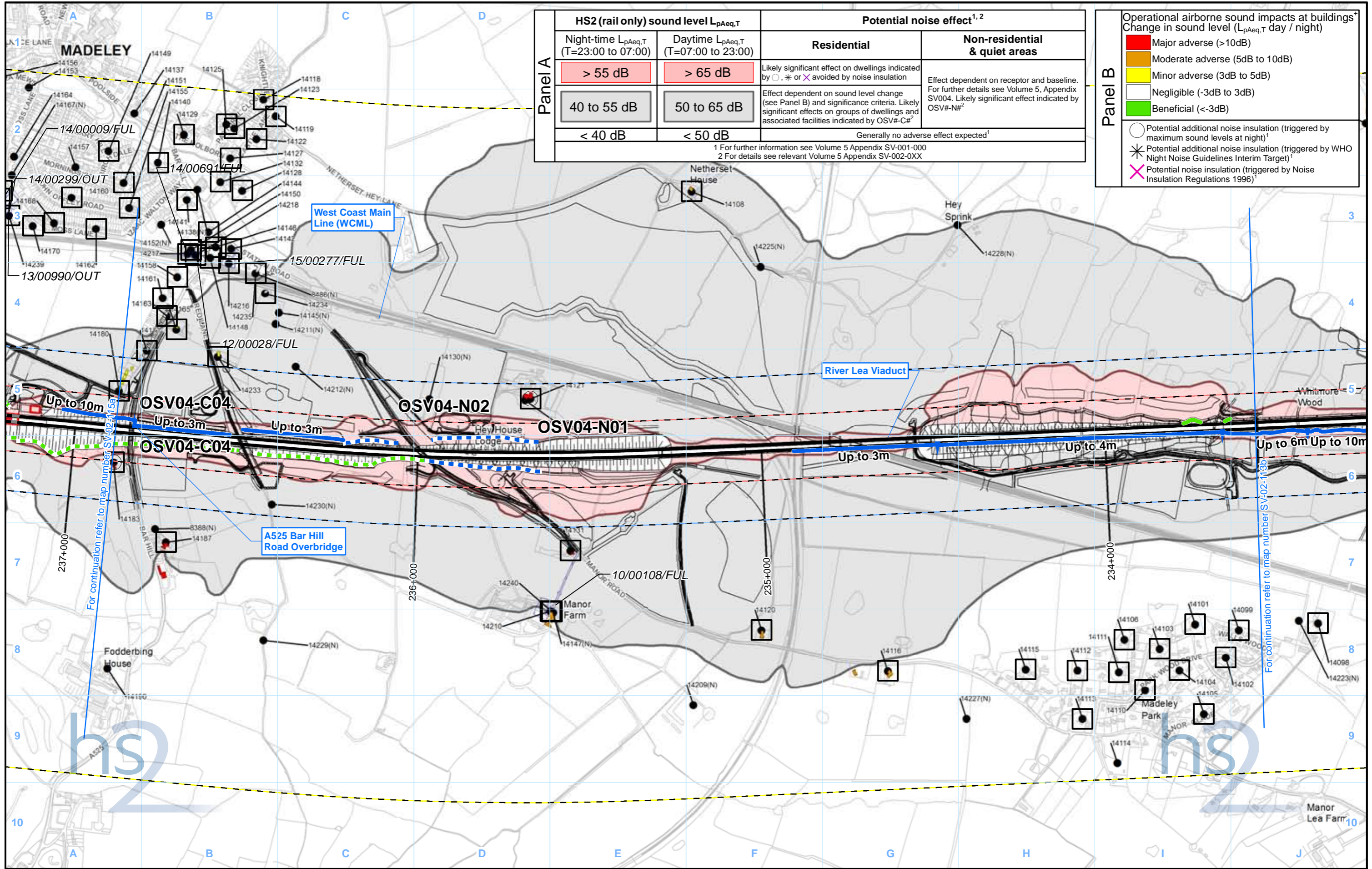
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Doc Number: C861-ARP-EV-MAP-000-131114-P03

Date: 06/06/17



| 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 | Generally no adverse effect expected ¹ |
| < 40 dB | < 50 dB | | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

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 cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Engineering earthworks:**
- Embankment
 - Cutting
 - L_{pAFmax} exceeds 60dB façade**
- Non engineering earthworks:**
- Embankment
 - Cutting
- * Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

- Legend - Sound related features**
- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-114

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 4: Whitmore Heath to Madeley

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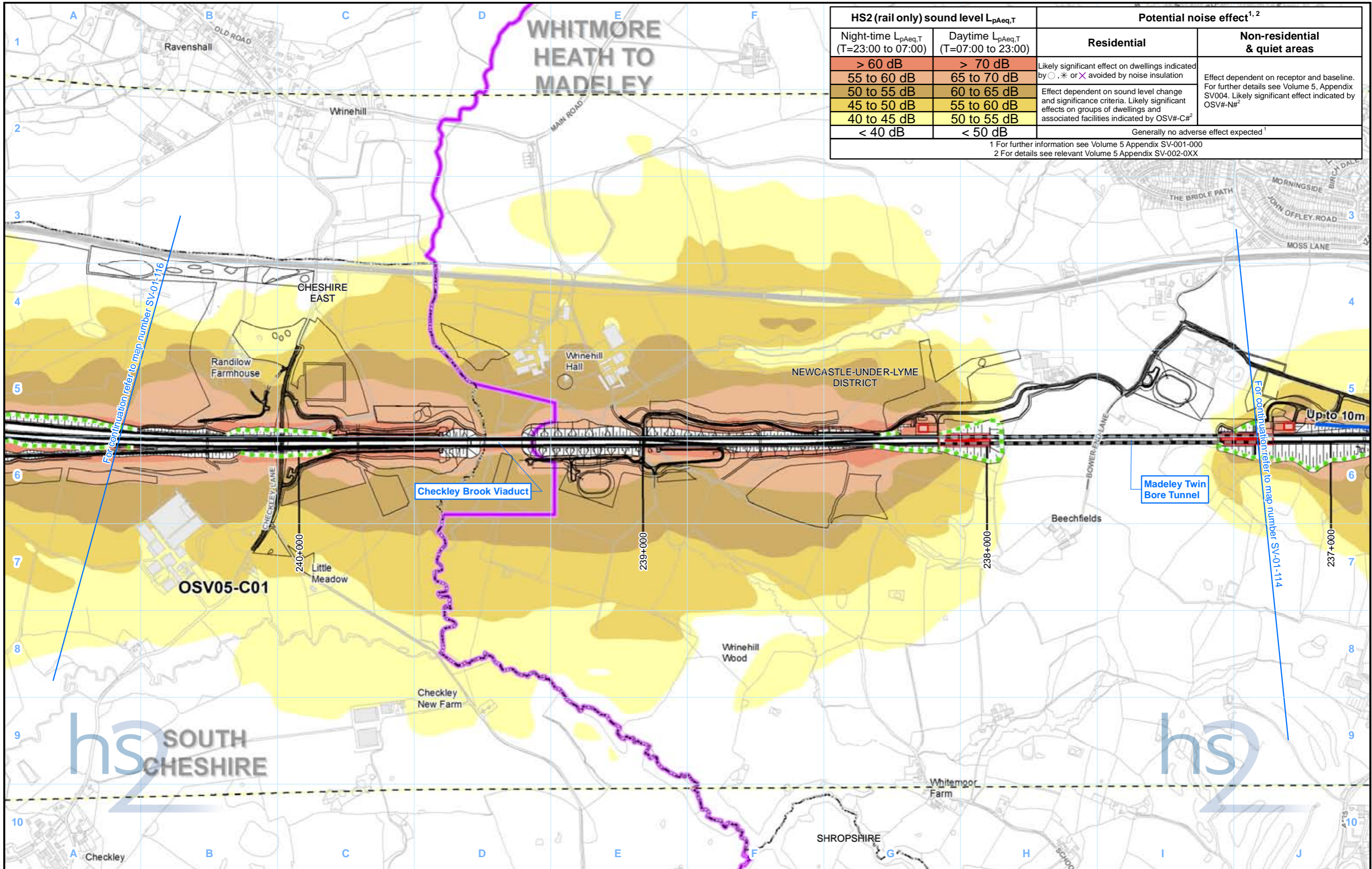
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Date: 07/06/17



| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | Generally no adverse effect expected ¹ |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 40 dB | < 50 dB | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

Envisaged mitigation to avoid / reduce significant noise effects:

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

Envisaged features further reducing noise effects:

- Other environmental e.g. landscaping
- Engineering e.g. cuttings

1km Airborne sound study area

- 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

* Labelled with total barrier height above rail level

Map Number: SV-01-115a

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 4: Whitmore Heath to Madeley

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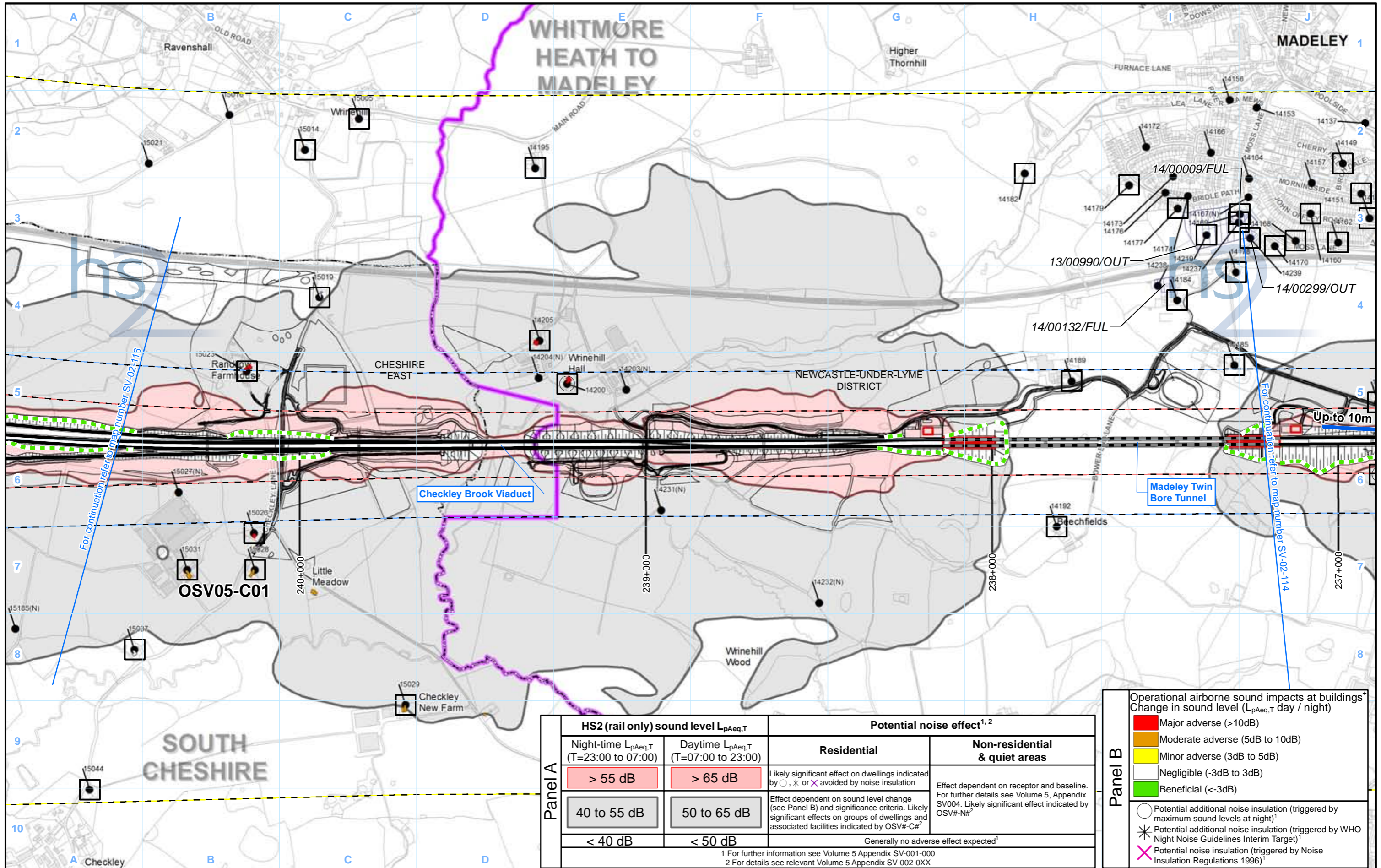
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Date: 07/06/17



| 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-002-0XX

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)

Panel B

- 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 cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Engineering earthworks:**
- Embankment
 - Cutting
- Non engineering earthworks:**
- Embankment
 - Cutting
- L_{pAFmax} exceeds 60dB façade**
- * Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

- Legend - Sound related features**
- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: **SV-02-115a**

Map Name: **Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)**

Community Area 4:
Whitmore Heath to Madeley

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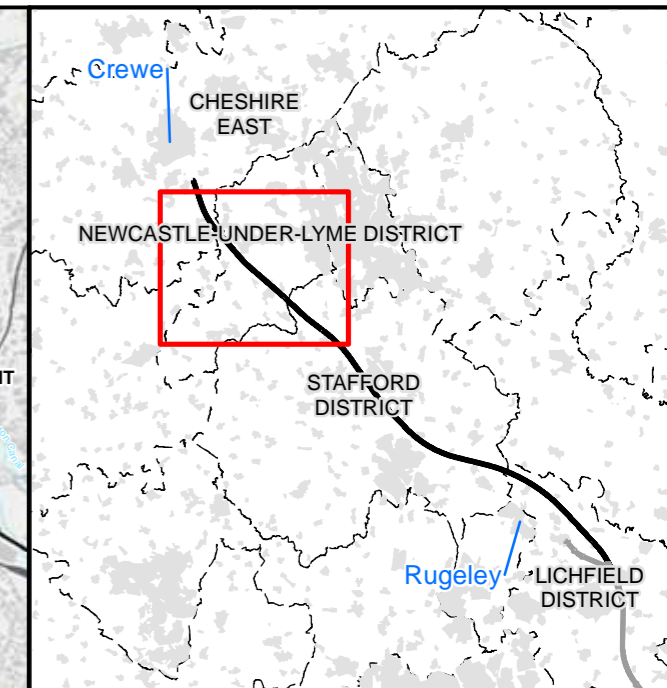
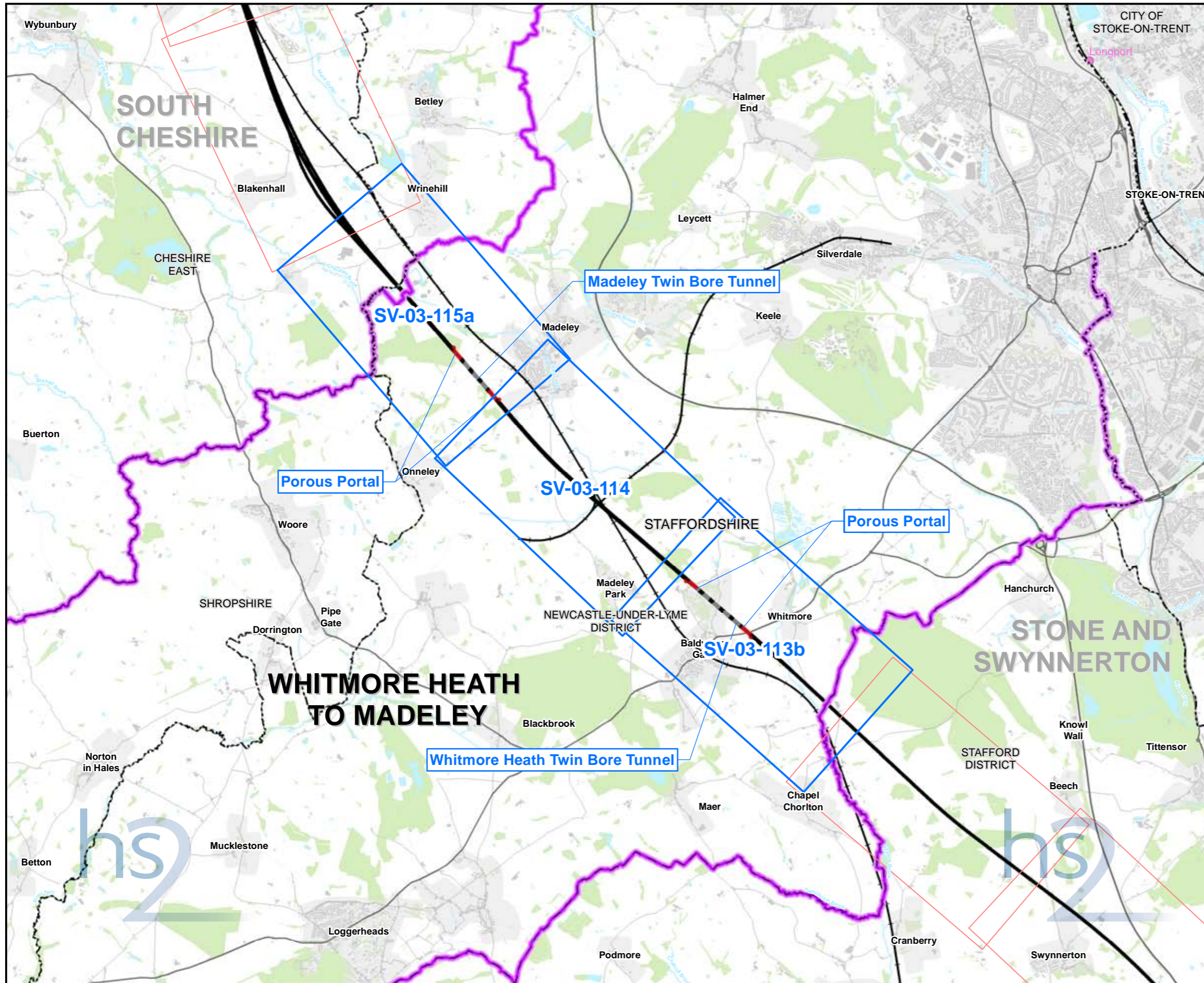
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Date: 07/06/17



Map Series Information:

The SV-03 figure series accompanies the construction noise & vibration assessments. It shows the locations at which a quantitative assessment of the direct effects of construction noise and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the construction noise and vibration reports contained in Volume 5: Appendix SV-002-0XX

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002-0XX.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Main Map Legend

| | |
|--|--|
| Route in tunnel | Map sheets included in this community area |
| Route on surface | Map sheets not included in this community area |
| Depot, station, headhouse or portal building | |
| Community area boundary | |
| Existing railway station | |
| County boundary | |
| District/Borough boundary | |

| | |
|------------|--|
| Map Number | SV-03-INDEX-CA4 |
| Map Name | Index Map of: Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments |
| | Community Area 4: Whitmore Heath to Madeley |

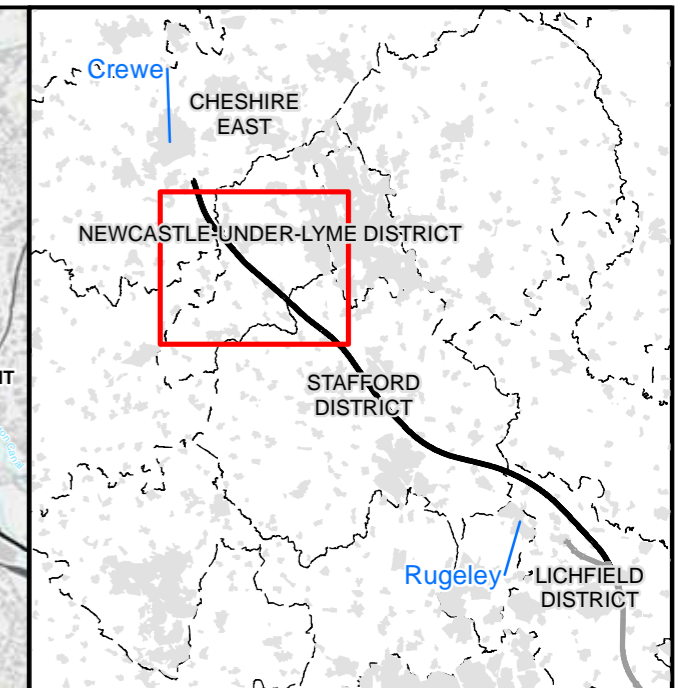
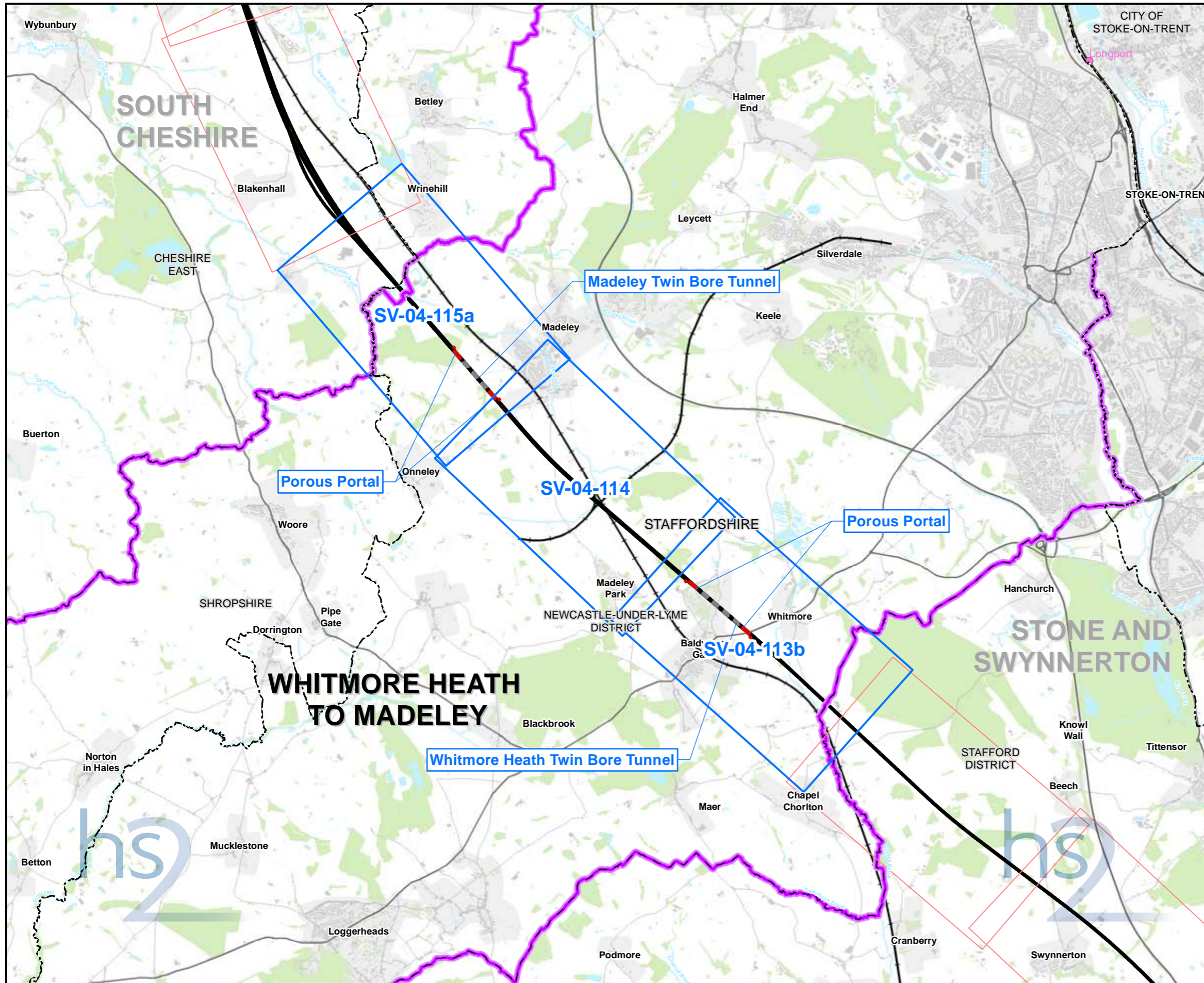
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Map Series Information:

The SV-04 figure series shows the locations at which a quantitative assessment of the direct effects of operational sound and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-002-0XX

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002-0XX

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

- Main Map Legend**
- Route in tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - Existing railway station
 - County boundary
 - District/Borough boundary
 - Map sheets included in this community area
 - Map sheets not included in this community area

| | |
|------------|---|
| Map Number | SV-04-INDEX-CA4 |
| Map Name | Index Map of: Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments |
| | Community Area 4: Whitmore Heath to Madeley |

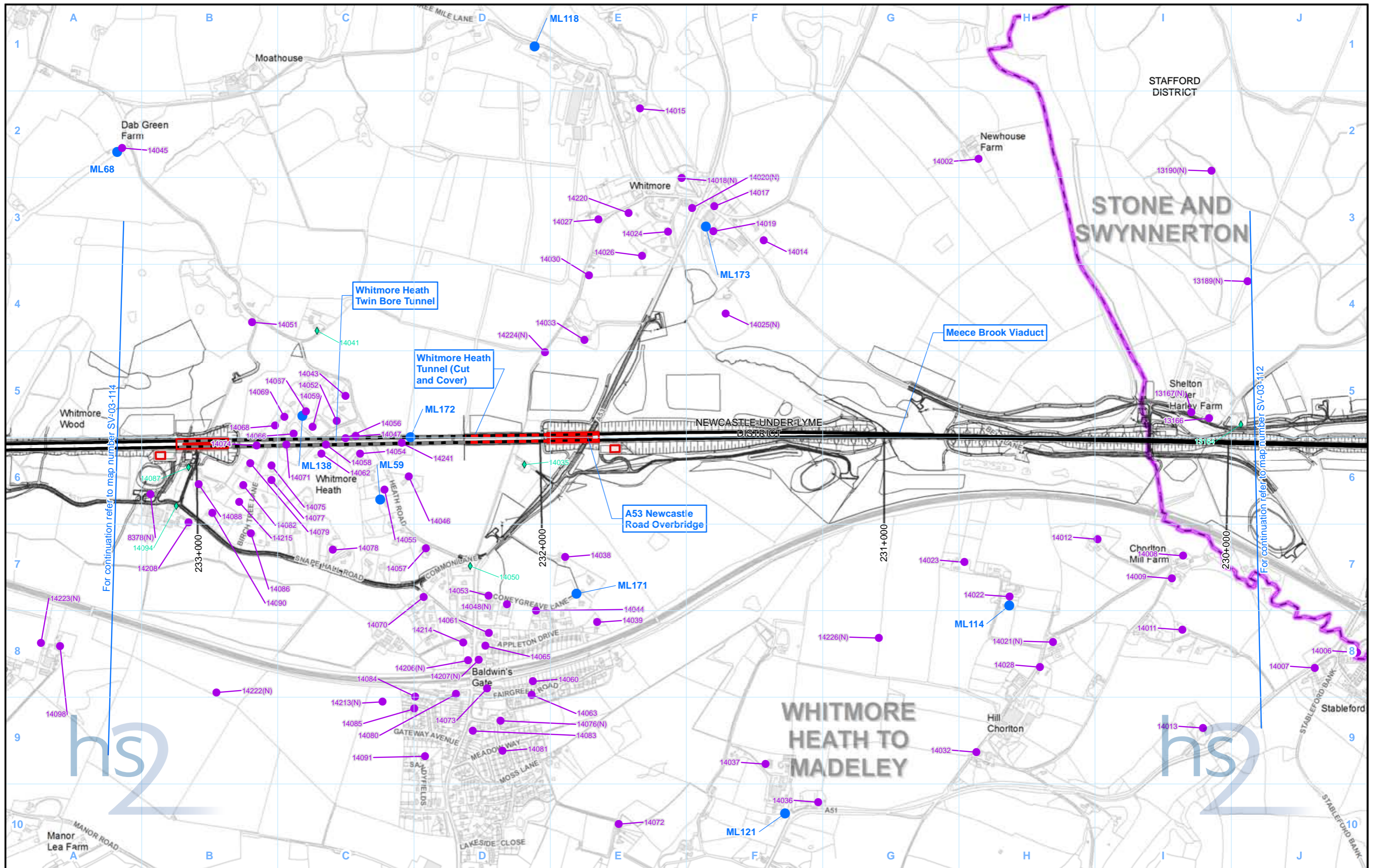
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Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

Map Number: **SV-03-113b**

Map Name: **Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments**

Community Area 4:
Whitmore Heath to Madeley

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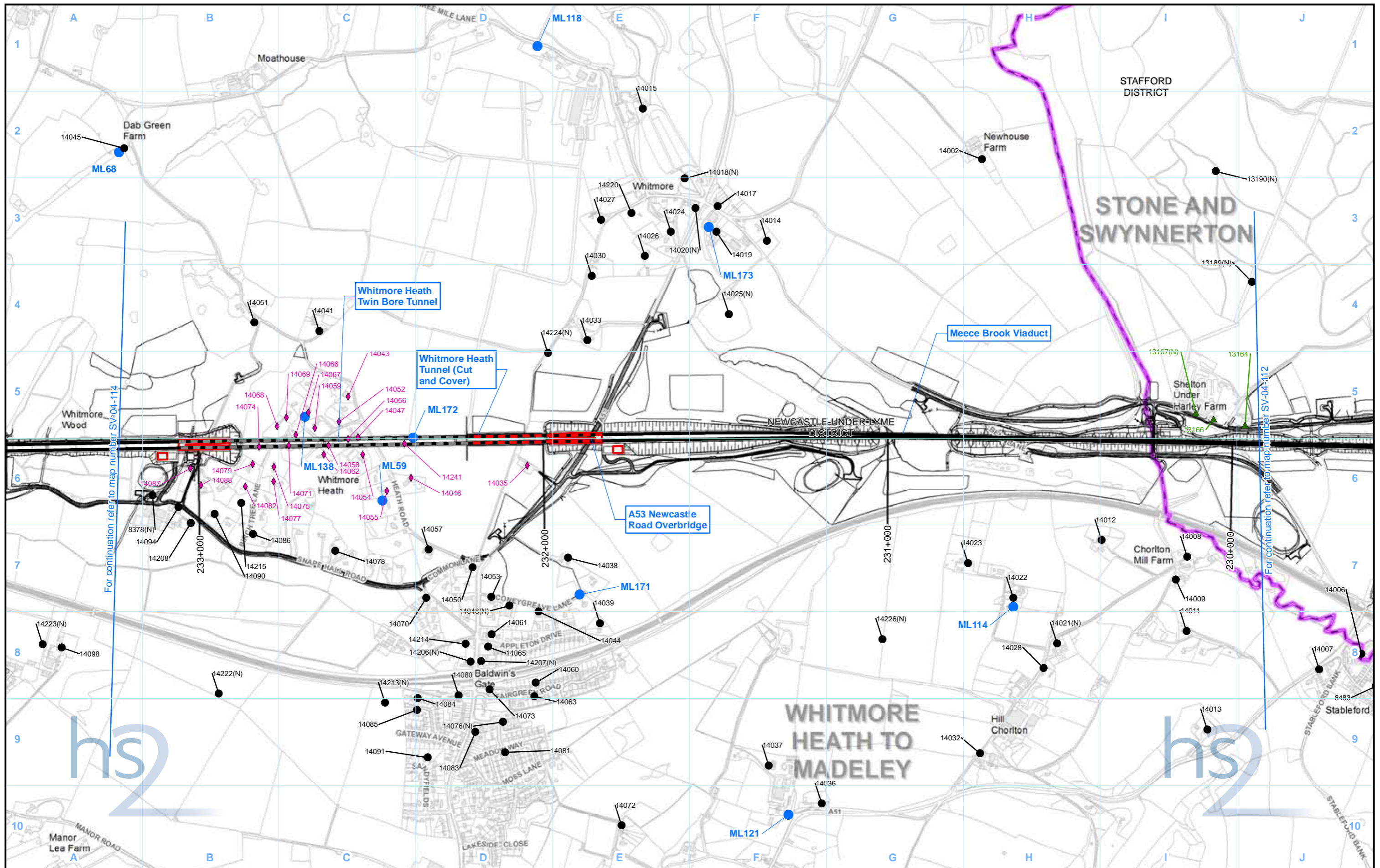
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Doc Number: C861-ARP-EV-MAP-000-133213-P03

Date: 07/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

- Engineering earthworks:**
- Embankment
- Cutting
- Non engineering earthworks:**
- Embankment
- Cutting

- 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
 - Baseline measurement locations
- labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

Map Number: SV-04-113b

Map Name: Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments

Community Area 4: Whitmore Heath to Madeley

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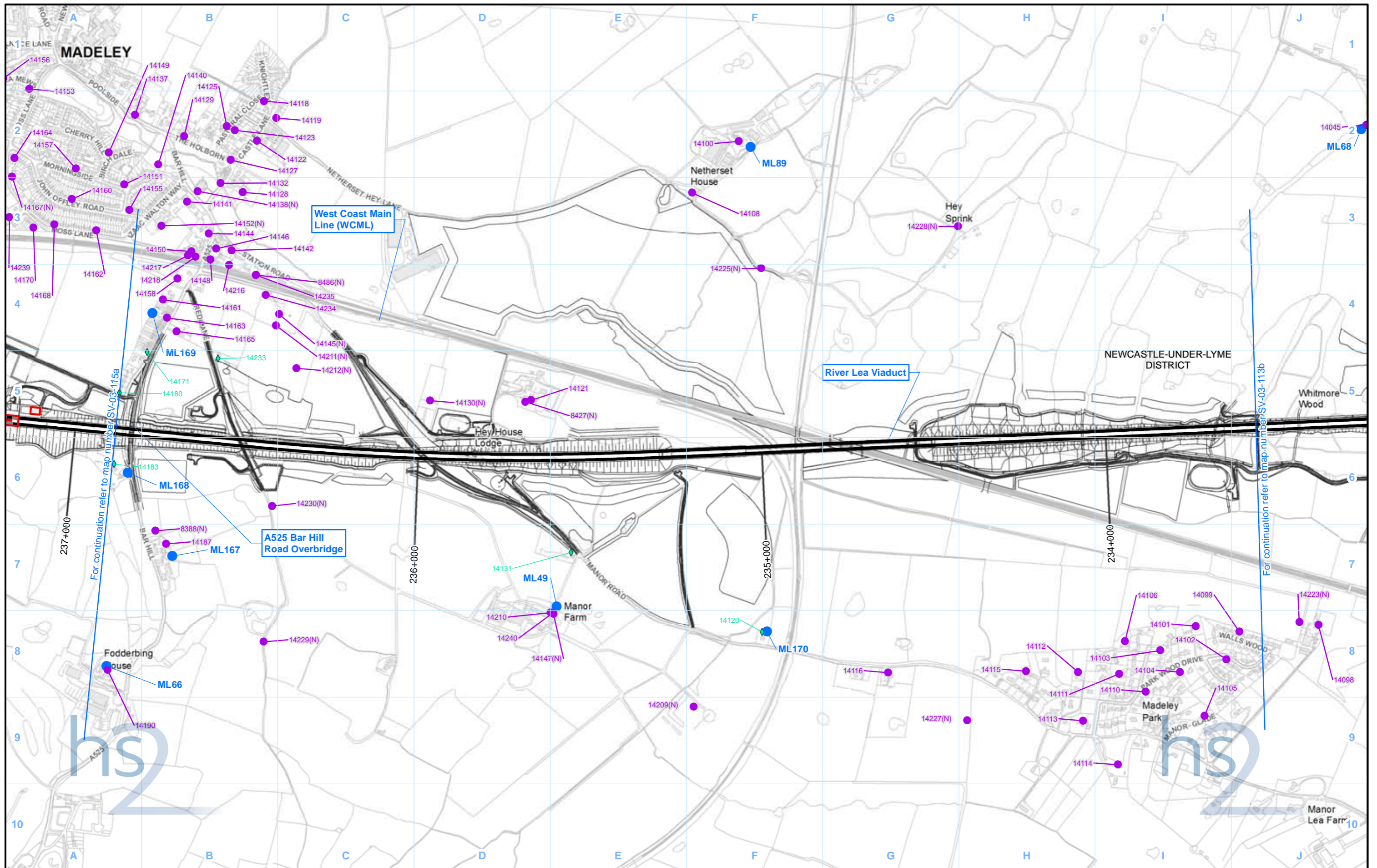
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Date: 07/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks: Non engineering earthworks:

- Embankment
- Cutting
- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

| | |
|--|---|
| Map Number | SV-03-114 |
| Map Name | Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments |
| Community Area 4: Whitmore Heath to Madeley | |

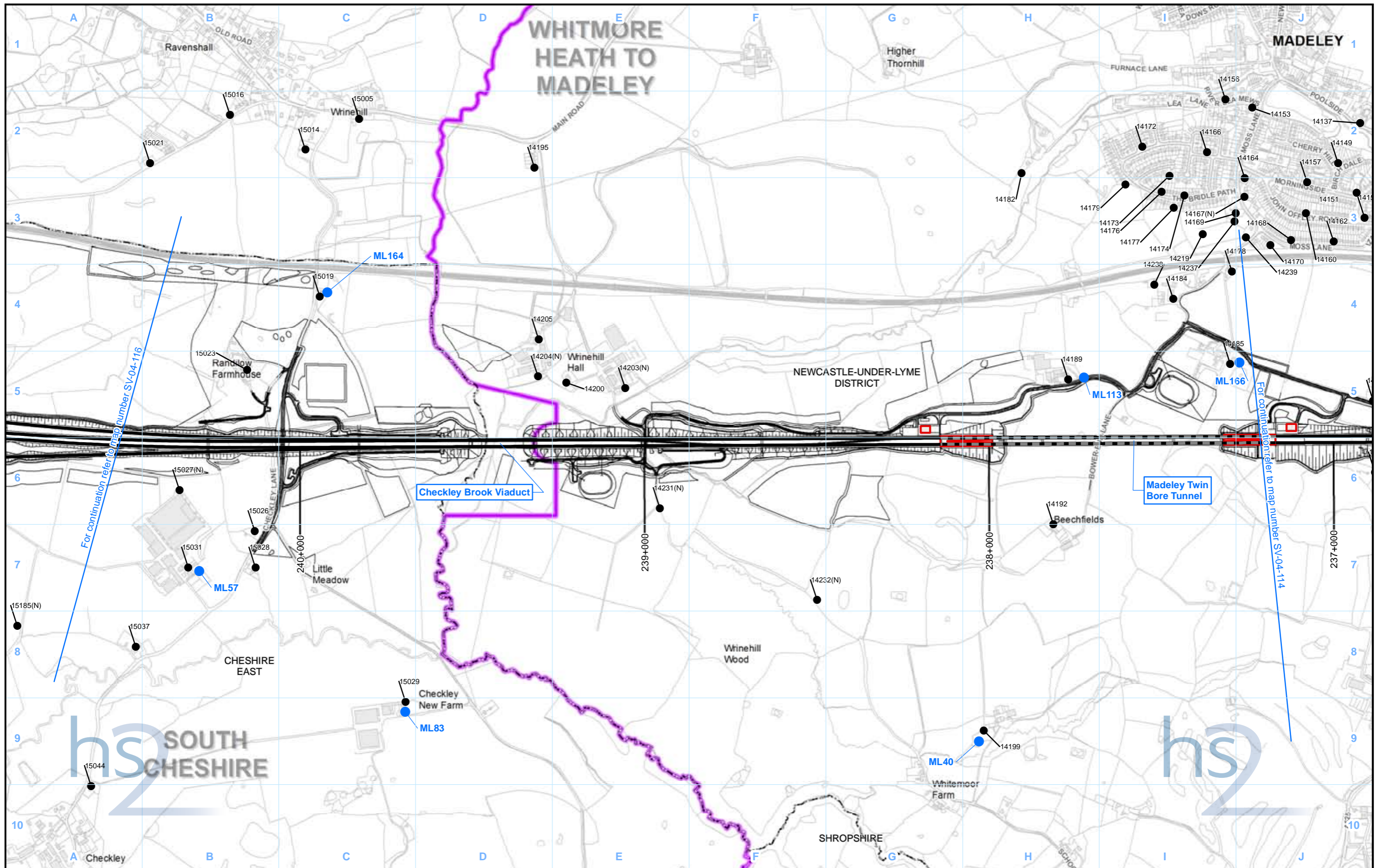
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Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

- Engineering earthworks:
- Non engineering earthworks: Embankment
 - Non engineering earthworks: Cutting

Legend - Sound related features

- 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
 - Baseline measurement locations
- labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

Map Number
SV-04-115a

Map Name
Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments

Community Area 4:
Whitmore Heath to Madeley

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Metres

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High Speed Rail (West Midlands-Crewe)

Environmental Statement

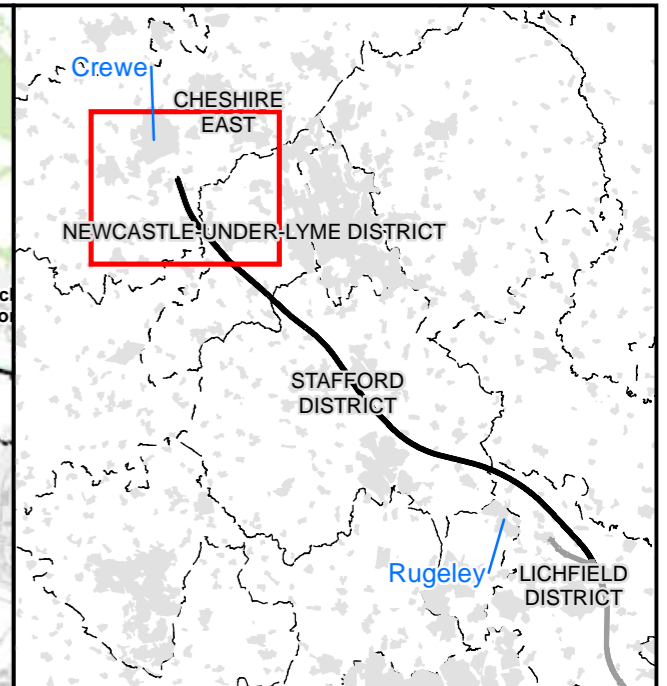
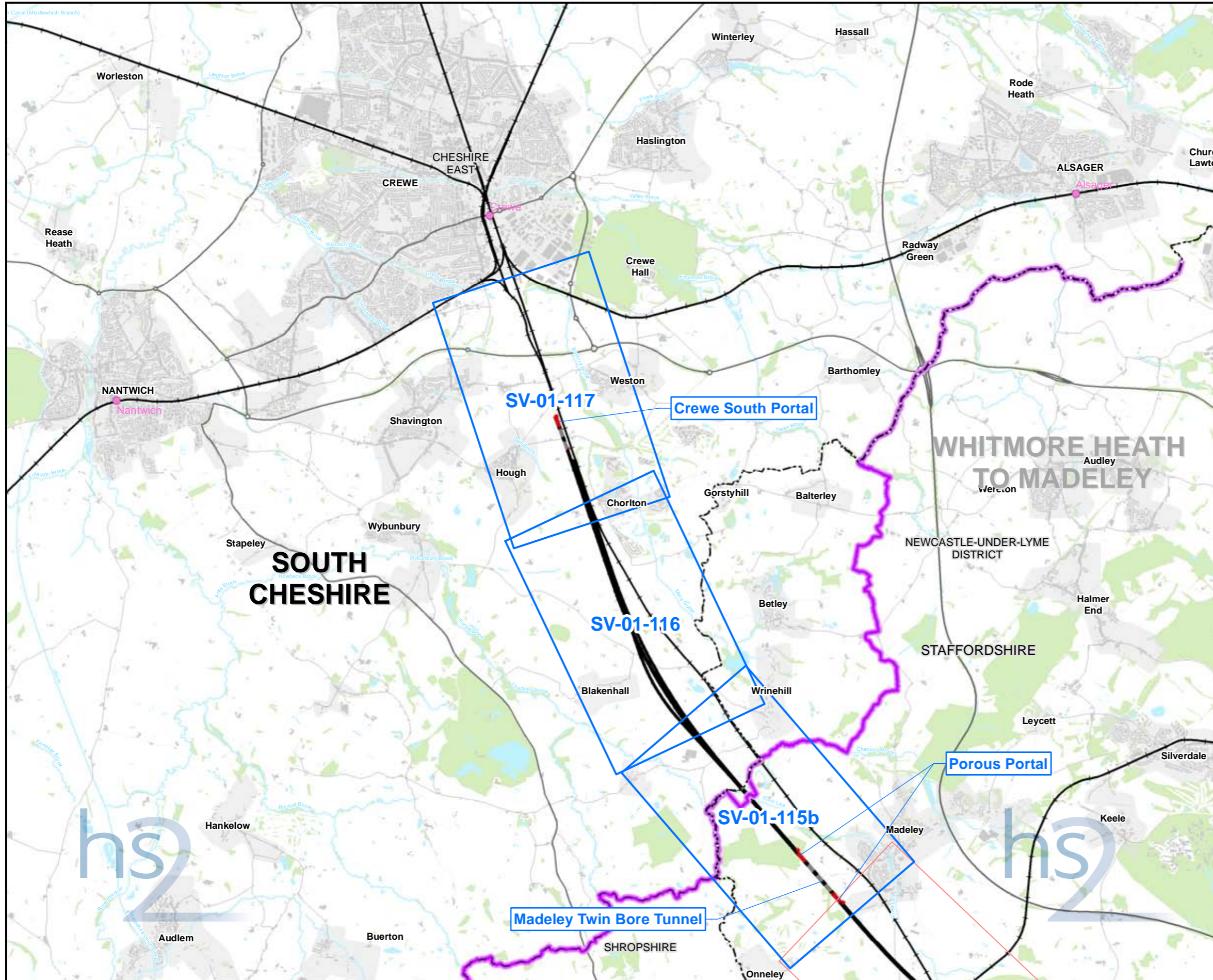
CA5 South Cheshire

**SV-01 - Operational Sound Contour Maps
and Likely Significant Effects**

**SV-02 - Operational Noise and Vibration Impacts
and Likely Significant Effects (with Assessment Locations)**

**SV-03 - Assessment and Monitoring Locations for Construction Sound,
Noise & Vibration Assessments**

**SV-04 - Assessment and Monitoring Locations for Operational Sound,
Noise & Vibration Assessments**



Map Series Information:

SV-01 presents the predicted operational sound from the new railway.

The sound levels from the new railway (expressed as $L_{pAeq,T}$) are presented in typical noise mapping colours in 5 dB steps. There is a panel at the top right of the figure; the left-hand section of this panel contains a key communicating the night-time and daytime sound levels represented by the various colours. The right-hand part of the same panel contains text explaining how the sound levels presented on the figure inform the assessment of direct noise impacts and likely significant effects. A corresponding and similar panel is found on SV-02, along with the key sound contours that were used within the environmental assessment.

Also presented on SV-01 are the following (which are also included on SV-02):

- A representation of the Proposed Scheme, including the railway alignment (indicating whether it is on the surface or in tunnel), any new and altered roads and all associated engineering and environmental mitigation earthworks;
- blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
- symbols representing buildings that would potentially qualify for noise insulation;
- labels identifying the residual likely significant noise effects of the Proposed Scheme, and
- the extent of the study area within which the direct impacts and effects of the scheme have been quantitatively assessed.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

| | |
|--|--|
| Route in tunnel | Map sheets included in this community area |
| Route on surface | Map sheets not included in this community area |
| Depot, station, headhouse or portal building | Community area boundary |
| Existing railway station | County boundary |
| District/Borough boundary | |

| | |
|-------------------|--|
| Map Number | SV-01-INDEX-CA5 |
| Map Name | Index Map of: Operational Sound Contour Maps and Likely Significant Effects |
| Community Area 5: | South Cheshire |

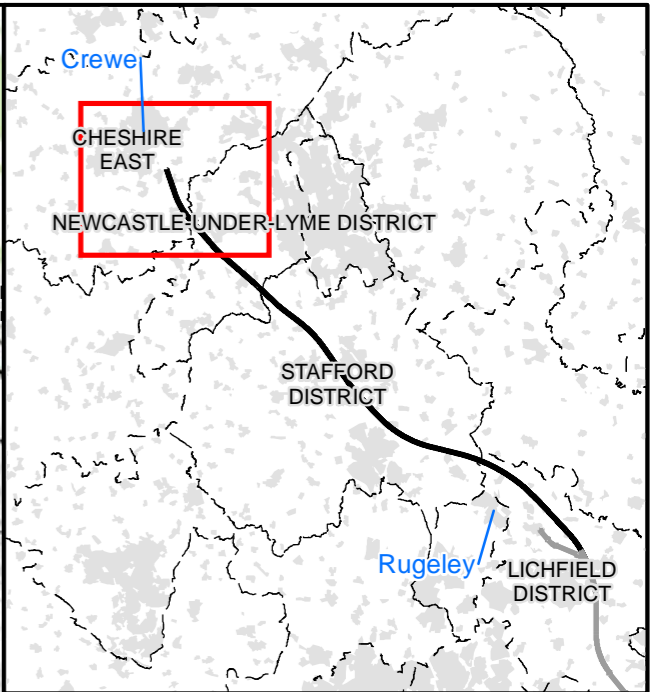
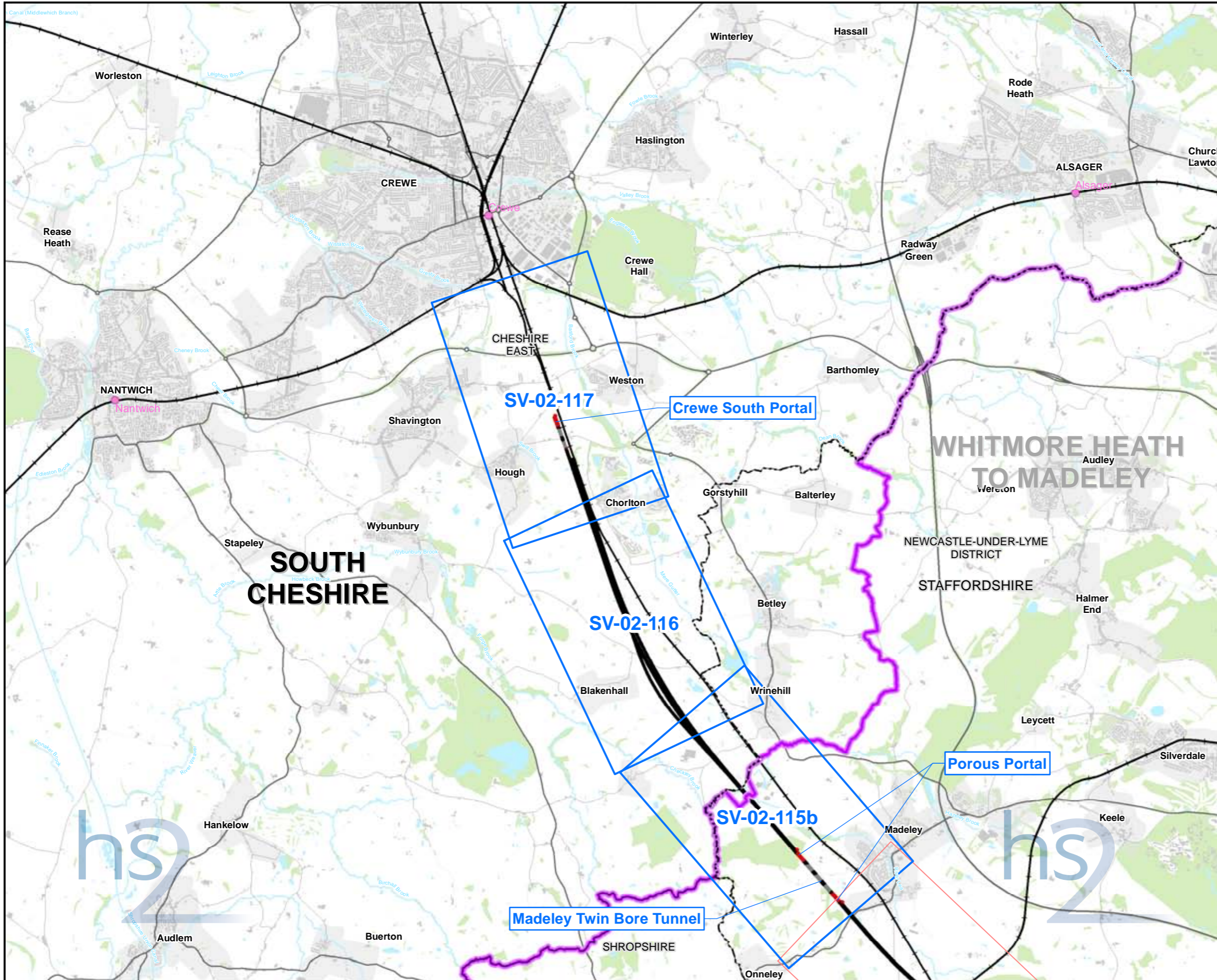
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Doc Number: C861-ARP-EV-MAP-000-131005-P03 Date: 06/06/17



Map Series Information:

SV-02 presents the direct operational noise impacts and likely significant effects of the Proposed Scheme.

The SV-02 figure series necessarily contains a large amount of information relating to the operational noise and vibration assessment. It is designed to communicate visually the assessment process from the prediction of impacts to the determination of likely residual significant effects. The corresponding text is included in Vol2 and Vol5.

- Key items on the map include the following:
- The Proposed Scheme (the proposed railway alignments and surrounding associated earthworks/roads);
 - blue and green lines representing the wayside airborne noise mitigation measures included in the Proposed Scheme;
 - the study areas, which indicate the areas within which direct sound and vibration impacts of the scheme have been quantitatively assessed;
 - the calculated direct operational impacts of the scheme, displayed as colour-coded buildings and symbols representing buildings that would potentially qualify for noise insulation;
 - sound contours representing sound produced by the new railway displayed in a simpler manner than on SV-01 in order not to obscure the features on the map series);
 - the assessment locations at which a quantitative prediction of sound and impacts have been carried out (representing a number of nearby buildings). These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004; and
 - labels indicating where the likely residual direct noise or vibration significant effects have been identified. These are labelled with a unique reference number to enable cross-reference to further detail regarding the assessments in Volume 5: Appendix SV-004.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Note: Not all data layers in the legend are represented on every map.

Main Map Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- Existing railway station
- County boundary
- District/Borough boundary
- Map sheets included in this community area
- Map sheets not included in this community area

Map Number: SV-02-INDEX-CA5

Map Name: Index Map of: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 5: South Cheshire

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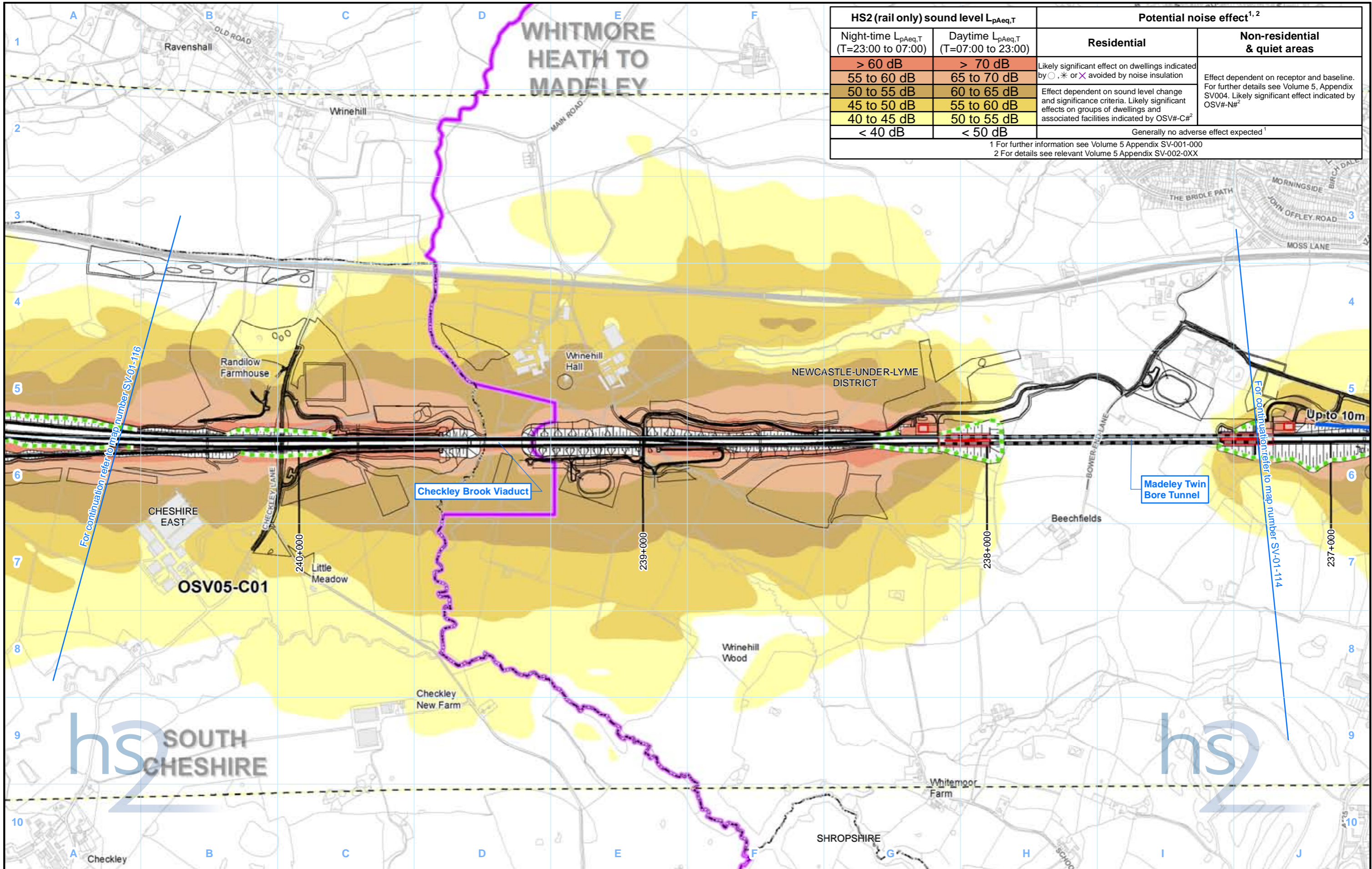
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0 500 1,000 1,500 2,000 2,500 Metres

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| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 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-002-0XX

Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

Envisaged mitigation to avoid / reduce significant noise effects:

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

Envisaged features further reducing noise effects:

- Other environmental e.g. landscaping
- Engineering e.g. cuttings

Engineering earthworks:

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

1km Airborne sound study area

- 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

* Labelled with total barrier height above rail level

Map Number: SV-01-115b

Map Name: Operational Sound Contour Maps and Likely Significant Effects

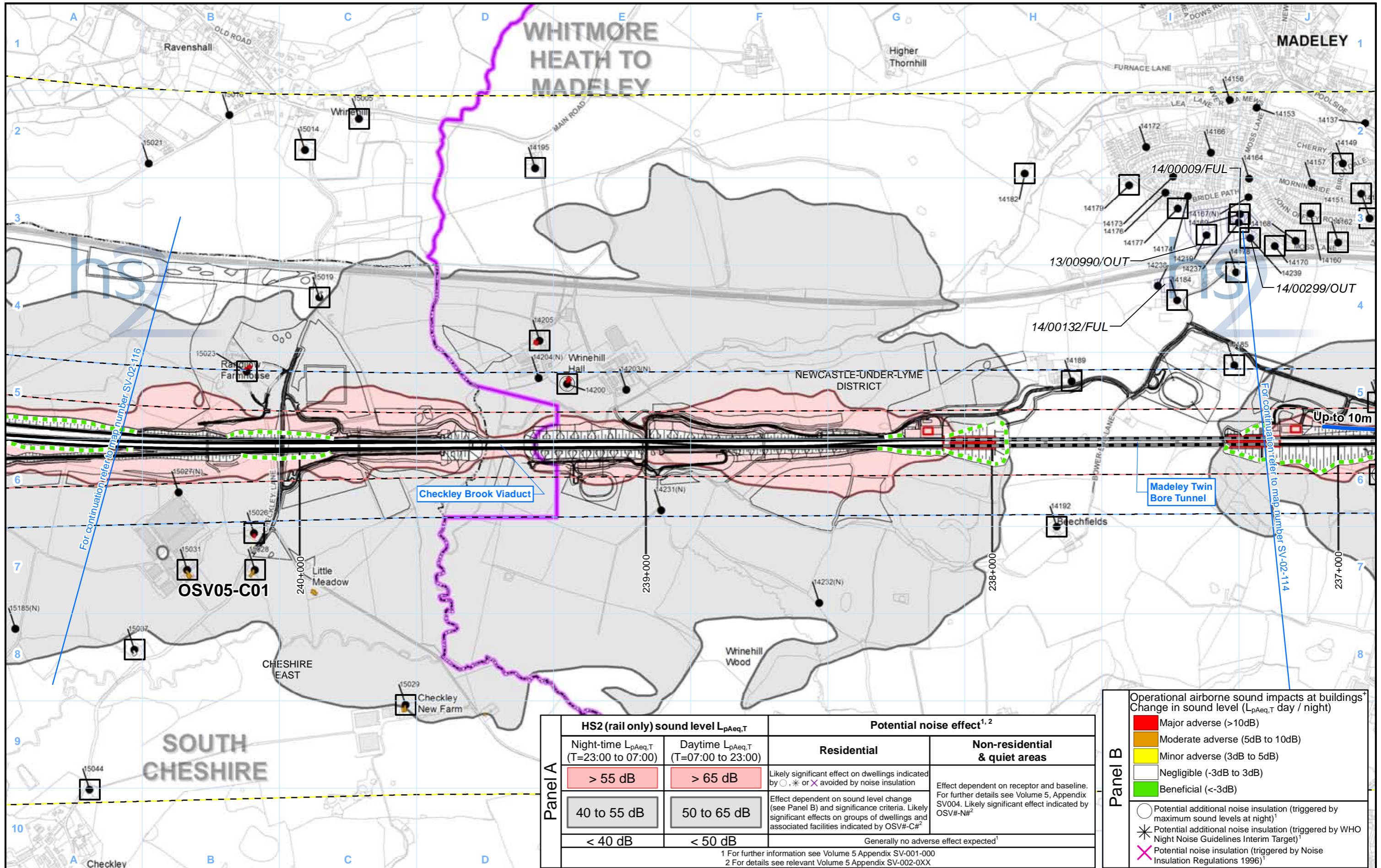
Community Area 5: South Cheshire

Scale at A3: 1:10,000

Doc Number: C861-ARP-EV-MAP-000-131315-P03

Date: 07/06/17

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| 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 | Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# 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-002-0XX

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)

Panel B

- 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 cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Engineering earthworks:**
- Embankment
 - Cutting
- Non engineering earthworks:**
- Embankment
 - Cutting
- L_{pAFmax} exceeds 60dB façade**
- * Residential buildings only
* Labelled with total barrier height above rail level
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

- Legend - Sound related features**
- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: **SV-02-115b**

Map Name: **Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)**

Community Area 5: South Cheshire

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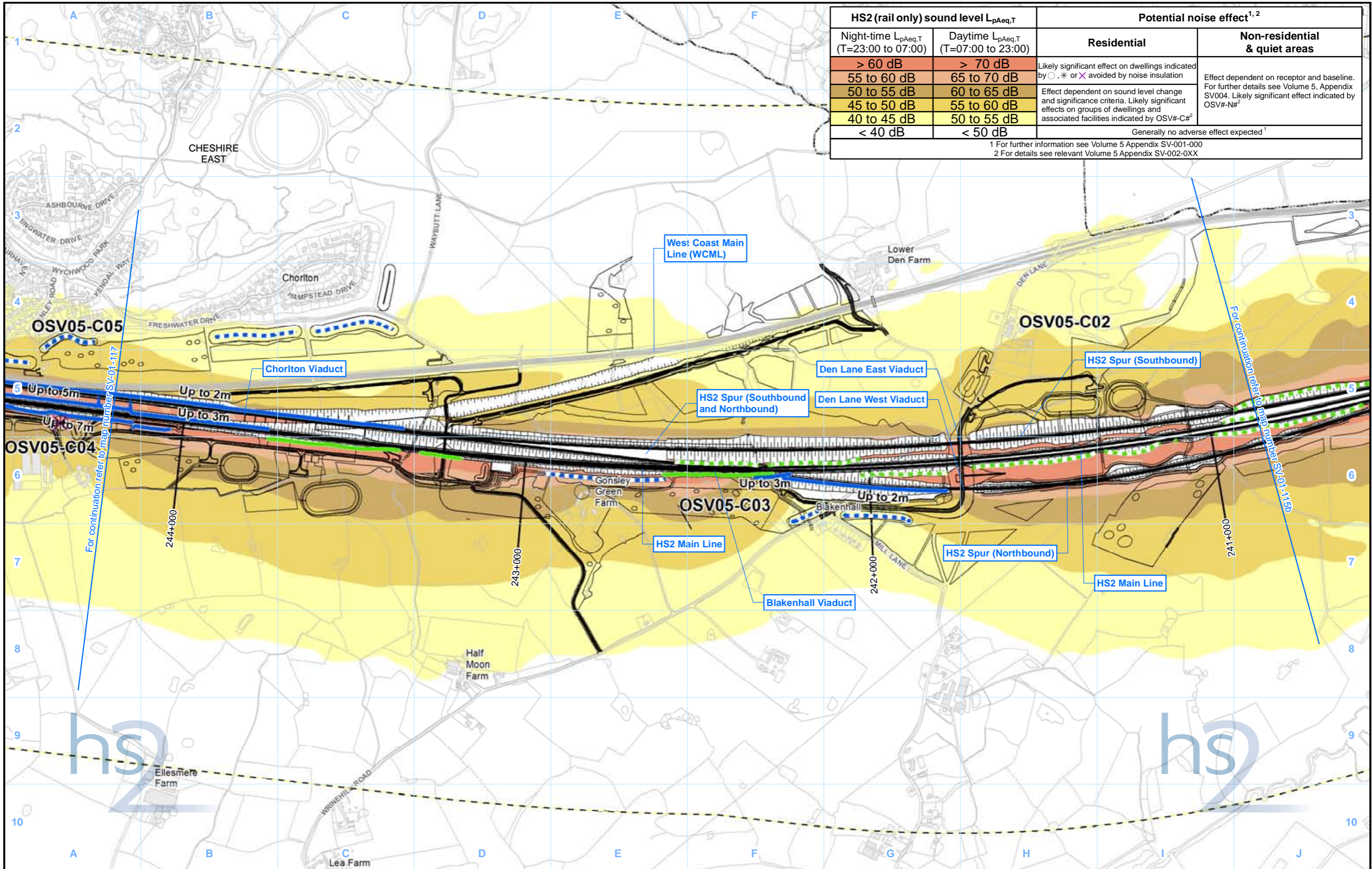
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Date: 07/06/17



| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | Generally no adverse effect expected ¹ |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 40 dB | < 50 dB | | |

1 For further information see Volume 5 Appendix SV-001-000
2 For details see relevant Volume 5 Appendix SV-002-0XX

Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

Engineering earthworks:

- Embankment
- Cutting

Non engineering earthworks:

- Embankment
- Cutting

Legend - Sound related features

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

Legend - Sound related features

- 1km Airborne sound study area
- 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

* Labelled with total barrier height above rail level

Map Number: SV-01-116

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 5: South Cheshire

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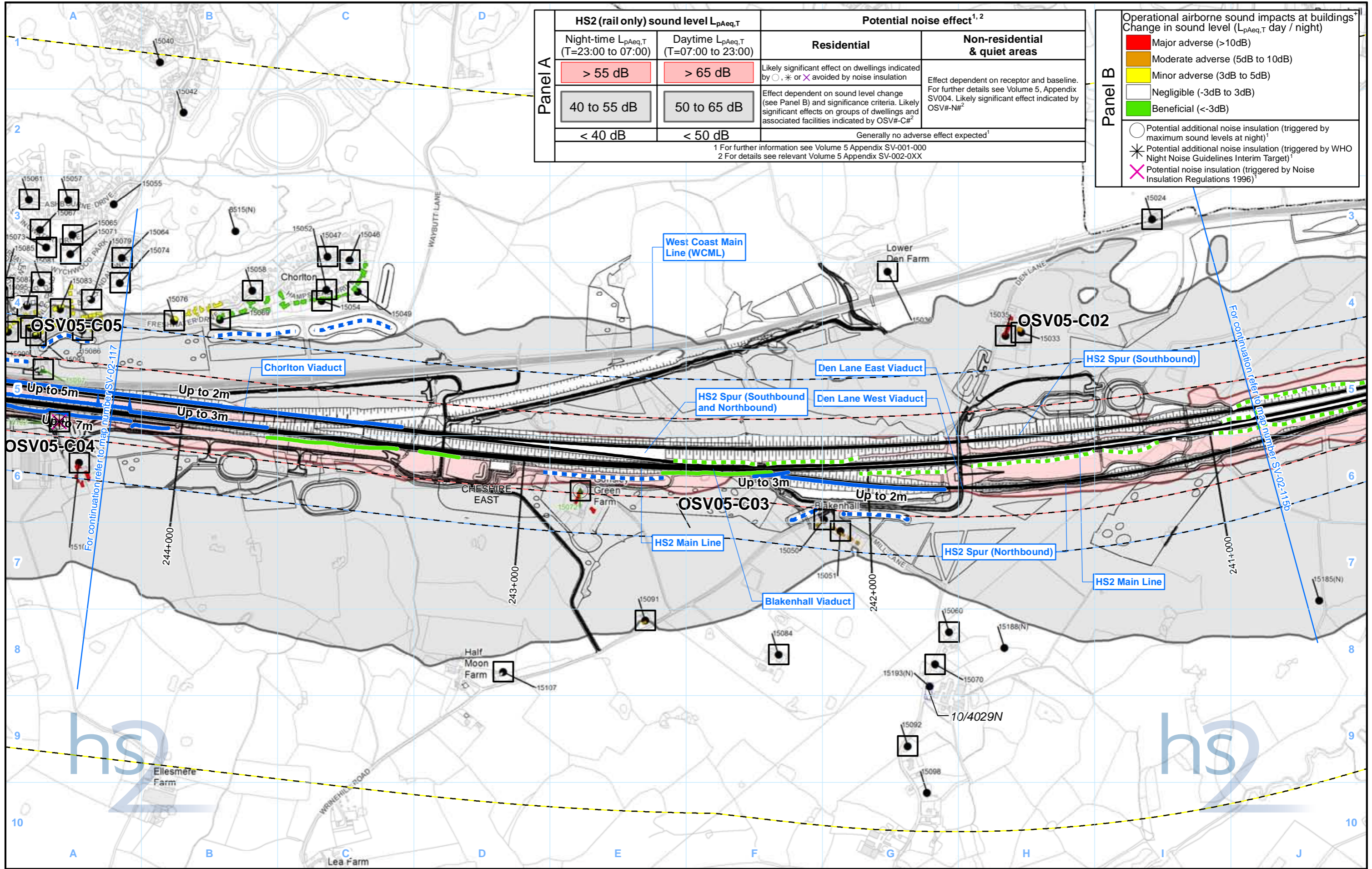
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Doc Number: C861-ARP-EV-MAP-000-131116-P03

Date: 06/06/17



| 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 | Effect dependent on receptor and baseline. For further details see Volume 5, Appendix SV004. Likely significant effect indicated by OSV#-N# 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-002-0XX

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 cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks: Non engineering earthworks:

- Embankment
- Cutting
- L_{pAFmax} exceeds 60dB façade**

* Residential buildings only
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

Legend - Sound related features

- Committed developments - 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
 - 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-116

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

Community Area 5: South Cheshire

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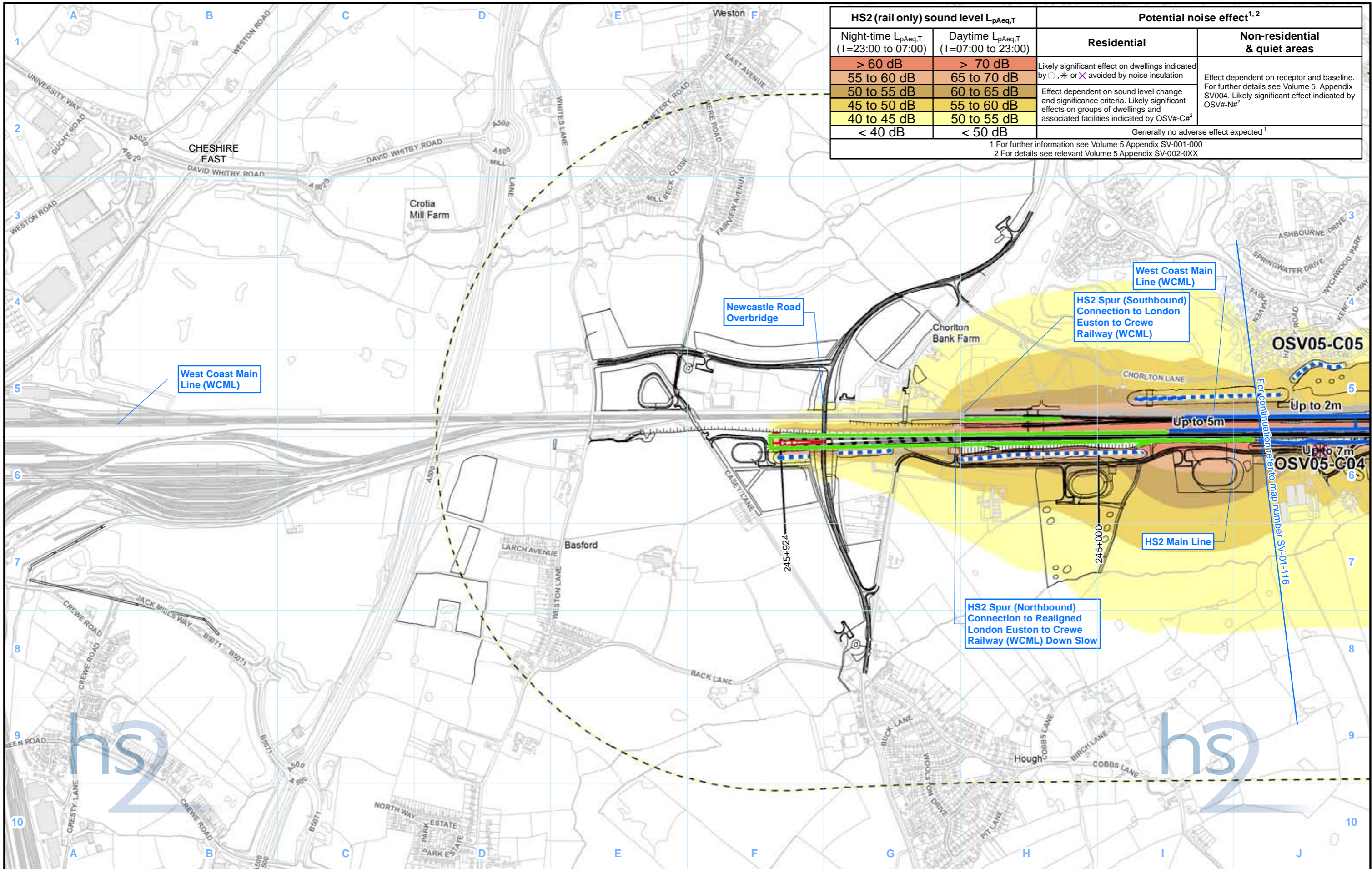
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Date: 07/06/17



| 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 |
| > 60 dB | > 70 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# ² |
| 55 to 60 dB | 65 to 70 dB | Effect dependent on sound level change and significance criteria. Likely significant effects on groups of dwellings and associated facilities indicated by OSV#-C# ² | |
| 50 to 55 dB | 60 to 65 dB | | |
| 45 to 50 dB | 55 to 60 dB | | |
| 40 to 45 dB | 50 to 55 dB | | |
| < 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-002-0XX

- Legend - General features**
- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary

- Legend - Sound related features**
- Engineering earthworks:
- Embankment
 - Cutting
- Non engineering earthworks:
- Embankment
 - Cutting

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

- 1km Airborne sound study area
- 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
- * Labelled with total barrier height above rail level

Map Number: SV-01-117

Map Name: Operational Sound Contour Maps and Likely Significant Effects

Community Area 5: South Cheshire

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Date: 06/06/17

Panel B

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

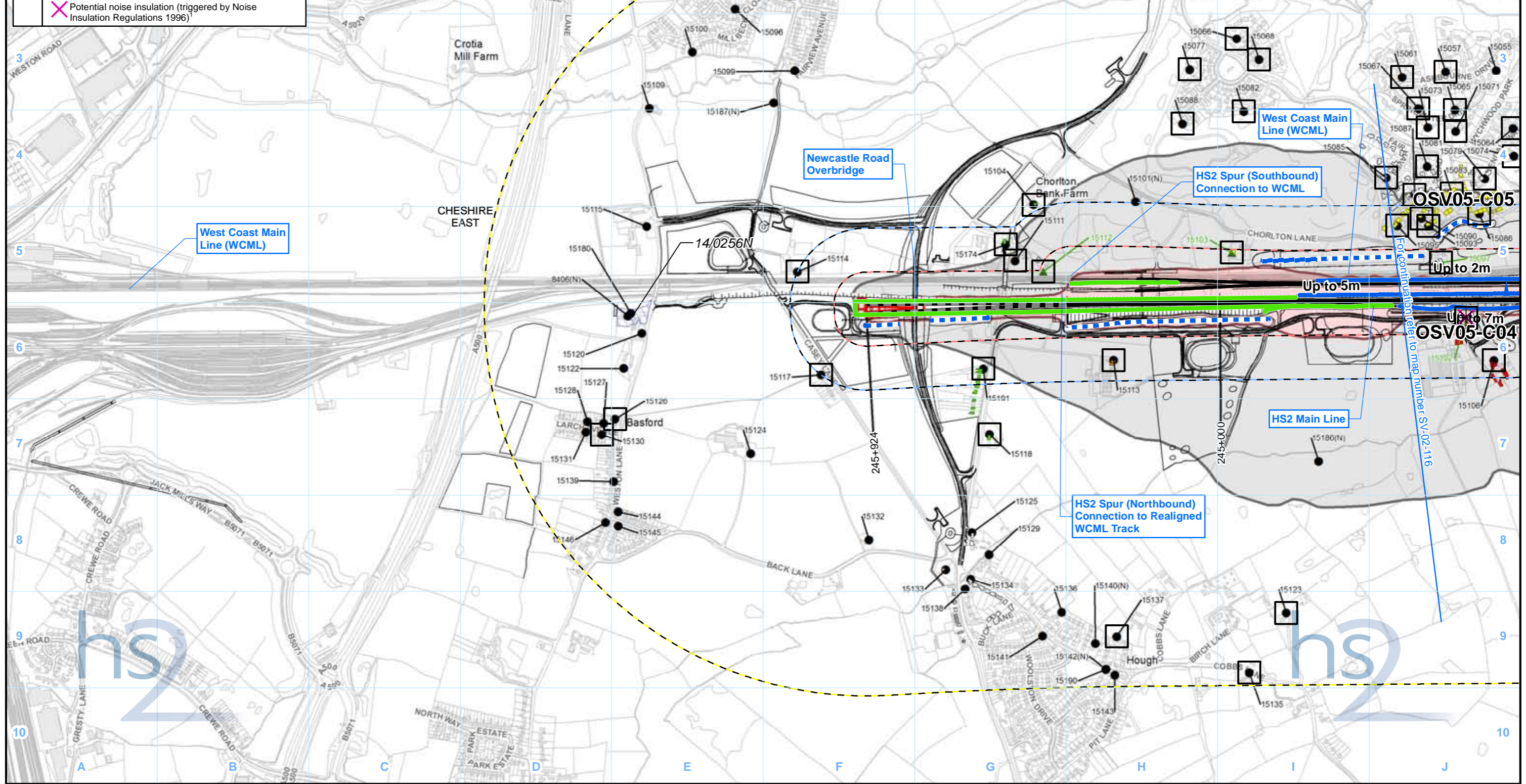
- Major adverse (>10dB)
- Moderate adverse (5dB to 10dB)
- Minor adverse (3dB to 5dB)
- Negligible (-3dB to 3dB)
- Beneficial (<-3dB)

- 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)²

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 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# 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-002-0XX



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Engineering earthworks:

- Embankment
- Cutting
- L_{pAFmax} exceeds 60dB façade**

Non engineering earthworks:

- Embankment
- Cutting

* Residential buildings only
** HS2 train only $L_{pAFmax} + 2.5dB$ façade correction

Legend - Sound related features

- Committed developments - 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
- 1km 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
- Ground-borne noise or vibration impact*

Map Number: SV-02-117

Map Name: Operational Noise and Vibration Impacts and Likely Significant Effects (with Assessment Locations)

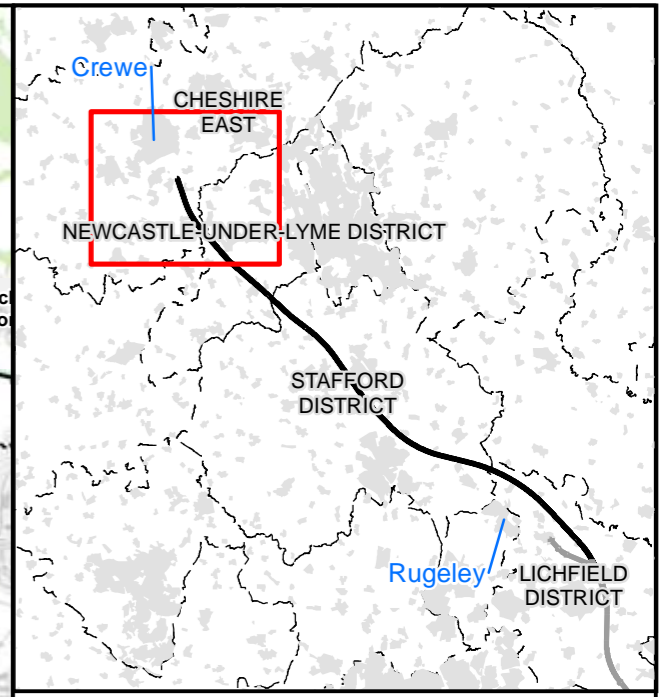
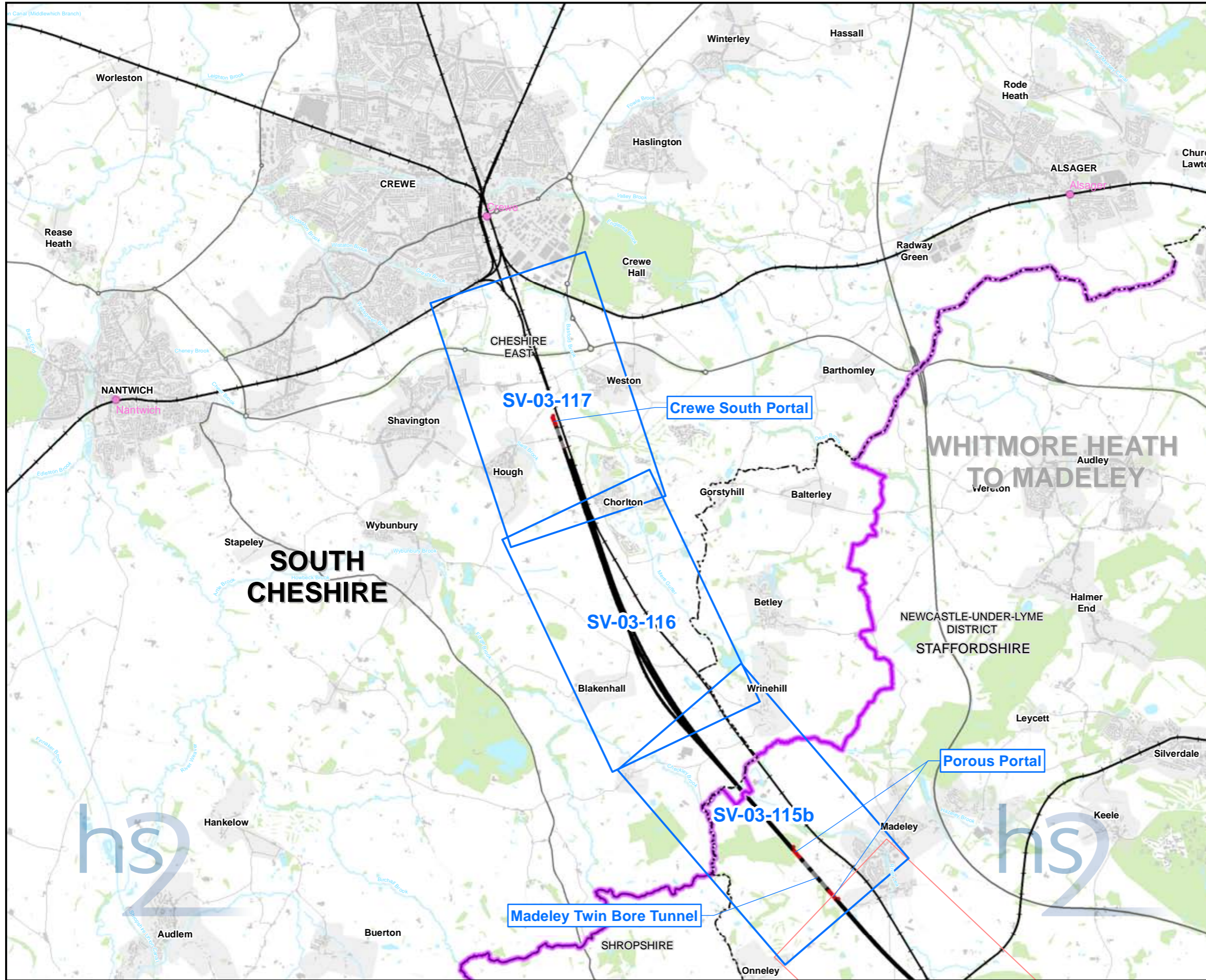
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Date: 14/06/17

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Map Series Information:

The SV-03 figure series accompanies the construction noise & vibration assessments. It shows the locations at which a quantitative assessment of the direct effects of construction noise and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the construction noise and vibration reports contained in Volume 5: Appendix SV-002-0XX

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002-0XX.

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

| Main Map Legend | |
|--|--|
| Route in tunnel | Map sheets included in this community area |
| Route on surface | Map sheets not included in this community area |
| Depot, station, headhouse or portal building | Community area boundary |
| Existing railway station | County boundary |
| District/Borough boundary | |

| | |
|-------------------|--|
| Map Number | SV-03-INDEX-CA5 |
| Map Name | Index Map of: Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments |
| Community Area 5: | South Cheshire |

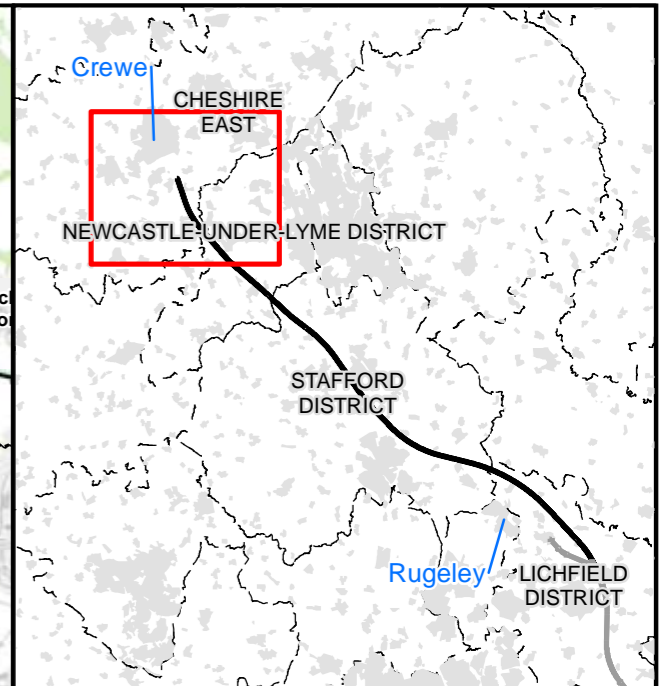
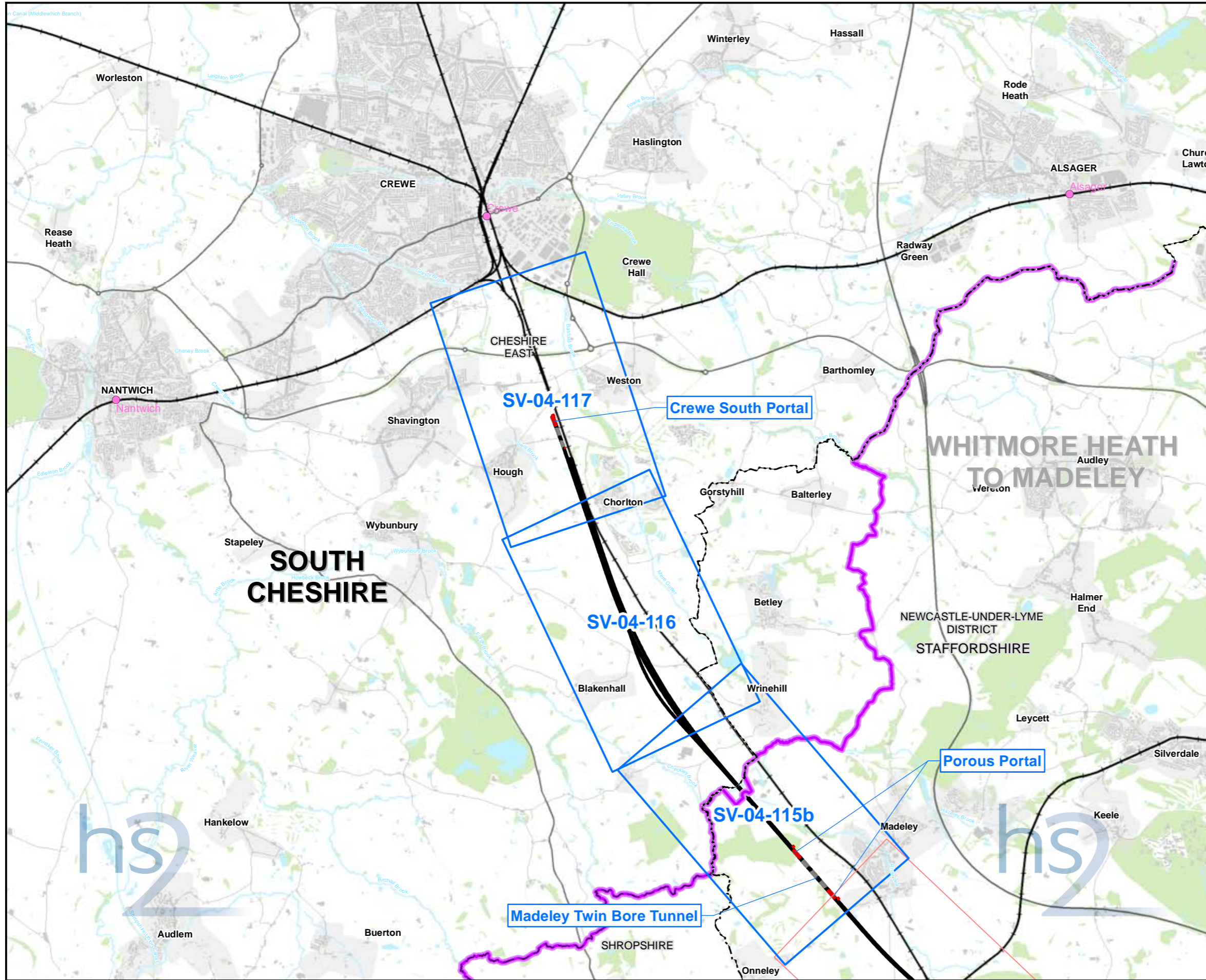
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Map Series Information:

The SV-04 figure series shows the locations at which a quantitative assessment of the direct effects of operational sound and/or vibration has been carried out. These are labelled as assessment locations with a reference number to enable cross-reference to the operational sound and vibration reports contained in Volume 5: Appendix SV-002-0XX

The figure series also shows locations at which baseline sound measurements were carried out. These baseline measurement locations are labelled with a reference number to enable cross-reference to the baseline sound reports contained in Volume 5: Appendix SV-002-0XX

The design of the Proposed Scheme will be informed through stakeholder engagement and further engineering and environmental studies.

A more detailed explanation of each legend item included on the figures can be found in the data dictionary.

Main Map Legend

| | |
|--|--|
| Route in tunnel | Map sheets included in this community area |
| Route on surface | Map sheets not included in this community area |
| Depot, station, headhouse or portal building | |
| Community area boundary | |
| Existing railway station | |
| County boundary | |
| District/Borough boundary | |

| | |
|-------------------|---|
| Map Number | SV-04-INDEX-CA5 |
| Map Name | Index Map of: Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments |
| Community Area 5: | South Cheshire |

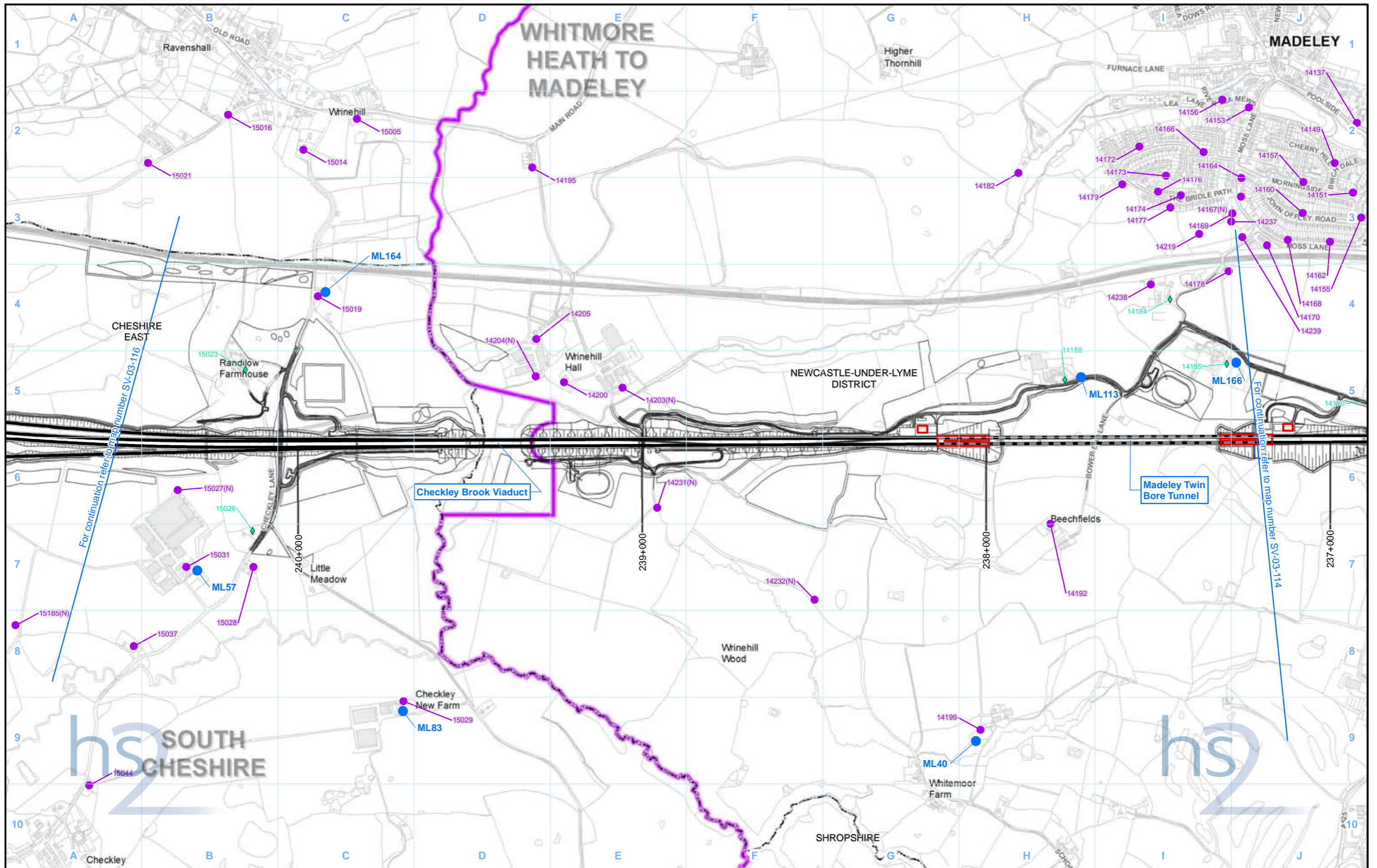
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Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks:

- Embankment
- Cutting
- Non engineering earthworks: Embankment
- Non engineering earthworks: Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

| | |
|-------------------------------------|---|
| Map Number | SV-03-115b |
| Map Name | Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments |
| Community Area 5: South Cheshire | |

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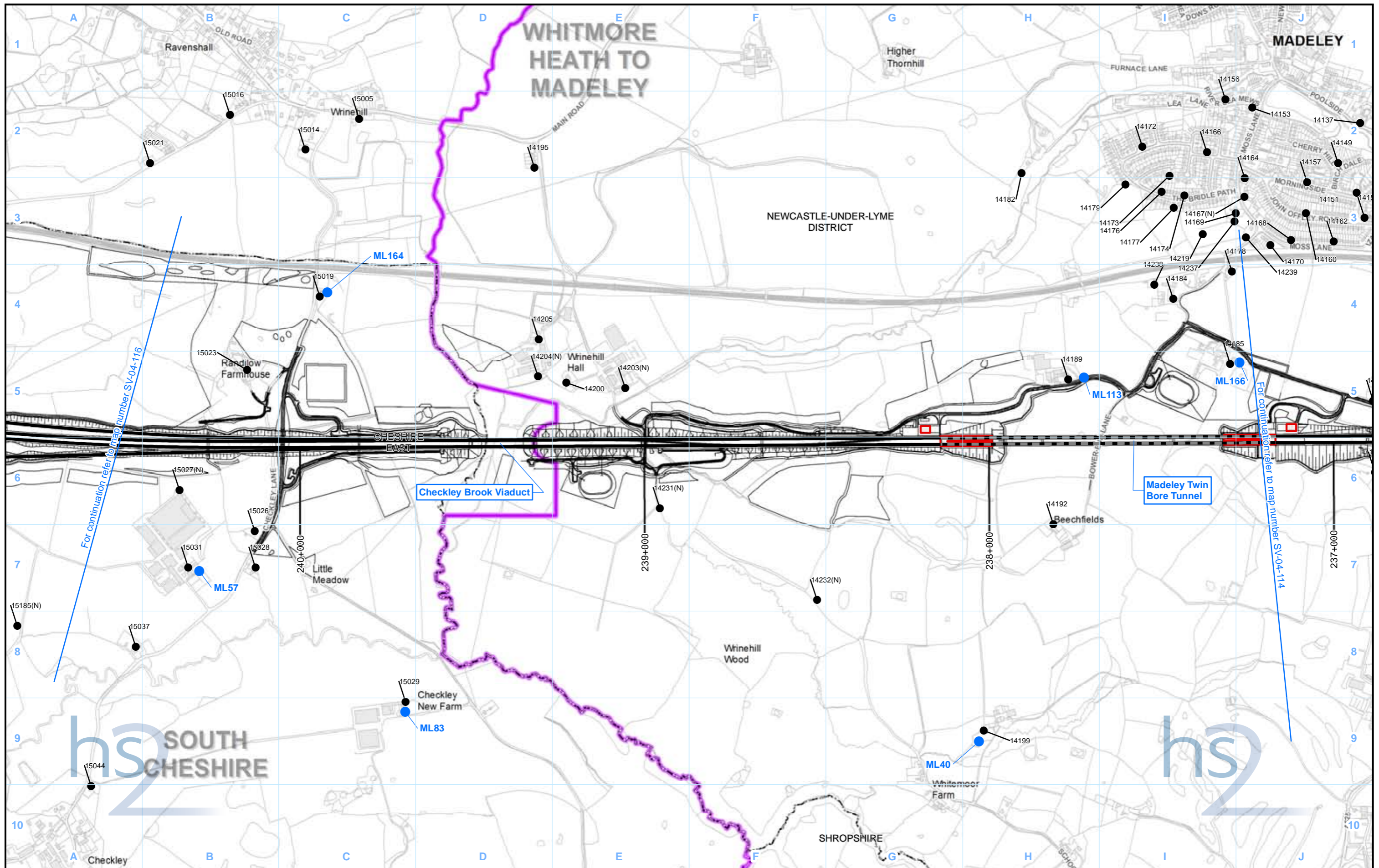
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Metres

Date: 07/06/17

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Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

- | | |
|-------------------------|-----------------------------|
| Engineering earthworks: | Non engineering earthworks: |
| Embankment | Embankment |
| Cutting | Cutting |

- 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
 - Baseline measurement locations
- labelled with Assessment Location ID reference number
(for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

| | |
|-------------------------------------|--|
| Map Number | SV-04-115b |
| Map Name | Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments |
| Community Area 5: South Cheshire | |

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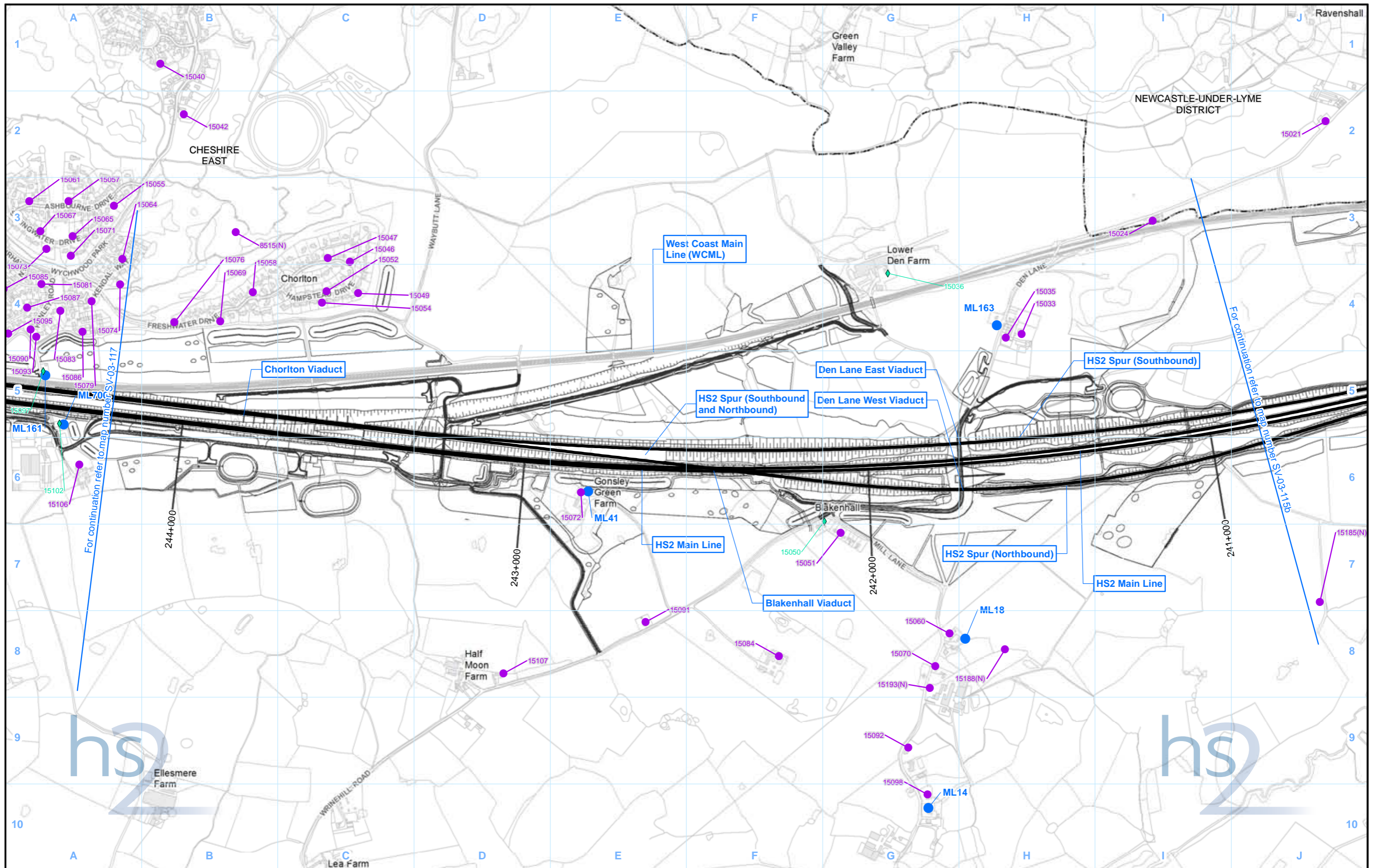
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Scale at A3: 1:10,000

0 100 200 300 400
Metres

Date: 07/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary

Engineering earthworks:

- Non engineering earthworks:
- Embankment
- Cutting

Legend - Sound related features

- Construction airborne sound assessment location
 - Construction vibration assessment locations
 - Construction airborne sound and vibration assessment location
 - Baseline measurement locations
- labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)
- (labelled with Measurement Location reference code)

| | |
|-------------------------------------|---|
| Map Number | SV-03-116 |
| Map Name | Assessment and Monitoring Locations for Construction Sound, Noise & Vibration Assessments |
| Community Area 5: South Cheshire | |

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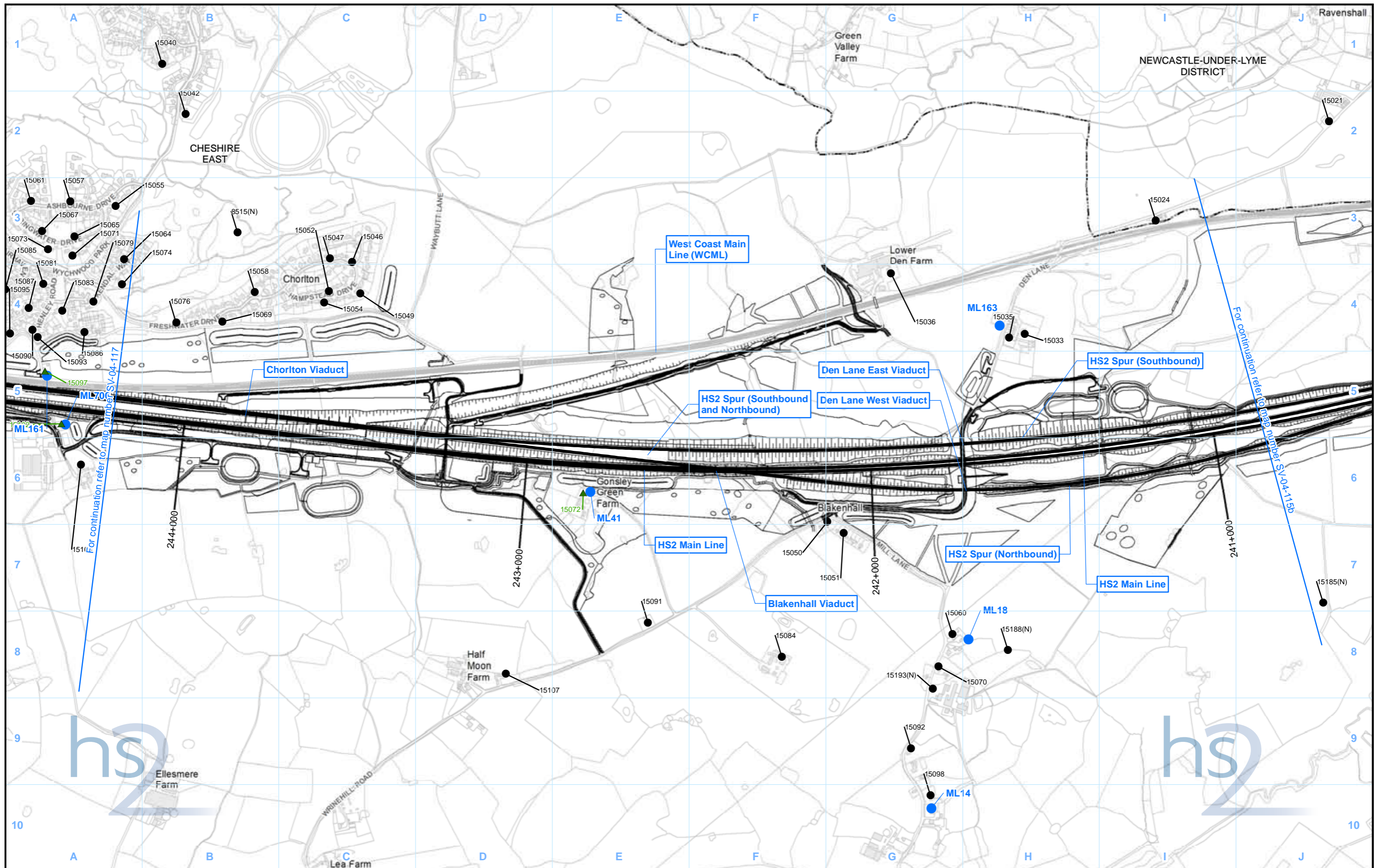
Doc Number: C861-ARP-EV-MAP-000-133116-P03

Scale at A3: 1:10,000

Metres

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Legend - General features

- Route in bored tunnel
 - Route in cut and cover tunnel
 - Route on surface
 - Depot, station, headhouse or portal building
 - Community area boundary
 - County boundary
 - District/Borough boundary
- Engineering earthworks:**
- Embankment
 - Cutting
- Non engineering earthworks:**
- Embankment
 - Cutting

Legend - Sound related features

- 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
 - Baseline measurement locations
- (labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX))*
- (labelled with Measurement Location reference code)*

Map Number: **SV-04-116**

Map Name: **Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments**

Community Area 5: South Cheshire

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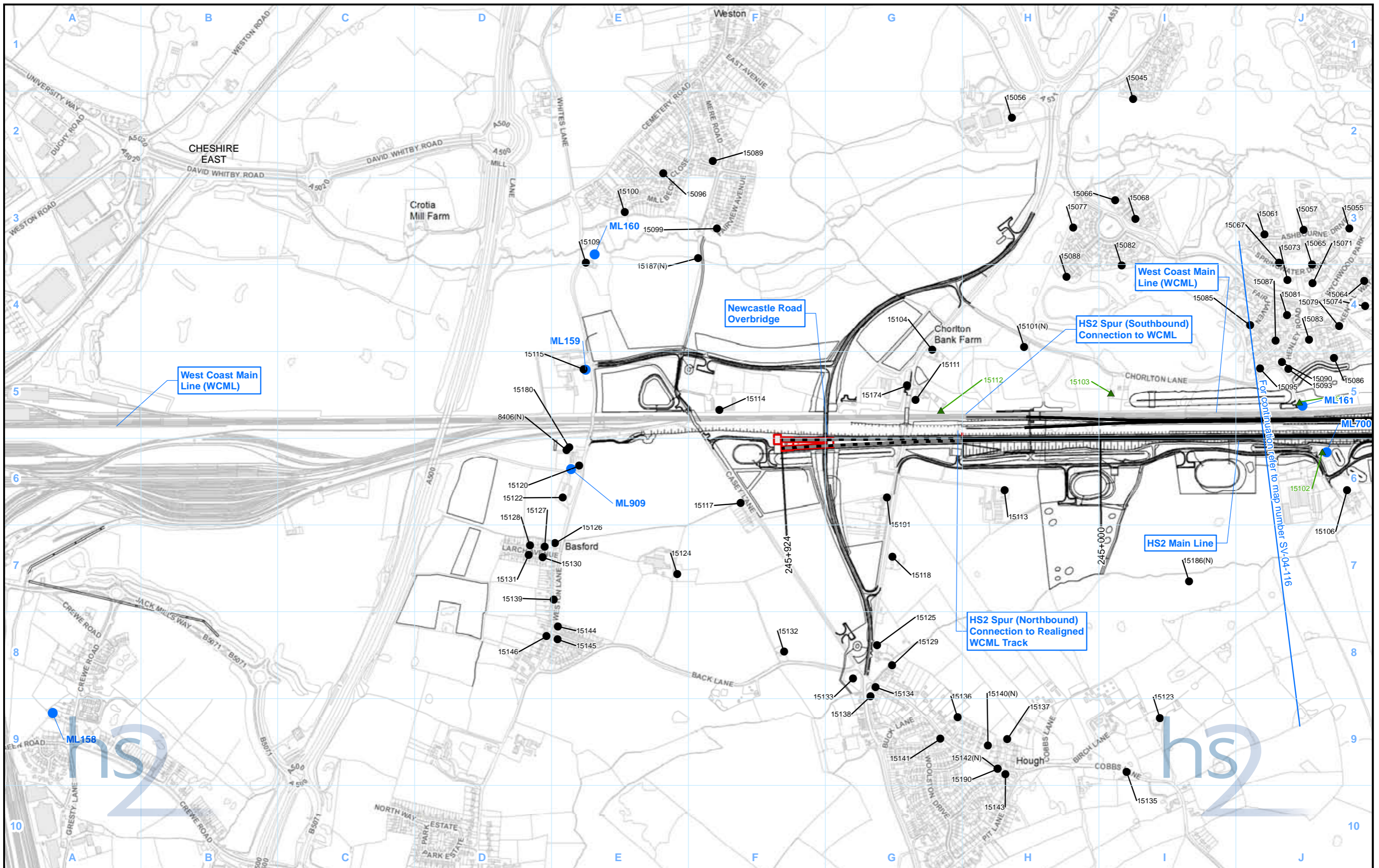
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Doc Number: C861-ARP-EV-MAP-000-134116-P03

Date: 07/06/17



Legend - General features

- Route in bored tunnel
- Route in cut and cover tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community area boundary
- County boundary
- District/Borough boundary

Legend - Sound related features

- Engineering earthworks:**
- Embankment
- Cutting
- Non engineering earthworks:**
- Embankment
- Cutting

- 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
- Baseline measurement locations

labelled with Assessment Location ID reference number (for details of the assessment results see Vol 5 Appendix SV-002-0XX)

labelled with Measurement Location reference code

Map Number: **SV-04-117**

Map Name: **Assessment and Monitoring Locations for Operational Sound, Noise & Vibration Assessments**

Community Area 5: **South Cheshire**

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