A585 Windy Harbour to Skippool Improvement Scheme

TR010035

6.11 Environmental Statement Chapter 11: Noise and Vibration

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Infrastructure Planning

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The Infrastructure Planning
(Applications: Prescribed Forms and
Procedure) Regulations 2009

A585 Windy Harbour to Skippool Improvement Scheme

Development Consent Order 201[ ]

ENVIRONMENTAL STATEMENT CHAPTER 11: NOISE AND VIBRATION

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11 NOISE AND VIBRATION

11.1 Introduction

11.1.1 This Chapter presents the assessment of the noise and vibration impacts associated with the Scheme; describing the regulatory framework, assessment methodology, study area, existing and future baseline, mitigation measures, residual effects, monitoring and a summary of the assessment findings.

11.1.2 This Chapter should be read in conjunction with Figure 11.1: Noise Monitoring Locations within Study Area, Figure 11.2: Study Area, Noise Important Areas and Other Sensitive Receptors, Figure 11.3: Future Baseline Change Contour, Figure 11.4: Noise Mitigation, Figure 11.5: Short Term Noise Change Contour, Figure 11.6: Long Term Noise Change Contour along with Appendix 11.1: Noise Survey Data (document reference TR010035/APP/6.11.1), Appendix 11.2: Construction Noise Assessment (document reference TR010035/APP/6.11.2) and Appendix 11.3: Noise Insulation Regulations Assessment (document reference TR010035/APP/6.11.3).

11.2 Regulatory Framework / National Networks National Policy Statement (NN NPS) Requirements

11.2.1 This assessment has been undertaken considering current legislation, together with national, regional and local plans and policies. A list is provided within Table 11-1 and further detail can be found in the Planning Statement and National Policy Statement Accordance (document reference TR010035/APP/7.1).

Table 11-1: Noise and Vibration – Regulatory Framework and NN NPS Requirements

Policy / Legislation
NN NPS (2014)
Noise Policy Statement for England' (NPSE) (2010)
National Planning Policy Framework (NPPF) (2018)
Planning Practice Guidance (PPG) - Noise (2014)
Environmental Protection Act 1990
Control of Pollution Act 1974
The Environmental Noise (England) Regulations 2006 implement the Assessment and Management of Noise Directive 2002/49/EC (the "Environmental Noise Directive" or "END")
Fylde Borough Local Plan, Fylde Borough Council, as altered: 2005/ policy EP27
Lancashire Joint Structure Plan, Lancashire County Council, 2005/ Policy 20
Wyre Local Plan, Wyre Council (1999)

11.3 Methodology

11.3.1 Technical guidance which has been used in the assessment of noise and vibration from the Scheme is presented in Table 11-2.

Table 11-2: Noise and Vibration – Technical Guidance

Technical Guidance	Scope of Guidance
BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise, British Standards Institution, 2014	Part 1 of the code of practice for noise and vibration control on construction and open sites provides guidance on the methods that can be used to predict and measure noise from construction activities and how to assess the impact on those exposed to it. In particular Annex F sets out the methods of estimating noise from construction sites which take into account distance, ground effects, and reflections from surfaces, and screening by obstacles.
BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Vibration, British Standards Institution, 2014	This part of BS 5228 gives recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration levels, including Industry specific guidance. Guidance is provided concerning methods of measuring vibration and assessing its effects on the environment.
Calculation of Road Traffic Noise (CRTN), Department for Transport and Welsh Office, 1988	CRTN is the standard method for calculating road traffic noise in the UK. It is the Design Manual for Roads and Bridges (DMRB) recommended method for calculating road traffic noise.
Converting the UK traffic noise index LA10, 18h to EU noise indices for noise mapping, TRL limited, PR/SE/451/02 dated 2002	The document provides a methodology for the establishment of a common EU framework for the assessment and management of exposure to environmental noise. The document provides 3 no. interim methodologies for the derivation of EU noise indices (including L_{night}) from CRTN derived noise levels.
DMRB, Volume 11 Section 3 Part 7 (HD213/11) 'Noise and Vibration'	DMRB provides guidance on the appropriate level of assessment to be used when considering the noise and vibration impacts arising from all road projects, including new construction, improvements and maintenance.

Technical Guidance	Scope of Guidance
Interim Advice Note 185/15	This IAN provides updated advice to support Highways England (HE) scheme assessments and relates to noise in the following way: • Analyse the performance of modelled traffic speeds on individual road links compared against observed speeds on the same road links • Adjust, where required, modelled traffic speeds on individual road links to better reflect observed speeds; this is known as the "Speed Pivoting" approach • Use of the speed-band categories within air quality and noise modelling and assessment

Post-Scoping and Preliminary Environmental Information Consultation

11.3.1 Further consultation has been undertaken since the receipt of the responses to the EIA Scoping Report and the Preliminary Environmental Information Report (PEIR) to agree a range of issues relevant to this Chapter, Table 3-1 of Chapter 3: Consultation (document reference TR010035/APP/6.3) provides full details.

Baseline Information

11.3.2 As part of the DMRB noise assessment for the Scheme, a schedule of noise surveys has been undertaken within the noise study area. The purpose of these surveys was to understand the nature of the existing ambient noise climate of the area surrounding the Scheme, and to identify areas of existing high or low noise levels and their source (traffic, aircraft, rail etc.).

11.3.3 The noise monitoring equipment used corresponded to that specified in BS-EN 61672-1 Electro-acoustics, Sound Level Meters, Specifications (2013). The equipment was calibrated in accordance with the manufacturers' specifications within the previous 2 years and was validated by a localised calibration to a known reference tone prior to the commencement and upon completion of the surveys (no drift was observed). Appendix 11.1 Noise Survey Data (document reference TR010035/APP/6.11.1) provides details of the monitoring locations and time history of the DCO monitored dataset.

11.3.4 Furthermore, all noise surveys were undertaken in accordance with the survey requirements of BS 7445 1996 "Description and measurement of environmental noise" (BS7445).

Attended Noise Surveys

11.3.5 Attended noise surveys were undertaken at 8 locations on 29 and 30 November 2017.

11.3.6 These surveys followed the shortened method measurement protocol contained within the CRTN 1988. This methodology is accepted for the quantification of road

traffic noise in the UK and requires the measurement of data for 3 consecutive hours between the hours of 10:00 and 17:00 on a typical weekday.

11.3.7 These monitoring locations are presented in Figure 11.1 and are detailed as follows:

- Attended Noise Monitoring Location (ANML) 1
  - Sound level meter set up at a height of 1.5m on the side of Pool Foot Lane, approximately 10m from the nearest property. Road noise was the dominant source of noise
- ANML 2
  - Sound level meter set up at a height of 1.5m on the side of Garstang Road, approximately 80m from the nearest property. Road noise was the dominant source of noise
- ANML 3
  - Sound level meter set up at a height of 1.5m on the side of Lodge Lane, approximately 3m from the nearest property. Road noise was the dominant noise source
- ANML 4
  - Sound level meter set up at a height of 1.5m on the side of Mains Lane, approximately 3m from the nearest property. Road noise was the dominant noise source
- ANML 5
  - Sound level meter set up at a height of 1.5m on the side of Breck Road, approximately 3m from the nearest property. Road noise was the dominant source of noise
- ANML 6
  - Sound level meter set up at a height of 1.5m on the side of Mains Lane, approximately 3m from the nearest property. Road noise was the dominant source of noise
- ANML 7
  - Sound level meter set up at a height of 1.5m on the side of Breck Road, approximately 3m from the nearest property. Road noise was the dominant source of noise
- ANML 8
  - Sound level meter set up at a height of 1.5m on the side of Garstang New Road, approximately 3m from the nearest property. Road noise was the dominant source of noise

11.3.8 During the noise measurement surveys, the following meteorological conditions were noted to prevail over both days, which are considered to be acceptable for the measurement of environmental noise:

- Winds speeds remained below 5m/s in a south westerly direction
- Cloud cover was estimated to be approximately 10%
- Temperature remained between 2°C and 6°C
- Ground conditions were noted to be dry with no precipitation falling during the

site visit

Unattended Long-Term Noise Surveys

11.3.9 Unattended long-term noise surveys were undertaken at 8 locations over the following dates:

- 24 April to 01 May 2018
- 01 May to 08 May 2018
- 08 May to 15 May 2018

11.3.10 These monitoring locations are presented in Figure 11.1 and are detailed as follows:

- Long-term Noise Monitoring Location (LTNML) 1
  - Sound level meter set up at a height of 1.5m in the rear garden of 32 Kevin Avenue, approximately 8m from the rear façade of the property. Road noise occasionally audible over the ambient residential noise.
- LTNML 2
  - Sound level meter set up at a height of 1.5m in the rear garden of 19 Little Poulton Lane, approximately 8m from the rear façade of the property. Road noise was not audible over other noise ambient noise sources.
- LTNML 3
  - Sound level meter set up at a height of 1.5m in the rear garden of 137 Mains Lane, approximately 5m from the rear façade of the property. Road noise was occasionally audible over general ambient noise.
- LTNML 4
  - Sound level meter set up at a height of 1.5m in the rear garden of 95 Mains Lane, approximately 6m from the rear façade of the property. Road noise was the dominant noise source.
- LTNML 5
  - Sound level meter set up at a height of 1.5m in the rear of Swans Rest on the A586, approximately 12m from the rear façade of 1 of the buildings. Road noise was the dominant noise source.
- LTNML 6
  - Sound level meter set up at a height of 1.5m in the rear garden of 95 Mains Lane, approximately 20m from the rear façade of the property. Road noise was the dominant noise source.
- LTNML 7
  - Sound level meter set up at a height of 1.5m in the front garden of 237 Garstang Road, approximately 3m from the front façade of the property. Road noise was the dominant noise source.
- LTNML 8
  - Sound level meter set up at a height of 1.5m in the rear garden of 1 Barnfield Manor, approximately 6m from the rear façade of the property. Road noise was occasionally audible in the distance but was not dominant over the ambient noise

11.3.11 During the long-term unattended noise surveys, a meteorological monitoring station was set up at LTNML 4 and LTNML 6. Analysis of this data was undertaken to exclude any periods during the survey of extraneous noise (dawn chorus), precipitation and/or wind speeds greater than 5m/s. The specifics of this are discussed within Appendix 11.1 (document reference TR010035/APP/6.11.1).

Construction

On Site Construction Noise

11.3.12 The method of assessing and calculating construction noise impacts has been undertaken using the guidance contained in British Standard 5228: 2009+A1: 2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' Part 1 (BS5228-1).

11.3.13 Construction activities generate noise which can be experienced by nearby sensitive receptors, such as the occupants of residential properties. The noise levels experienced depend upon a number of variables, the most significant of which are:

- The noise generated by plant or equipment used on site, generally expressed as a sound power level (Lw)
- The periods of operation of the plant on the site, known as its 'on-time'
- The distance between the noise source and the receptor
- Operational times

11.3.14 Predictions of the construction noise impacts from the Scheme have been undertaken in accordance with BS 5228-1 for areas up to 300m from the draft order limits, utilising the calculation methods contained within BS5228. All predicted noise levels have been presented as a façade level (+3dB correction to freefield level) at representative receptors.

11.3.15 The calculations of predicted noise impacts undertaken within the study area for this assessment have been conducted using a computer-based prediction program IMMI (produced by Wölfel Meßsysteme). The software package follows the procedures given in BS 5228 and is widely used to predict noise impacts for various types of environmental noise assessments.

11.3.16 The construction noise assessment has been based upon an envisaged construction schedule and construction plant itinerary. A copy of the construction schedule and plant itinerary is presented in Appendix 11.2 - Construction Noise (document reference TR010035/APP/6.11.2).

11.3.17 Where construction plant does not have a reference sound power level provided in BS 5228, reasonable worst-case assumptions based on similar plant or manufacturer's data have been used.

Off Site Construction Vehicle Noise

11.3.18 Construction vehicle noise impacts have been calculated in accordance with the methodology for mobile plant, contained within BS5228 along a defined Heavy Hoods Vehicle (HGV) route. For each considered link the predicted construction HGV noise levels have been logarithmically combined with the prevailing baseline traffic noise levels (calculated as an $L_{Aeq\ 12\ hour}$) derived from the 2022 opening year

traffic model.

11.3.19 Numbers of average daily HGV movements along the assumed HGV routes have been provided by the project traffic team for each year of construction.

11.3.20 It has been assumed within the calculations that the sound power level of a HGV under acceleration is 105.5 dB(A) as stipulated as a maximum permitted value in EC Directive 92/97/EC. This level has been corrected in accordance with BS 5228 to account for number of vehicles per hour and speed.

Construction Vibration from Piling

11.3.21 Predictions of vibration levels in terms of Peak Particle Velocity (PPV) generated from the operation of piling equipment during the construction phase of the Scheme have been undertaken using the prediction formulae contained within Annex E of BS5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites, Part 2 - Vibration (5228-2).

Operation

Operational Daytime Road Traffic Noise Prediction

11.3.22 Road traffic noise fluctuates in intensity hourly, daily and seasonally and as such the impact of traffic generated noise is assessed in terms of a time-averaged indicator.

11.3.23 In the UK, road traffic noise is normally assessed using the dB $L_{A10\ 18\ hour}$ index, defined as the arithmetic mean of the dB(A) noise levels exceeded for 10% of the time in each of the 18, 1-hour periods between 06:00 and 00:00 on a typical weekday. This takes account of the diurnal variation in traffic noise. Annual Average Weekday Traffic (AAWT) flows, speeds and percentage of heavy vehicles are used to allow for seasonal variations.

11.3.24 The procedure for predicting the noise level from a road is described in the Department for Transport and Welsh Office technical memorandum CRTN. The prediction method takes into account factors such as the traffic flow, composition and speed, the alignment and distance of the road relative to the receiving property, the road surface type, the nature of the intervening ground cover between the road and receptors, and reflections from building facades in order to calculate the dB $L_{A10\ 18\ hour}$ noise level.

11.3.25 The calculations undertaken within the 'detailed calculation area' have been modelled using a computer-based prediction program IMMI (produced by Wölfel Meßsysteme). The software package follows the procedures given in CRTN.

Operational Night-time Road Traffic Noise Prediction

11.3.26 The assessment of night-time noise impacts identifies those dwellings and Other Sensitive Receptors in the study area that meet the following night-time noise criteria over the long-term:

- Where the introduction of the Scheme results in a sensitive receptor being exposed to night-time noise levels in excess of 55dB $L_{night,\ outside}$ where it is currently below that level
- Where a receptor is exposed to pre-existing $L_{night,\ outside}$ in excess of 55dB and

this is predicted to increase

11.3.27 The prediction of an annual average $L_{night, outside}$ uses guidance provided in the TRL report 'Converting the UK traffic noise index dB $L_{A10\ 18\ hour}$ to EU noise indices for noise mapping'. This report provides 3 methods for the prediction of L_{night}, depending on the traffic data that is available:

- Method 1 can be used where traffic data for each separate hour over the 24-hour period is available for each road link. Values of $L_{A10,1\ hour}$ are calculated and then converted to $L_{Aeq,\ 1\ hour}$ values, and subsequently L_{den} values, using the relationships provided in the TRL report
- Method 2 can be used where detailed hourly traffic data is not available but traffic data is known for the relevant L_{den} time periods. The value of $L_{A10,18\ hour}$ is calculated using CRTN, and converted to L_{den} time periods using the relationships provided
- Method 3 is used where detailed hourly traffic data is not available. An 'end-correction' is applied to the CRTN calculated levels of $L_{A10,18\ hour}$ to convert to L_{day} (07:00 to 19:00), $L_{evening}$ (19:00 to 23:00) and L_{night} (23:00 to 07:00) as required

11.3.28 For the noise assessment informing this study Method 3.

Operational Road Traffic Noise Modelling Inputs

11.3.29 Traffic data used in the 3-dimensional noise model has been provided by the Scheme traffic team. The raw traffic data derived from the A585 Traffic Model was converted into 18 hour AAWT flows for the period of 06:00 to 00:00, and 8 hour AAWT for the period of 23:00 to 07:00 required for the noise assessment.

11.3.30 Traffic data from the A585 Traffic Model has been provided for the opening year of 2022, with and without the Scheme, and future assessment year (assumed to be 15 years after opening in line with DMRB) of 2037, with and without the Scheme.

11.3.31 In accordance with IAN 185/13 'Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3, Part 1 'Air Quality and Volume 11, Section 3. Part 7 Noise' speed banding was applied in the preparation of the traffic data used in the noise model.

11.3.32 Environmental Traffic Data describes the source of the traffic data and the expansion factors used to derive the traffic data necessary for the noise assessment.

11.3.33 Other data sources used in the creation of the operational road traffic noise model include:

- Ordnance Survey MasterMap product mapping data
- Three dimensional Lidar Digital Terrain Model (DTM) data
- Scheme design drawings and:
- Ordnance Survey address-base data.

11.3.34 This information allowed a 3-dimensional model to be constructed ensuring correct spatial positioning of features such as buildings, road kerb-lines, areas of different ground types.

11.3.35 In addition, the address point data has been used to identify residential dwellings, and other sensitive receptors, within the detailed calculation area.

11.3.36 In terms of future developments in the area, residential dwellings and other sensitive receptors have been identified which are likely to be occupied in the opening year of the Scheme for inclusion within the assessment. The future developments included in the assessment are provided in the Limitations and Assumptions section.

11.3.37 Details of the existing road surfaces in the study area have been obtained which indicate a predominance of hot rolled asphalt, with the exception of the following roads which would have a thin surfacing system in the opening year of 2022:

- Fleetwood Road
- All roads within Noise Important Areas (NIA)

11.3.38 These surfacing specifics form the basis of the noise model for the Do-Minimum opening year (2022) scenario.

11.3.39 It is assumed in the Do-Something Scenarios that all new roads within the Scheme would be surfaced with a thin surfacing system (or a material with similar characteristics from a noise emissions perspective). 'Thin surface' is a generic term covering proprietary surface coarse materials that are laid at a thickness less than 50 mm. These surfaces are recognised as being significantly quieter than conventional surfacing such as hot rolled asphalt and brushed concrete.

11.3.40 In the Do-Minimum and Do-Something 2037 scenarios, it has been assumed that all key roads within the detailed calculation area would be surfaced with a thin surfacing system based upon the expected life span of a road surface carrying high volumes of traffic being no more than 10 to 15 years.

11.3.41 In accordance with the DMRB where a thin surfacing system/low noise surface has been presumed the following corrections have been applied:

- A -2.5 dB(A) surface correction has been applied for an existing low noise surface
- A -1.0 dB(A) surface correction should be applied to any new low-noise surface where the mean traffic speed is <75 km/hr
- A -3.5 dB(A) surface correction should be applied to any new low-noise surface where the mean traffic speed is >75 km/hr

11.3.42 Although it is likely that thin surfacing systems would provide more acoustic benefit than specified above at lower speeds, until further research is carried out, the advice contained within DMRB is to apply a conservative correction as detailed above.

Operational Road Traffic Noise assessment

11.3.43 A DMRB 'detailed' assessment has been undertaken as a result of the scale and potential impacts of the Scheme. In accordance with DMRB the following comparisons have been made of the predicted 18hr daytime road traffic noise levels (06:00 to 24:00):

- Do-Minimum scenario in the opening year against Do-Something scenario in the opening year (short-term)

- Do-Minimum scenario in the opening year against Do-Minimum scenario in the future assessment year (long-term)
- Do-Minimum scenario in the opening year against Do-Something scenario in the future assessment year (long-term)

11.3.44 The assessment of night-time noise impacts identifies those dwellings in the study area that would experience a night-time noise level in excess of 55dB $L_{night, outside}$. In accordance with DMRB only the long-term comparisons have been made with the predicted night-time road traffic noise levels as follows:

- Do-Minimum scenario in the opening year against Do-Minimum scenario in the future assessment year (long-term)
- Do-Minimum scenario in the opening year against Do-Something scenario in the future assessment year (long-term).

Operational Road Traffic Noise Nuisance

11.3.45 The assessment of traffic nuisance is undertaken following the procedures provided within DMRB, based on the calculations of road traffic noise at each receptor. The increases and decreases in the number of people bothered very much or quite a lot by noise is tabulated in percentage points in defined bands; <10%, 10<20%, 20<30%, 30<40% and >40%. The following assessments should be undertaken;

- Do-Minimum scenario in the baseline year against the Do-Minimum scenario in the future assessment year
- Do-Minimum scenario in the baseline year against Do-Something in the future assessment year

11.3.46 The noise levels and noise changes are used to establish the percentage of people bothered very much or quite a lot by traffic noise using the DMRB procedures as follows:

- The Do-Minimum assessment calculates the noise nuisance level for a steady state situation, i.e. when there would not be an abrupt change in noise, from Figure A6.1 of DMRB. This has been concluded for both the Do-Minimum in the opening year (2022) and the future year (2037). From this the difference between the percentage of people bothered very much or quite a lot in the Do-Minimum scenarios is then calculated
- The Do-Something assessment calculates the noise nuisance level for a steady state situation just prior to the Scheme opening compared:
  - Firstly to the resultant level of noise nuisance just after the Scheme opening
  - Secondly to the steady state position at the end of the 15-year design period

11.3.47 The maximum level of noise nuisance change with the Scheme, i.e. either after opening or after 15 years is used to determine the change to the percentage numbers of people affected for the Do-Something assessment.

Operational Airborne Road Traffic Vibration Impact Assessment Method

11.3.48 Airborne vibration from traffic can be produced by the engines or exhausts of road vehicles with dominant frequencies in the 50-100Hz range. Traffic-induced vibrations from low frequency sound emitted by vehicle engines and exhausts can

be a source of annoyance to nearby residents and can occur to some extent along any type of road. Such sound may result in detectable vibrations in building elements e.g. windows and doors.

11.3.49 The assessment of vibration impacts has been undertaken following the guidance given within DMRB which relates airborne vibration to predicted noise levels. For all dwellings within 40m of a proposed new road the dB $L_{A10\ 18\text{-hour}}$ has been calculated for the Do-Minimum and Do-Something situations in the opening and future year.

11.3.50 From this comparison the percentage of people bothered 'very much' or 'quite a lot' by noise exposure has then been calculated for each dwelling using the graphs from Figure A6.1 of DMRB, with the percentage of people bothered 'very much' or 'quite a lot' by vibration considered to be 10% lower than for noise exposure.

11.3.51 In accordance with the recommendation of paragraph A6.21 of DMRB, for dwellings at noise exposure levels below 58dB $L_{A10,18\ hour}$, a zero percent change in those bothered by vibration has been assumed.

Identifying Mitigation and Enhancement Measures, and Assessing Residual Effects

11.3.52 In determining whether any noise and vibration impacts as a result of the Scheme would require mitigation, consideration has been given to guidance provided in PPG Note – Noise (2014).

11.3.53 The information detailed within the PPG indicates that noise impacts should be considered when:

- New developments may create additional noise; and/ or,
- New developments would be sensitive to the prevailing acoustic environment

11.3.54 The guidance also indicates that Planning Authorities should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur
- Whether or not an adverse effect is occurring or likely to occur
- Whether or not a good standard of amenity can be achieved

11.3.55 In line with NPSE and NN NPS this would involve identifying whether the influence of the absolute resultant level of the noise or vibration exposure would be above or below a Significant Observed Adverse Effect Level (SOAEL) or a Lowest Observed Adverse Effect Level (LOAEL) for the given situation.

11.3.56 The terms LOAEL and SOAEL are concepts of effect which are derived from toxicology and are defined within NPSE along with a further term of No Observed Effect Level (NOEL). These are described below:

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

11.3.57 PPG also adds a further term of Unacceptable Adverse Effect Level (UAEL) which is exposure to a noise or vibration level above a SOAEL which should be prevented due to the physiological effects and medically definable harm caused by such an exposure.

11.3.58 The hierarchy of noise exposure taken from PPG and the resultant mitigating action/Scheme response is presented in Table 11-3.

Table 11-3: Noise and Vibration – PPG Hierarchy of Noise Exposure Responses

Perception	Examples of Outcomes	Effect Level	Action
No Observed Effect Level (NOEL)			
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum

Perception	Examples of Outcomes	Effect Level	Action
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Unacceptable Adverse Effect Level (UAEL)			
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

11.3.59 With regard to levels of SOAEL the NPSE states:

> *'It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.'*

11.3.60 The following sections describe how the different noise and vibration impacts associated with the Scheme have been quantified using relevant guidance and British Standards to determine LOAEL and SOAEL for each different identified element of the noise and vibration assessment.

Construction Noise Criteria

11.3.61 BS 5228-1 Annex E provides examples of a number of methods for establishing a significance criteria of construction noise effects. Of these methods, a precedent has been set through numerous significant infrastructure projects, taken through both public inquiry and the Development Consent Order process, for the use of the

'ABC method' as the most appropriate way to establish construction noise limits for large infrastructure projects. Within the 'ABC method' the change in the ambient noise level with construction noise is assessed against defined threshold values. Example threshold values from within BS 5228 are reproduced below in Table 11-4.

Table 11-4: Noise and Vibration – Construction Noise Significance Thresholds

Assessment category and threshold value period	Threshold level dB L_{Aeq}		
	Category A	Category B	Category C
Night-time (23.00 – 07.00)	45 dB L_{Aeq}	50 dB L_{Aeq}	55 dB L_{Aeq}
Evenings & weekends[1]	55 dB L_{Aeq}	60 dB L_{Aeq}	65 dB L_{Aeq}
Daytime (07.00 – 19.00) and Saturday mornings[2]	65 dB L_{Aeq}	70 dB L_{Aeq}	75 dB L_{Aeq}
[1] 19.00 - 23.00 weekdays, 13.00 - 23.00 Saturdays and 07.00 – 23.00 Sundays [2] 07.00 – 13.00 Saturdays			
A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			

11.3.62 An adverse effect is considered to have occurred if the construction activity L_{Aeq} noise level exceeds the calculated threshold level for the category appropriate to the ambient noise level for a period of 1 month or more.

11.3.63 The construction noise LOAEL at noise sensitive receptors is defined as the predicted construction noise level exceeding the existing ambient noise level for the relevant time period (day/evening/night).

11.3.64 The construction noise SOAEL at noise sensitive receptors is defined as the predicted construction noise level exceeding the existing the relevant category threshold presented in Table 11-4 for the relevant time period (day/evening/night).

11.3.65 If the existing ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then an adverse effect is deemed to occur as the total L_{Aeq} noise level for the period would increase by more than 3dB due to the construction activity.

11.3.66 A significant adverse effect in terms of both the environment and on impacts on health and quality of life is deemed to have occurred if the total construction noise generated from the project exceeds the ABC Category/SOAEL values for each time period (day, evening and night) presented in Table 11-4 for a period of 1 month or more.

Construction Vibration Impact Criteria

11.3.67 BS 5228-2 Annex B provides guidance on effects of vibration levels on humans in terms of PPV. The guidance is based upon human response to vibration contained within British Standard 6472-1:2008 'Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting' (BS 6472).

11.3.68 Using the guidance provided in BS 5228-2, a significance of effect in terms of PPV for piling operations has been determined and is presented in Table 11-5.

Table 11-5: Noise and Vibration – Classification of Construction Vibration Thresholds

Vibration level (PPV)	Effect	Significance	Observed Adverse Effect Level
0.14 $mm \cdot s^{-1}$	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Neutral	
0.3 $mm \cdot s^{-1}$	Vibration might be just perceptible in residential environments.	Slight Adverse	LOAEL
1.0 $mm \cdot s^{-1}$	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.	Moderate Adverse	SOAEL
10 $mm \cdot s^{-1}$	Vibration is likely to be intolerable for any more than a very brief exposure to this level.	Large Adverse	

11.3.69 A significant adverse effect in terms of both the environment and on impacts on health and quality of life is deemed to have occurred if the predicted vibration level generated from piling activities exceeds the SOAEL value presented in Table 11-5.

Operational Road Traffic Noise Impact Criteria

11.3.70 DMRB provides classification for the magnitude of change in road traffic noise. A change in road traffic noise of 1 dB(A) in the short-term is considered within DMRB as the smallest perceptible change and classified as the short-term threshold criteria. The short-term magnitude of road traffic noise impacts from the Scheme has therefore be classified in accordance with DMRB, as detailed in Table 11-6.

Table 11-6: Noise and Vibration – Classification of Magnitude of Noise Impact (Short-Term)

Noise Change Band $L_{A10(18\ hour)}$ dB	Magnitude of Impact
0	No change
0.1 to 0.9	Negligible
1 to 2.9	Minor
3 to 4.9	Moderate
5 or more	Major

11.3.71 In the long-term, DMRB classifies a 3dB(A) change in operational road traffic noise as the smallest change perceptible due to the change in noise level being gradual over time, and therefore specifies this as the long-term threshold criteria. The long-term magnitude of road traffic noise impacts from the Scheme have therefore be classified in accordance with these criteria presented in Table 11-7.

Table 11-7: Noise and Vibration – Classification of Magnitude of Noise Impacts (Long-term)

Noise Change Band $L_{A10(18\ hour)}$ dB	Magnitude of Impact
0	No change
0.1 to 2.9	Negligible
3 to 4.9	Minor
5 to 9.9	Moderate
10 or more	Major

11.3.72 In addition to the above classifications of magnitude associated with operational road traffic noise, the definitions of LOAEL and SOAEL used in the operational traffic noise assessment are presented in Table 11-8.

Table 11-8: Noise and Vibration - Levels of LOAEL and SOAEL Assumed for Operational Road Traffic Noise

Time period	Adverse effect level	L_{Aeq} noise level (dB)	L_{A10} noise level (dB)
Day	LOAEL	50	55
Day	SOAEL	63	68*
Night	LOAEL	40	n/a
Night	SOAEL	55	n/a
*Aligned with Noise Insulation regulations			

11.3.73 The levels of LOAEL and SOAEL presented in Table 11-8 have been derived as follows:

- The daytime LOAEL is based on World Health Organization (WHO) Guidelines for Community Noise were the onset of moderate community annoyance is considered to begin.
- The daytime SOAEL is based on WHO Guidelines for Community Noise were the onset of cardiovascular health effects is considered to begin
- The night-time LOAEL is based on published levels of LOAEL contained within the WHO Night Noise Guidelines levels
- The night-time SOAEL is equivalent to the levels above which cardio vascular health effects become the major public health concern contained within the WHO Night Noise Guidelines levels

11.3.74 A significant adverse effect on health and quality of life from road traffic noise is deemed to have occurred if the predicted change in road traffic noise level is moderate or greater and above a SOAEL value presented in Table 11-8.

11.3.75 A significant environmental effect has been determined based upon professional judgement taking into account the factors such as:

- Magnitude of change in short term and long term
- Absolute noise level with reference to LOAEL and SOAEL
- Acoustic context and characteristics of the resultant noise climate; and
- Circumstance of receptor i.e. location of noise sensitive rooms (bedrooms/living rooms) and whether the receptor would also experience benefits from the Scheme.

Assumptions and Limitations

11.3.76 At present, the final construction methodologies and plant detail are not defined. The construction noise assessment has therefore been undertaken based upon an envisaged construction programme and plant itinerary taking into account worst case assumptions as to the types of activities and plant that are likely to be used.

11.3.77 From an operational aspect it has been assumed that the following developments located within the detailed calculation area have been fully completed by the opening year of the Scheme and as such have been considered as sensitive receptors:

- Moorfield Park (residential)
- Wyre Grange (residential)

11.3.78 The assessment undertaken for construction vehicle movements assumes the worst case that all required deficit material would be brought to site via the local road network and that borrowpits would not be used. However, the construction noise assessment assesses that the borrowpits would be used and machinery to excavate the borrowpits has been modelled. Therefore, this assessment covers both scenarios.

Items Scoped out of the Assessment

Construction Vibration other than Piling Activities

11.3.79 There are currently no British Standards that provide a methodology to predict levels of vibration from construction activities, other than that contained within BS5228-2, which relates to percussive or vibratory piling activities only.

11.3.80 Research into levels of vibration from various construction activities were reported by The Transport and Road Research Laboratory (now the Transport Research Laboratory (TRL)) in Supplementary Report 328 'Ground vibrations caused by road construction activities'. The report concluded:

> *'that at distances greater than 20m, the vibration levels measured were below the level of human perception because of attenuation in the ground and that it is unlikely that people would be disturbed by vibration from general construction activities at distances of 20m or more.'*

11.3.81 Given the research undertaken by TRL, it is not anticipated that there would be any vibration impacts from general construction activities on sensitive receptors.

11.3.82 For the reasons detailed above general construction vibration would not be considered an issue associated with the Scheme, however vibration impacts from piling activities have been deemed necessary for consideration within the scope of the construction noise and vibration assessment.

Operational Groundborne Road Traffic Vibration

11.3.83 Groundborne vibration from road traffic movements is typically found to be in the 8-20Hz range and is produced by the interaction between rolling wheels and the road surface. Research undertaken by TRL in report RR246 'Traffic induced vibration in buildings' found no evidence that traffic induced groundborne vibration is a source of significant damage to buildings. The report concluded that:

> *'peak particle velocities in the structure of buildings close to heavily trafficked roads rarely exceed 2 mm/s and typically are below 1mm/s. Normal use of a building such as closing doors, walking on suspended wooden floors and operating domestic appliances can generate similar levels of vibration to those from road traffic.'*

11.3.84 Traffic generated vibrations mostly arise where road surfaces are uneven, e.g. on older roads that are damaged or require re-surfacing, and where they carry a significant proportion of HGVs (the high axle loading passing over a break in the road surface imparts vibrational energy into the ground).

11.3.85 The new road surface would be constructed in accordance with the Manual of Contract Documents for Highway Works, Volume 1, Specification for Highway Works, Series 700 Road Pavements – General which would ensure any surface irregularities would not be permitted resulting in a smooth road surface.

11.3.86 Paragraph A5.26 of DMRB HD213/11 states that:

> *'vibrations are unlikely to be important when considering disturbance from new roads and an assessment will only be necessary in exceptional circumstances'*

11.3.87 A review of the OS Address point data for the local area indicates that no such exceptional circumstances (i.e. test laboratories etc.) have been identified within the close proximity to the Scheme and as such consideration of ground borne road traffic induced vibration has not been deemed to be a requirement of the noise and vibration assessment.

11.4 Study Area

Receptors Potentially Affected (including value / sensitivity)

11.4.1 In terms of noise, a methodology has not yet been developed to assign the value of a receptor, currently this is defined based upon professional judgement and the guidance notes of the NPSE. Therefore, based upon professional judgement the value of a receptor would be defined using the criteria provided in Table 11-9.

Table 11-9: Noise and Vibration - Determining the Importance / Sensitivity of Resource

Importance/Sensitivity of Receptor	Criteria
High	• Residential dwellings • Hospitals • Schools • Community facilities • Designated areas (e.g. AONB, National Park, Special Area of Conservation (SAC), Special Protection Area (SPA), Site of Special Scientific Interest (SSSI), Scheduled Monument • Places of Worship • Public Rights of Way
Medium	• Offices • Bars/cafes/restaurants where external noise may be intrusive
Low	• Factories and working environments with existing high noise levels • Night clubs

Construction

Construction Noise

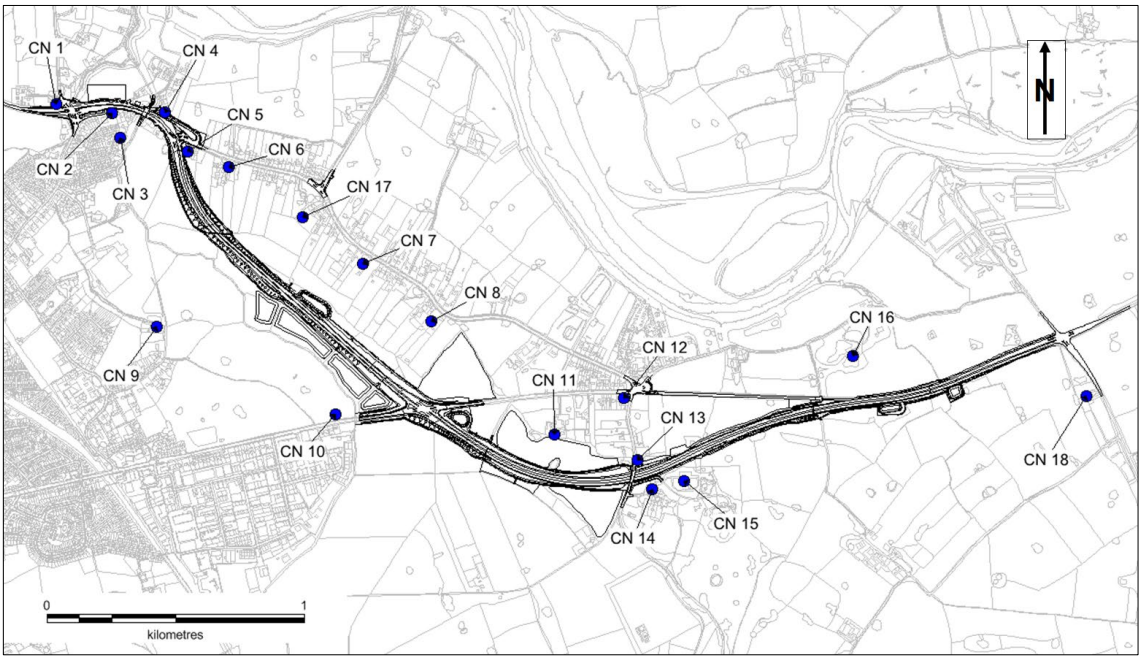
11.4.2 The study area for the construction noise assessment comprises an area up to 300m from the draft order limits. This was determined in accordance with guidance provided in BS5228-1. BS 5228-1 states that at distances over 300m noise predictions should be treated with caution because of the increasing importance of meteorological effects. As such the prediction of construction noise levels has been limited to within 300m.

11.4.3 Noise impacts from the construction of the Scheme have been assessed at 18 selected worst-case sensitive receptors which are considered to be representative of all noise sensitive receptors within the immediate vicinity of the scheme. These receptors were agreed with the Environmental Health Departments of Wyre Council and Fylde Council, and are presented in Table 11-10 and on Insert 11-1.

Table 11-10: Noise and Vibration – Construction Noise Sensitive Receptors

Sensitive receptor	Receptor ID
Barton House, Skippool Road	CN1
198 Breck Road	CN2
36 Kevin Avenue	CN3
The Cottage, Old Mains Lane	CN4
Meadow View Barn, 195 Mains Lane	CN5
183 Mains Lane	CN6
103 Mains Lane	CN7
71 Mains Lane	CN8
36 Little Poulton Lane	CN9
New Development	CN10
Springfield, Garstang Road	CN11
Silver Ridge, Garstang Road	CN12
North Lodge, Lodge Lane	CN13
1 Barnfield Man, Lodge Lane	CN14
The Manor, Singleton Hall, Lodge Lane	CN15
Bankfield Manor, Poolfoot Lane	CN16
133 Mains Lane	CN17
Kirkham I'th' Fields Farm, Fleetwood Road	CN18

Insert 11-1: Noise and Vibration – Construction Noise Sensitive Receptors



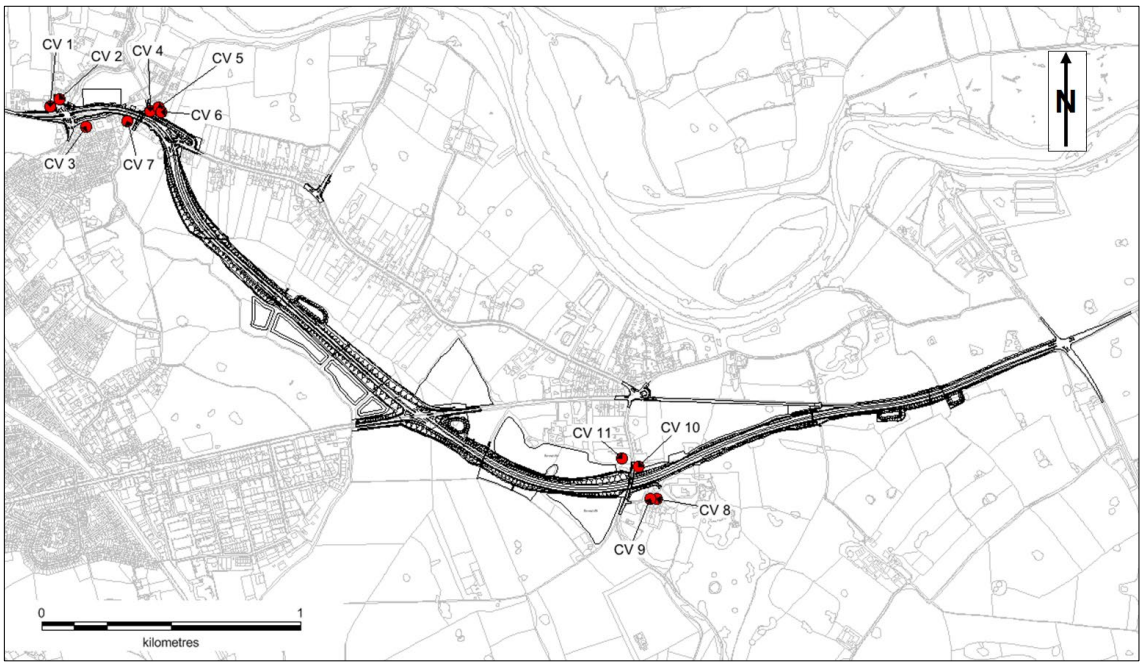
Construction Vibration

11.4.4 Vibration impacts from the construction of the Scheme have been assessed at 11 selected worst-case sensitive receptors which are considered to be representative of vibration sensitive receptors within the immediate vicinity of construction phase piling operations. These receptors are presented in Table 11-11 and on Insert 11-2.

Table 11-11: Noise and Vibration – Construction Vibration Sensitive Receptors

Sensitive receptor	Receptor ID
Barton House	CV 1
Throstles Nest	CV 2
180 Breck Road	CV 3
Riverside	CV 4
Wyre Lodge	CV 5
The Cottage	CV 6
210 Breck Road	CV 7
3 The Hazels	CV 8
1 Keepers Cottage	CV 9
North Lodge	CV 10
Larkfield	CV 11

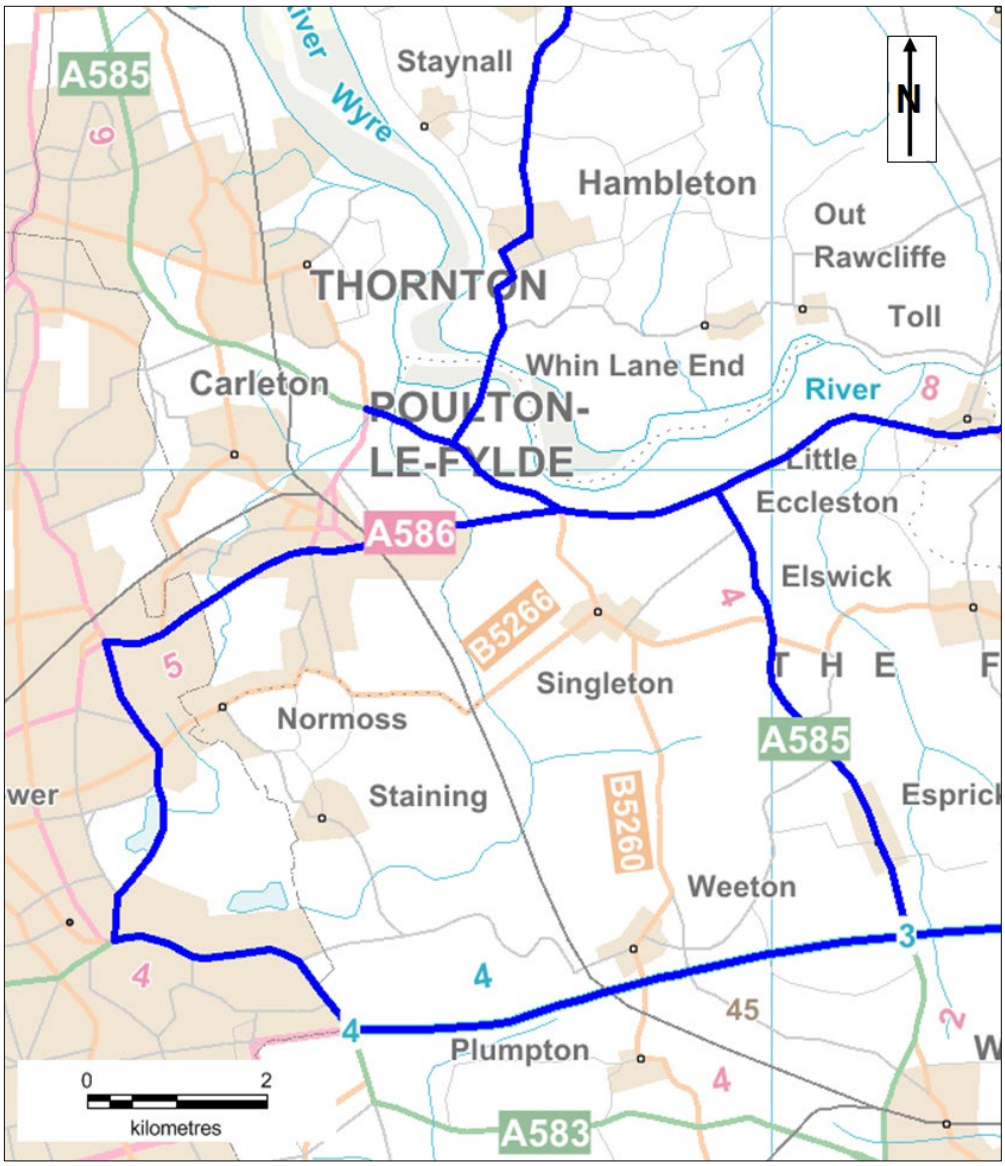
Insert 11-2: Noise and Vibration – Construction Vibration Sensitive Receptors



Off Site Construction Vehicle Study Area

11.4.5 The study area for the construction vehicle assessment has considered noise changes within 300m of any road/route identified within the Transport Assessment as experiencing temporary increases in HGV activity as a result of the construction of the Scheme. The assumed routes which would be used by HGVs during construction are presented in Insert 11-3 indicated by the blue line.

Insert 11-3: Noise and Vibration – Heavy Vehicle Construction Routes



11.4.6 The roads identified by the blue line in Insert 11-3 to be used for construction HGV movements are as follows:

- A583
- A585
- A586
- A587
- Back Lane
- Bradshaw Lane
- Breck Road
- Chepstow Road
- Dinmore Avenue
- East Park Drive
- Fleetwood Road
- Garstang New Road
- Garstang Road East
- Kentmere Drive
- M55
- Mains Lane
- Oakleaf Way
- Preston New Road
- Riversway
- South Park Drive
- St Walburga's Road
- White Carr Lane

Operation

11.4.7 The operational noise study area has been derived in accordance with the requirements of DMRB.

11.4.8 The study area in accordance with DMRB is defined by the following process:

A - Identify the start and end points of the physical works associated with the road project.

B - Identify the existing routes that are being bypassed or improved, and any proposed new routes, between the start and end points.

C - Define a boundary 1km from the carriageway edge of the routes identified in (B) above.

D - Define a boundary 600m from the carriageway edge around each of the routes identified in (B) above and also 600m from any other affected routes* within the boundary defined in (C) above. The total area within these 600m boundaries is termed the 'calculation area'.

*An affected route is one where there is the possibility of a change of 1dB(A) or more between the Do-Minimum and Do-Something scenarios in the short-term or 3dB(A) or more in the long-term.

E - Identify any affected routes beyond the boundary defined in (C) above.

F - Define a boundary 50m from the carriageway edge of the routes identified in (E) above.

11.4.9 Within the calculation area a total 2,422 residential receptors and 30 other sensitive receptors (OSR) have been considered in the operational road traffic noise assessment. This includes existing receptors and residential developments likely to be occupied in the year of opening.

11.4.10 OSRs are defined within DMRB as:

- Hospitals
- Schools
- Community facilities
- Designated areas (e.g. AONBs)
- National Parks, Ramsar sites, SAC's, SPA's, SSSI's
- Scheduled Monuments
- Public Rights of Way

11.4.11 The OSRs included within the assessment are presented in Table 11-12.

Table 11-12: Noise and Vibration – Identified Other Sensitive Receptors Within Operational Noise Study Area

ID	Name (Refer to Figure 11.2)	ID	Name (Refer to Figure 11.2)
1	Windy Harbour Holiday Centre	16	The Moorland Nursing Home
2	River Wyre Holiday Camp	17	Happy Days Nursery
3	Singleton Stables	18	Carr Head Primary School
4	West Stables	19	Kingdom Hall of Jehovah's Witness
5	New Poulton Cemetery Mausoleum	20	St Johns primary school
6	Brookfield School	21	Nationwide Laboratories
7	Breck Primary School	22	River Wyre Hotel
8	Breck Caravan Park	23	St John Church
9	Poulton Golf Club	24	Swans Rest Holiday Cottages 1
10	Alexandra Nursing Home	25	Swans Rest Holiday Cottages 2
11	Primrose Bank Rest Home	26	Swans Rest Holiday Cottages 3
12	Poulton YMCA Swimming and Fitness Centre	27	Swans Rest Holiday Cottages 4
13	Poppy & Jack Nursery	28	Swans Rest Holiday Cottages 5
14	Poulton Guides HQ	29	Swans Rest Holiday Cottages 6
15	Hodgson Academy	30	Swans Rest Holiday Cottages 7

11.4.12 NIAs within the calculation area, have also been identified and assessed. These areas are defined by Department for Environment Food & Rural Affairs (Defra) Under Directive 2002/49/EC which requires member states to draw up Action Plans for major roads to aid in the management of environmental noise.

11.4.13 NIAs are defined by Defra as where the top 1% of the population that are affected by the highest noise levels from major roads are located according to the results of the Environmental Noise Directive (END) noise mapping. The Important Areas identified and considered within the calculation area are shown on Figure 11.2 and listed as:

- IA10542, on the B5260
- IA64, on the A585
- IA6819, on the A585
- IA6820, on the A585
- IA66, on the
- IA67, on the A585

A585

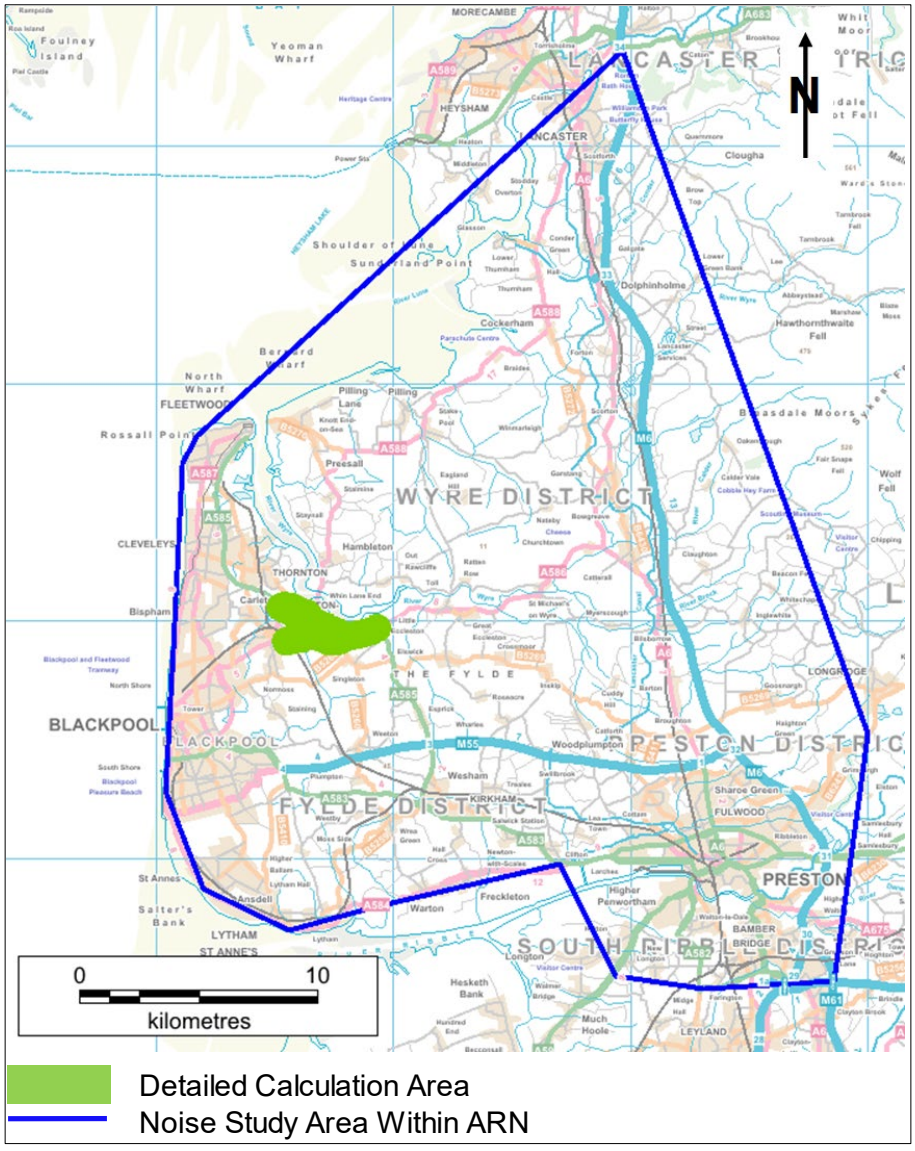
- IA65, on the A585
- IA63, on the A585
- IA68, on the A585
- IA69, on the A585

11.4.14 The extent of the detailed calculation area, the locations of the OSRs and the locations of the NIAs is presented on Figure 11.2.

11.4.15 Outside of the detailed calculation area, consideration of noise changes along traffic links within the A585 traffic model Affected Road Network (ARN) has been undertaken by comparison of basic noise levels calculated in accordance with CRTN.

11.4.16 The relationship between the calculation area and A585 traffic model ARN study area is presented in Insert 11-4.

Insert 11-4: Noise and Vibration – Road Traffic Noise Study Areas



11.5 Existing and Future Baseline

Existing Baseline

Attended Noise Monitoring Survey Results

11.5.1 A summary of the attended daytime noise monitoring survey data is presented in Table 11-13.

Table 11-13: Noise and Vibration – Attended Noise Survey Results

Noise Monitoring Location (Refer to Figure 11.1)	dB $L_{A10,\ 3\ hour}$	dB $L_{Aeq,\ 3\ hour}$	dB $L_{A90,\ 3\ hour}$	dB $L_{A10,\ 18\ hour}$*
ANML 1	71.4	69.2	62.6	70.4
ANML 2	80.8	76.3	56.0	79.8
ANML 3	76.3	71.2	55.8	75.3
ANML 4	73.3	70.2	60.8	72.3
ANML 5	69.6	67.0	62.4	68.6
ANML 6	78.3	75.2	66.0	77.3
ANML 7	80.6	76.9	65.5	79.6
ANML 8	85.1	81.7	74.1	84.1
* dB $L_{A10,\ 18\ hour}$ value estimated in accordance with CRTN by subtracting 1dB from the dB $L_{A10\ 3\ hour}$ noise measurement				

11.5.2 At all monitoring locations subjective field notes conclude that road traffic noise forms a significant part of the existing noise climate. This can be seen from the small differences between the L_{Aeq} and L_{A10} parameters.

Unattended Long-term Noise Survey Results

11.5.3 A summary of the unattended long-term noise monitoring survey data is presented in Table 11-14.

Table 11-14: Noise and Vibration – Unattended Long-term Noise Survey Results

LTNML	Time Period (T)	$L_{A90,T}$	$L_{Aeq,T}$	$L_{A10,T}$
LTNML 1	Weekday 12 hour (07:00 – 19:00)	41.6	57.6	51.0
	Weekday 16 hour (07:00 – 23:00)	40.9	56.4	49.6
	Weekday 18 Hour (06:00 - 00:00)	40.6	56.0	49.3
	Weekday evening (19:00 - 23:00)	39.1	46.1	45.3
	Night (23:00 - 07:00)	33.8	43.8	42.3
	Saturday (07:00 - 13:00)	37.7	53.1	48.1
	Saturday (13:00 - 23:00)	39.6	53.5	49.3
	Sunday 16 hour (07:00 – 23:00)	38.7	52.1	48.3

LTNML	Time Period (T)	$L_{A90,T}$	$L_{Aeq,T}$	$L_{A10,T}$
LTNML 2	Weekday 12 hour (07:00 – 19:00)	41.6	57.6	51.0
	Weekday 16 hour (07:00 – 23:00)	40.9	56.4	49.6
	Weekday 18 Hour (06:00 - 00:00)	40.6	56.0	49.3
	Weekday evening (19:00 - 23:00)	39.1	46.1	45.3
	Night (23:00 - 07:00)	31.6	42.4	41.0
	Saturday (07:00 - 13:00)	37.7	53.1	48.1
	Saturday (13:00 - 23:00)	39.6	53.5	49.3
	Sunday 16 hour (07:00 – 23:00)	38.7	52.1	48.3
LTNML 3	Weekday 12 hour (07:00 – 19:00)	40.3	51.3	49.0
	Weekday 16 hour (07:00 – 23:00)	39.9	49.9	48.9
	Weekday 18 Hour (06:00 - 00:00)	39.1	49.3	47.6
	Weekday evening (19:00 - 23:00)	35.1	44.6	45.7
	Night (23:00 - 07:00)	36.7	48.2	46.5
	Saturday (07:00 - 13:00)	37.4	47.4	48.6
	Saturday (13:00 - 23:00)	36.0	47.0	45.3
	Sunday 16 hour (07:00 – 23:00)	35.2	49.5	46.2
LTNML 4	Weekday 12 hour (07:00 – 19:00)	49.0	54.9	56.5
	Weekday 16 hour (07:00 – 23:00)	47.9	54.0	55.0
	Weekday 18 Hour (06:00 - 00:00)	47.5	53.9	54.7
	Weekday evening (19:00 - 23:00)	44.5	49.6	50.8
	Night (23:00 - 07:00)	35.5	50.5	50.3
	Saturday (07:00 - 13:00)	45.2	51.9	54.8
	Saturday (13:00 - 23:00)	44.7	54.7	52.7
	Sunday 16 hour (07:00 – 23:00)	45.0	59.4	55.4
LTNML 5	Weekday 12 hour (07:00 – 19:00)	48.3	57.0	55.0
	Weekday 16 hour (07:00 – 23:00)	47.1	56.1	54.4
	Weekday 18 Hour (06:00 - 00:00)	46.5	55.9	54.3
	Weekday evening (19:00 - 23:00)	43.6	51.6	52.6
	Night (23:00 - 07:00)	34.8	46.9	47.4
	Saturday (07:00 - 13:00)	47.6	54.0	54.6
	Saturday (13:00 - 23:00)	46.4	51.7	53.1
	Sunday 16 hour (07:00 – 23:00)	45.6	52.3	53.8

LTNML	Time Period (T)	$L_{A90,T}$	$L_{Aeq,T}$	$L_{A10,T}$
LTNML 6	Weekday 12 hour (07:00 – 19:00)	50.1	53.7	54.8
	Weekday 16 hour (07:00 – 23:00)	48.9	53.0	53.9
	Weekday 18 Hour (06:00 - 00:00)	48.5	52.8	53.6
	Weekday evening (19:00 - 23:00)	45.3	49.5	51.1
	Night (23:00 - 07:00)	37.2	46.8	47.2
	Saturday (07:00 - 13:00)	47.2	51.1	53.1
	Saturday (13:00 - 23:00)	45.8	49.8	51.8
	Sunday 16 hour (07:00 – 23:00)	47.2	51.0	52.6
LTNML 7	Weekday 12 hour (07:00 – 19:00)	52.4	70.9	75.2
	Weekday 16 hour (07:00 – 23:00)	50.0	70.2	74.3
	Weekday 18 Hour (06:00 - 00:00)	49.2	70.0	73.7
	Weekday evening (19:00 - 23:00)	43.2	67.3	71.6
	Night (23:00 - 07:00)	34.3	63.5	56.2
	Saturday (07:00 - 13:00)	56.6	71.3	75.2
	Saturday (13:00 - 23:00)	44.3	68.8	73.5
	Sunday 16 hour (07:00 – 23:00)	44.2	68.6	72.6
LTNML 8	Weekday 12 hour (07:00 – 19:00)	45.3	52.3	53.5
	Weekday 16 hour (07:00 – 23:00)	44.1	51.4	52.2
	Weekday 18 Hour (06:00 - 00:00)	43.7	51.2	51.9
	Weekday evening (19:00 - 23:00)	40.6	47.0	48.5
	Night (23:00 - 07:00)	34.1	45.3	43.4
	Saturday (07:00 - 13:00)	39.8	48.8	50.7
	Saturday (13:00 - 23:00)	40.1	49.5	49.9
	Sunday 16 hour (07:00 – 23:00)	43.4	50.4	51.2

Future Baseline

11.5.4 Consideration of potential changes to the road traffic noise climate in 2037 (future assessment year) in the absence of the Scheme has been undertaken in accordance with the requirements of the DMRB detailed assessment methodology. This has been undertaken by the comparison of the predicted Do-Minimum 2022 scenario against the Do-Minimum 2037 scenario.

11.5.5 This comparison has been undertaken in order to appreciate how road traffic noise levels would change at receptors over time without the implementation of the Scheme. Figure 11.3 presents the changes in road traffic noise in this comparison.

Table 11-15: Noise and Vibration – Long-term traffic noise impacts inside detailed study area without Scheme (DM2022) versus (DM2037)

Change in Noise Level		Daytime		Night-time
		Number of Dwellings	Number of Other Sensitive Receptors	Number of Dwellings
Noise Level Above SOAEL				
Increase in noise level, $L_{A10,18\text{-hour}}$	0.1 - 2.9	24	0	5
	3.0 - 4.9	0	0	4
	5.0- 9.9	0	0	0
	>10	0	0	0
No Change	0	0	0	0
Decrease in noise level, $L_{A10,18\text{-hour}}$	0.1 - 2.9	0	0	0
	3.0 - 4.9	0	0	0
	5.0- 9.9	0	0	0
	>10	0	0	0
Noise Level Below SOAEL				
Increase in noise level, $L_{A10,18\text{-hour}}$	0.1 - 2.9	2360	30	Assessment below night SOAEL (<55dBL_{Aeq}) not required in accordance with DMRB
	3.0 - 4.9	0	0	
	5.0- 9.9	0	0	
	>10	0	0	
No Change	0	8	0	
Decrease in noise level, $L_{A10,18\text{-hour}}$	0.1 - 2.9	1	0	
	3.0 - 4.9	0	0	
	5.0- 9.9	0	0	
	>10	0	0	

11.5.6 Without the Scheme, the majority of sensitive receptors within the study area are predicted to experience no change/negligible changes in long-term road traffic noise in the future assessment year 2037 without the implementation of the Scheme.

11.5.7 In the future year Do-Minimum night time comparison 2,369 receptors of the 2,422 receptors within the Study Area are predicted to experience road traffic noise levels below 55 dB L_{night}, and as such are not required to be assessed under the DMRB guidance.

11.5.8 Of the receptors predicted to be in excess of 55 dB L_{night}, the following is concluded:

- 5 dwellings are predicted to experience a negligible change in road traffic noise during the night-time without the implementation of the Scheme
- 4 dwellings are predicted to experience a minor adverse change in road traffic noise during the night-time without the implementation of the Scheme

11.5.9 Table 11-16 presents the predicted daytime noise levels at identified OSRs.

Table 11-16: Noise and Vibration – Long-term traffic noise impacts without scheme at Other Sensitive Receptors

ID	Name (Refer to Figure 11.2)	2022 Do-Minimum dB $L_{A10\ 18\ hour}$	2037 Do-Minimum dB $L_{A10\ 18\ hour}$	Difference
1	Windy Harbour Holiday Centre	54.1	54.6	0.5
2	River Wyre Holiday Camp	50.0	50.5	0.5
3	Singleton Stables	52.5	53.4	0.9
4	West Stables	51.1	51.7	0.6
5	New Poulton Cemetery Mausoleum	56.5	57.0	0.5
6	Brookfield School	52.6	52.9	0.3
7	Breck Primary School	53.6	53.8	0.2
8	Breck Caravan Park	59.7	60	0.3
9	Poulton Golf Club	55.0	55.2	0.2
10	Alexandra Nursing Home	43.3	43.7	0.4
11	Primrose Bank Rest Home	58.1	58.5	0.4
12	Poulton YMCA Swimming and Fitness Centre	54.4	54.7	0.3
13	Poppy & Jack Nursery	55.4	55.8	0.4
14	Poulton Guides HQ	60.6	60.9	0.3
15	Hodgson Academy	46.3	46.6	0.3
16	The Moorland Nursing Home	41.0	41.4	0.4
17	Happy Days Nursery	42.6	43.1	0.5
18	Carr Head Primary School	44.9	45.3	0.4
19	Kingdom Hall of Jehovas Witness	46.1	46.5	0.4
20	St Johns primary school	55.0	55.3	0.3
21	Nationwide Laboratories	55.3	55.9	0.6

ID	Name (Refer to Figure 11.2)	2022 Do-Minimum dB $L_{A10\ 18\ hour}$	2037 Do-Minimum dB $L_{A10\ 18\ hour}$	Difference
22	River Wyre Hotel	53.9	54.3	0.4
23	St John Church	48.2	48.6	0.4
24	Swans Rest Holiday Cottages	54.6	55.2	0.6
25	Swans Rest Holiday Cottages	57.1	57.6	0.5
26	Swans Rest Holiday Cottages	57.5	58.1	0.6
27	Swans Rest Holiday Cottages	57.7	58.3	0.6
28	Swans Rest Holiday Cottages	49.0	49.7	0.7
29	Swans Rest Holiday Cottages	52.9	53.6	0.7
30	Swans Rest Holiday Cottages	58.6	59.1	0.5

11.5.10 With regard to the assessment of OSRs this indicates negligible changes in road traffic noise at all 30 OSR locations with none predicted to be above a SOAEL.

11.5.11 Table 11-17 presents the results of the baseline noise level (BNL) calculations of the change between Do-Minimum 2022 compared with Do-Minimum 2037 undertaken for road traffic links outside of the detailed calculation area.

Table 11-17: Noise and Vibration – Long-term traffic noise impacts outside detailed study area without Scheme – by number of roads

Change in noise level		Number of roads
Increase in noise level, $L_{A10,18\text{-hour}}$	0.1 - 2.9	1218
	3.0 - 4.9	4
	5.0- 9.9	0
	>10	0
No Change	0	397
Decrease in noise level, $L_{A10,18\text{-hour}}$	0.1 - 2.9	224
	3.0 - 4.9	0
	5.0- 9.9	4
	>10	0

11.5.12 Calculations indicate that 4 of the roads outside the detailed study area would

exceed the threshold levels of 3dB in the long-term without the Scheme. Worst-case future noise impacts outside of the detailed study area would be considered to be Minor Adverse without the Scheme in the long-term.

11.5.13 Table 11-18 presents a comparison of predicted road traffic noise levels at NIAs within the detailed study area. There are no changes in road traffic noise levels predicted in the long-term without the implementation of the Scheme that exceed 3dB(A) suggesting that there are no detrimental effects and NIAs would experience a Negligible impact in the long-term without the Scheme.

Table 11-18 Long-term impacts on Important Areas within the detailed study area without the Scheme (Figure 11.2)

Defra Important Area ID Ref	Road Name	2022 Do-Minimum dB $L_{A10\ 18\ hour}$	2037 Do-Minimum dB $L_{A10\ 18\ hour}$	Change dB $L_{A10\ 18\ hour}$
IA10542	B5260	74.4	74.9	+0.5
IA6819	A585	72.7	63.7	+0.5
IA66	A585	71.2	62.6	+0.4
IA65	A585	74.5	71.5	+0.3
IA63	A585	74.5	73.3	+0.2
IA64	A585	73.8	68.9	+0.4
IA6820	A585	70.1	69	+0.1
IA67	A588	69.6	69.3	+0.5
IA68	A586	67.5	68.3	+0.4
IA69	A586	69.1	70.5	+0.4

11.6 Mitigation and Enhancement Measures

Construction

11.6.1 A Construction Environmental Management Plan (CEMP) and Noise and Vibration Management Plan would be prepared and agreed with local authorities prior to commencing construction. An Outline CEMP (document reference TR010035/APP/7.2) has been prepared together with a Record of Environmental Actions and Commitments (REAC) (document reference TR010035/APP/7.3) and the paragraphs that follow outline measures within it relating to noise and vibration.

11.6.2 The following issues would be addressed prior to construction:

- Pre-construction noise monitoring surveys would be undertaken and agreed with the relevant local authorities to establish a pre-construction baseline for the derivation of construction noise limits
- Following any changes to the design, the Contractor would ensure that an updated noise assessment has been carried out to ensure there would be no additional or increase in negative effects on nearby receptors

11.6.3 The Contractor would be responsible for notifying the local residents of particularly noisy work prior to commencement of those works. Effective communication should

be established, keeping residents informed of the type and timing of works involved.

11.6.4 Within the Outline CEMP (document reference TR010035/APP/7.2) and REAC (document reference TR010035/APP/7.3) a set of best practice working methods for the control of construction noise and vibration, referred to as Best Available Techniques (BAT) are specified for implementation where necessary through the construction phase of the Scheme.

11.6.5 During the construction phase, noise monitoring would be undertaken at key sensitive receptors (to be defined through development of the CEMP and Noise and Vibration Management Plan) to ensure that the mitigation measures suggested are working effectively. The regime would be agreed with the relevant Environmental Health Officers (EHO) prior to works commencing.

Operation

11.6.6 The Scheme includes specific noise mitigation measures, which have been incorporated as part of the design. The proposed mitigation measures which have been implemented into the design are as follows:

- Low noise/thin surfacing system surface to be laid on new or altered roads
- 2m high acoustic barrier from chainage 750 to 825 along the eastbound carriageway
- 2m high acoustic/landscape bund from chainage 825 to 1190 along the eastbound carriageway
- 2m high acoustic barrier from chainage 1190 to 1675 along the eastbound carriageway (*note: this barrier has a small break in it for vehicle access*)
- 2m high acoustic/landscape bund from chainage 1675 to 2100 along the eastbound carriageway
- 2m high acoustic/landscape bund from chainage 2270 to 2755 along the eastbound carriageway
- 3m high acoustic barrier from chainage 3100 to 3200 along the eastbound carriageway
- 2m high acoustic/landscape bund from chainage 750 to 1100 along the westbound carriageway
- 2m high acoustic/landscape bund from chainage 1200 to 1500 along the westbound carriageway
- 2m high acoustic barrier from chainage 1500 to 2100 along the westbound carriageway
- 2m high acoustic/landscape bund from chainage 2200 to 2500 along the westbound carriageway
- 2m high acoustic barrier from chainage 3100 to 3270 along the westbound carriageway

11.6.7 The location of the proposed noise barriers, noise bunds and low noise surfacing is presented in Figure 11.4. The details of the noise mitigation designed into the Scheme would be secured by Requirement 4 in the draft DCO (document reference TR010035/APP/3.1).

11.7 Residual Effects

Construction

Construction Noise Level Thresholds

11.7.1 In order to define appropriate noise limits in accordance with the ABC method of BS5228, the measured ambient noise levels for each relative time period have been considered. These levels have been rounded to the nearest 5dB and classified in accordance with the appropriate ABC category threshold values. Table 11-19 below presents the ambient noise levels for each of the closest receptors considered during the daytime, with Table 11-20 presenting the same information for the night time.

Table 11-19 Determination of Construction Noise Level Thresholds - Daytime

Receptor ID	Nearest Noise Monitoring Location	Existing Daytime Ambient Noise Level	Level Rounded to the Nearest 5dB	ABC Assessment Category	Threshold Value (LAeq,T dB façade)
CN1	Predicted*	66.2	65	B	70
CN2	Predicted*	65.1	65	B	70
CN3	LTNML 1	57.6	60	A	65
CN4	Predicted*	60.9	60	A	65
CN5	LTNML 4	54.9	55	A	65
CN6	LTNML 4	54.9	55	A	65
CN7	LTNML 6	53.7	55	A	65
CN8	LTNML 6	53.7	55	A	65
CN9	LTNML 2	57.6	60	A	65
CN10	LTNML 7	70.9	70	C	75
CN11	LTNML 5	57.0	55	A	65
CN12	Predicted*	63.2	65	B	70
CN13	LTNML 8	52.3	50	A	65
CN14	LTNML 8	52.3	50	A	65
CN15	LTNML 8	52.3	50	A	65
CN16	Predicted*	56.9	55	A	65
CN17	LTNML 3	51.3	50	A	65
CN18	Predicted	59.5	60	A	65
*Existing noise level predicted from baseline road traffic noise model					

Table 11-20 Determination of Construction Noise Level Thresholds – Night-time

Receptor ID	Nearest Noise Monitoring Location	Existing Night-time Ambient Noise Level	Level Rounded to the Nearest 5dB	ABC Assessment Category	Threshold Value (LAeq,T dB façade)
CN1	Predicted*	56.8	55	C	55
CN2	Predicted*	55.2	55	C	55
CN3	LTNML 1	43.8	45	B	50
CN4	Predicted*	50.6	50	C	55
CN5	LTNML 4	50.5	50	C	55
CN6	LTNML 4	50.5	50	C	55
CN7	LTNML 6	46.8	45	B	50
CN8	LTNML 6	46.8	45	B	50
CN9	LTNML 2	42.4	40	A	45
CN10	LTNML 7	63.5	65	>C	63.5
CN11	LTNML 5	46.9	45	B	50
CN12	Predicted*	54.2	55	C	55
CN13	LTNML 8	45.3	45	B	50
CN14	LTNML 8	45.3	45	B	50
CN15	LTNML 8	45.3	45	B	50
CN16	Predicted	47.3	45	B	50
CN17	LTNML 3	48.2	50	C	55
CN18	Predicted*	49.5	50	C	55
*Existing noise level predicted from baseline road traffic noise model					

Daytime Construction Noise Impacts

11.7.2 Within the vicinity of the Scheme there are a number of receptors that may be impacted by noise produced during the construction phase given their relatively close proximity to the worksite.

11.7.3 Noise levels generated during typical construction operations would depend on the different plant types being used, the percentage on-time of this equipment and types of activity being undertaken. The assumptions made in the prediction of construction noise levels are presented in Appendix 11.2: Construction Noise Assessment (document reference TR010035/APP/6.11.2).

11.7.4 Table 11-21 presents the range of predicted construction noise levels at the closest façade of the closest receptors based upon the assumptions made within the

calculations (Appendix 11.2 (document reference TR010035/APP/6.11.2)). These levels would occur within the construction month identified, and assessment has been undertaken against the relevant ABC category for the time period.

Table 11-21 Noise and Vibration – Daytime Construction Noise Impacts

Receptor ID	Construction Noise Level Range dB LAeq	Worst Case Construction month	BS 5228-ABC Threshold dB LAeq	Exceed ABC Threshold
CN1	23.4 - 64.8	Month 18	70	No
CN2	5.5 – 65.0	Month 7	70	No
CN3	24.7 - 58.7	Month 2	65	No
CN4	25.3 - 64.7	Month 17	65	No
CN5	9.7 - 64.8	Month 6	65	No
CN6	13.6 – 60.0	Month 5	65	No
CN7	10.2 - 60.6	Month 5	65	No
CN8	13.8 - 58.7	Month 12	65	No
CN9	20.4 - 56.1	Month 2	65	No
CN10	6.8 - 54.9	Month 3	75	No
CN11	7.7 - 64.6	Month 3	65	No
CN12	21.6 - 58.8	Month 24	70	No
CN13	20.0 - 64.9	Month 14	65	No
CN14	20.1 - 62.3	Month 15	65	No
CN15	19.4 - 63.7	Month 11	65	No
CN16	33.6 - 60.9	Month 19	65	No
CN17	11.2 - 60.8	Month 2	65	No
CN18	13.8 – 57.0	Month 18	65	No

11.7.5 As indicated in Table 11-22 construction noise levels predicted at the closest receptors to the scheme during the daytime would not breach the corresponding ABC construction noise daytime threshold level and therefore would not exceed a construction noise daytime SOAEL.

11.7.6 As all predicted daytime construction noise levels remain below the relevant ABC category and a SOAEL throughout the construction period, daytime construction noise levels are therefore not considered to be a significant effect during daytime construction activities.

Night-time Construction Noise Impacts

11.7.7 Only limited construction activities would occur during the night time period for road crossings and final surfacing tie ins. The predicted results presented in Table 11- assume all of these activities occurring simultaneously.

11.7.8 Table 11-22 presents the predicted night time construction noise levels at the representative receptors based upon the assumptions made within the calculations (Appendix 11.2 (document reference TR010035/APP/6.11.2)). These levels have been compared to the relevant ABC category for the time period.

Table 11-22 Noise and Vibration – Night-time Construction Noise Impacts

Receptor ID	Construction Noise Level dB $L_{Aeq\ 8\ hour}$	BS 5228-ABC Threshold dB $L_{Aeq\ 8\ hour}$	Exceed ABC Threshold
CN1	54.1	55	No
CN2	52.1	55	No
CN3	48.1	50	No
CN4	39.1	55	No
CN5	42.3	55	No
CN6	27.9	55	No
CN7	39.3	50	No
CN8	42.9	50	No
CN9	35.5	45	No
CN10	48.0	63.5	No
CN11	38.2	50	No
CN12	26.0	55	No
CN13	34.2	50	No
CN14	37.2	50	No
CN15	38.1	50	No
CN16	49.8	50	No
CN17	37.6	55	No
CN18	37.1	55	No

11.7.1 As indicated in Table 11- construction noise levels predicted at the closest receptors to the scheme during the night-time would not breach the corresponding ABC construction noise night-time threshold level and therefore would not exceed a construction noise night-time SOAEL.

11.7.2 As all predicted night-time construction noise levels remain below the relevant ABC category and a SOAEL throughout the construction period, night-time construction noise levels are therefore not considered to be a significant effect during night-time construction activities.

HGV Construction Noise Impacts

11.7.3 Table 11-23 presents the predicted range of noise levels during the construction phase along the routes which would be used by HGVs.

11.7.4 Construction vehicle noise has been calculated in accordance with the methodology of BS5228. In addition, the baseline traffic noise climate of the area has been calculated in accordance with CRTN and corrected to an appropriate L_{Aeq} value for comparison using the appropriate formulae from within the TRL document Converting the UK traffic noise index $L_{A10\ 18\ hour}$ to EU Noise indices for noise mapping'.

11.7.5 The numbers of average daily construction HGV movements along the assumed HGV construction routes have been provided by the Scheme traffic team for each month of construction.

Table 11-23 Noise and Vibration – Predicted Construction HGV Noise Levels

Road Name	BNL	Min	Max	Total	Diff	Magnitude
A583	65.3	28.8	50.3	65.4	+0.1	Negligible
A585	69.2	36.7	58.2	69.5	+0.3	Negligible
A586	64.4	30.1	51.6	64.6	+0.2	Negligible
A587	65.3	30.6	52.1	65.5	+0.2	Negligible
Back Lane	68.8	35.3	56.8	69.1	+0.3	Negligible
Bradshaw Lane	75.0	24.7	46.2	75.0	0.0	Negligible
Breck Road	68.1	25.6	47.1	68.1	0.0	Negligible
Chepstow Road	64.9	29.6	51.1	65.1	+0.2	Negligible
Dinmore Avenue	63.9	27.8	49.3	64.0	+0.1	Negligible
East Park Drive	64.5	29.6	51.1	64.7	+0.2	Negligible
Fleetwood Road	69.2	36.7	58.2	69.5	+0.3	Negligible
Garstang New Road	69.2	36.7	58.2	69.5	+0.3	Negligible
Garstang Road East	63.1	29.2	50.7	63.3	+0.2	Negligible
Kentmere Drive	66.0	28.4	50.0	66.1	+0.1	Negligible
M55	75.5	34.6	56.1	75.5	0.0	Negligible
Mains Lane	67.8	25.7	47.2	67.8	0.0	Negligible
Oakleaf Way	66.2	28.8	50.3	66.3	+0.1	Negligible
Preston New Road	65.3	28.8	50.3	65.4	+0.1	Negligible
Riversway	64.0	29.7	51.2	64.2	+0.2	Negligible
South Park Drive	65.3	30.6	52.1	65.5	+0.2	Negligible
St Walburga's Road	64.8	28.7	50.2	64.9	+0.1	Negligible
White Carr Lane	76.3	34.5	56.1	76.3	0.0	Negligible

11.7.6 The predicted change in noise level along each identified construction HGV route presented in Table 11-23 indicates that there would be no change in noise level greater than 1dB.

11.7.7 In the short term a change of 1dB is the smallest that is considered perceptible and as such noise from HGV movements during the construction phase would be assessed as negligible and would not be a significant effect.

Construction Vibration Impacts from Piling Operations

11.7.8 Table 11-24 assesses the potential vibration levels from vibratory sheet piling operations on the selected worst-case receptors. The conclusion drawn within Table 11-25 below are based upon the significance criteria detailed in Table 11-5 (taken from BS5228: Part 2).

Table 11-24 Noise and Vibration – Vibration effects from Vibratory Sheet Piling

Receptor ID	Predicted PPV	Magnitude of Impact	Above LOAEL	Above SOAEL
1	0.22	Negligible	No	No
2	0.38	Slight Adverse	Yes	No
3	0.15	Negligible	No	No
4	0.74	Slight Adverse	Yes	No
5	0.27	Negligible	No	No
6	0.23	Negligible	No	No
7	0.47	Slight Adverse	Yes	No
8	0.12	Negligible	No	No
9	0.16	Negligible	No	No
10	0.36	Slight Adverse	Yes	No
11	0.24	Negligible	No	No

11.7.9 The predicted levels of PPV presented in Table 11- range from 0.12mm/s to 0.74mm/s. The worst case predicted levels would be above 0.3mm/s which is the level at which it is considered that vibration may just be perceptible in a residential environment and vibration levels of this magnitude would be considered to be slight adverse impact.

11.7.10 These worst case slight adverse impacts would remain below a SOAEL of vibration and would be temporary in nature for a short duration of time and as such would not be considered to be a significant effect.

Construction Phase Significant Effects

National Policy

11.7.11 In terms of National policy (NN NPS, NPSE and NPPF) noise and vibration levels generated by the construction phase of the Scheme are predicted to remain below a SOAEL and as such would avoid significant adverse impacts on health and quality of life from noise as a result of the construction of the Scheme.

11.7.12 Construction noise and vibration impacts would be mitigated to a minimum through the implementation of BAT and strict adherence to the CEMP.

Environmental Impact Assessment Regulations 2017

11.7.13 In terms of the EIA Regulations and likely significant environmental effects, the predicted construction noise levels at selected noise sensitive receptors during the construction phase of the Scheme are predicted to be below the threshold levels presented in BS5228 and as such would not be considered a likely significant environmental effect.

11.7.14 Levels of vibration from piling activities are predicted to range from negligible to slight adverse. A magnitude of slight adverse is defined, in terms of BS5228 as vibration being '*just perceptible in a residential environment'* and would be over a short duration as such would not be considered a likely significant environmental effect.

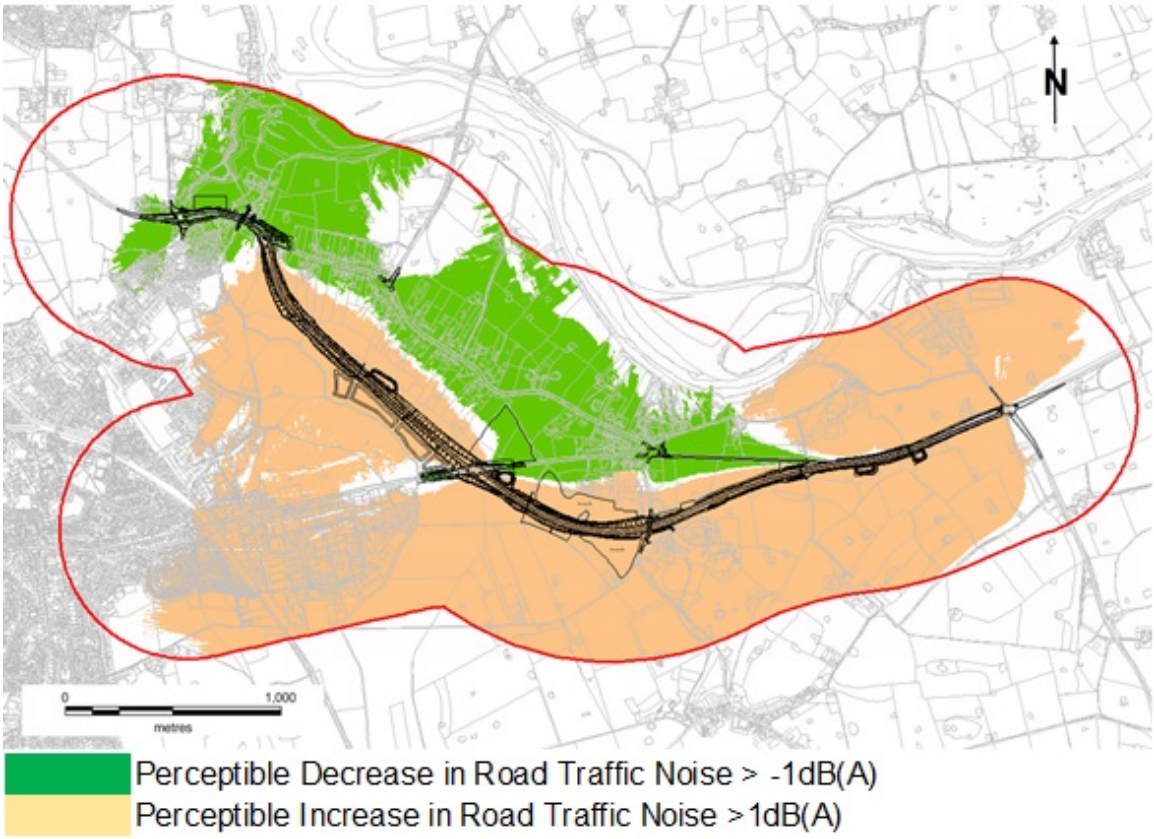
Operation

Short-Term Operational Noise Impacts

11.7.15 To assess short-term road traffic noise impacts associated with the Scheme in accordance with the DMRB, a comparison has been made between the Do-Minimum and Do-Something scenarios in the opening year (2022). This enables the consideration of the abrupt change in road traffic noise following the opening of the Scheme.

11.7.16 Insert 11-5 presents a graphical representation of the areas of short-term perceptible noise increases in orange and decreases in green within the detailed calculation area in the opening year.

Insert 11-5: Noise and Vibration – Areas of Perceptible Change in Road Traffic Noise Level in Opening Year



11.7.17 The predicted perceptible increases in road traffic noise levels within the detailed calculation area presented in Insert 11-5 are due to the following:

- Noise increases from the Scheme itself due to the new alignment passing through an area of existing low-level road traffic noise
- Increase of 49% in traffic flow along Garstang Road East as a result of the Scheme

11.7.18 The predicted perceptible decreases in road traffic noise levels within the detailed calculation area presented in Insert 11-5 are due to the following:

- The closure of part of Garstang New Road
- A reduction in operation traffic flow of 84% along Garstang Road, west of Little Singleton
- A reduction in operation traffic flow of 90% along Mains Lane

11.7.19 Further to the areas of perceptible change identified, Table 11-25 and Figure 11.5 presents the changes in road traffic noise in this short-term comparison by dwelling numbers and other sensitive receptors in accordance with the magnitude of change prescribed within DMRB (Table 11-6). For clarity impacts that occur above and below a SOAEL have been presented separately.

Table 11-25: Noise and Vibration – Short-term traffic noise impacts inside detailed study area without Scheme (DM2022) versus with Scheme (DS2022)

Change in Noise Level		Daytime	
		Number of Dwellings	Number of Other Sensitive Receptors
Noise Level Above SOAEL			
Increase in noise level, $L_{A10,18\text{-hour}}$	0.1 - 0.9	96	0
	1.0 - 2.9	19	1
	3.0 - 4.9	0	0
	>5	0	0
No Change	0	2	0
Decrease in noise level, $L_{A10,18\text{-hour}}$	0.1 - 0.9	29	1
	1.0 - 2.9	17	1
	3.0 - 4.9	25	0
	>5	57	0
Noise Level Below SOAEL			
Increase in noise level, $L_{A10,18\text{-hour}}$	0.1 - 0.9	592	6
	1.0 - 2.9	680	4
	3.0 - 4.9	124	2
	>5	79	4
No Change	0	42	1
Decrease in noise level, $L_{A10,18\text{-hour}}$	0.1 - 0.9	465	6
	1.0 - 2.9	137	1
	3.0 - 4.9	20	0
	>5	38	3

11.7.20 Further to the information presented within Table 11-25 above additional, specific assessment of each of the OSRs is presented in Table 11-26.

Table 11-26: Noise and Vibration – Short-term traffic noise impacts with Scheme at OSR's

ID	Name (Refer to Figure 11.2)	2022 Do-Minimum dB $L_{A10\ 18\ hour}$	2022 Do-Something dB $L_{A10\ 18\ hour}$	Difference
1	Windy Harbour Holiday Centre	53.7	55.2	+1.4
2	River Wyre Holiday Camp	58.2	51.3	-6.9
3	Singleton Stables	53.2	59.9	+6.7

ID	Name (Refer to Figure 11.2)	2022 Do-Minimum dB $L_{A10\ 18\ hour}$	2022 Do-Something dB $L_{A10\ 18\ hour}$	Difference
4	West Stables	49.5	56.6	+7.1
5	New Poulton Cemetery Mausoleum	59.7	60.6	+1.0
6	Brookfield School	51.6	54.9	+3.3
7	Breck Primary School	52.5	54.6	+2.1
8	Breck Caravan Park	71.7	72.8	+1.2
9	Poulton Golf Club	54.1	53.7	-0.4
10	Alexandra Nursing Home	49.5	51.1	+1.6
11	Primrose Bank Rest Home	63.1	62.3	-0.9
12	Poulton YMCA Swimming and Fitness Centre	53.8	53.5	-0.3
13	Poppy & Jack Nursery	69.0	68.1	-1.0
14	Poulton Guides HQ	66.0	65.1	-0.8
15	Hodgson Academy	46.9	47.4	+0.5
16	The Moorland Nursing Home	46.1	46.2	+0.1
17	Happy Days Nursery	44.8	45.4	+0.6
18	Carr Head Primary School	45.9	46.5	+0.5
19	Kingdom Hall of Jehovas Witness	66.9	65.8	-1.2
20	St Johns primary school	65.0	64.1	-0.9
21	Nationwide Laboratories	67.8	54.8	-13.0
22	River Wyre Hotel	68.4	66.6	-1.8
23	St John Church	55.5	54.6	-0.9
24	Swans Rest Holiday Cottages	63.6	57.6	-6.1
25	Swans Rest Holiday Cottages	57.0	60.2	+3.2
26	Swans Rest Holiday Cottages	57.7	59.2	+1.5
27	Swans Rest Holiday Cottages	58.1	59.1	+1.0
28	Swans Rest Holiday Cottages	48.3	57.5	+9.3
29	Swans Rest Holiday Cottages	52.5	57.6	+5.1
30	Swans Rest Holiday Cottages	58.4	58.3	0.0

11.7.21 The following is concluded with regard to the information presented in Table 11-25 and Table 11-26 in the opening year of the Scheme:

- 44 dwellings and 1 other sensitive receptor (ID 30) are predicted to experience a 0.0dB change in road traffic noise as a result of the Scheme. This would result in a short-term impact classification of no change and would not be considered be a significant adverse impact on health and quality of life or give rise to a significant environmental effect
- 1182 dwellings and 13 other sensitive receptors are predicted to experience a negligible change in road traffic noise as a result of the Scheme. This would result in a short-term impact classification of negligible and would not be a significant adverse impact on health and quality of life or give rise to a significant environmental effect
- 699 dwellings and 5 other sensitive receptors are predicted to experience a 1dB to 2.9dB increase in road traffic noise as a result of the Scheme, of these 19 occur at a level above a SOAEL. This would result in a short-term impact classification of minor adverse and would not be a significant adverse impact on health and quality of life. These minor adverse noise impacts would occur at receptors located:
  - North of Garstang Road East within the Moorfield Development
  - South of the A586 in Poulton le Fylde and
  - Along Skippool Road.

  Of the 19 dwellings where the adverse change in noise level is above a SOAEL the change in noise level ranges from 1.0dB(A) to 1.6dB(A). It is considered that changes in road traffic noise of this magnitude would not result in changes to behaviour or response to road traffic noise that would give rise to a significant environmental effect.
- 124 dwellings and 2 other sensitive receptors are predicted to experience a 3.0dB to 4.9dB increase in road traffic noise as a result of the Scheme, of these zero occur at a level above a SOAEL. This would result in a short-term impact classification of moderate adverse and would not be a significant adverse impact on health and quality of life as no impacts would occur above a SOAEL. These moderate adverse noise impacts would occur at receptors located:
  - On the southern side of Mains Lane facing onto the Scheme
  - Nearest to the Scheme in the Moorfield Park Development
  - Approximately 150m south of the Lodge Lane underpass.

  These impacts have been mitigated to a minimum through low noise surfacing on the new road and the implementation of barriers and environmental bunds (presented on Figure 11.4) along the Scheme alignment. Although mitigated to a minimum an adverse change in road traffic noise of this magnitude would be considered to be a significant environmental effect
- 79 dwellings and 4 other sensitive receptors are predicted to experience an increase in road traffic noise of greater than 5dB(A) as a result of the Scheme, of these zero occur at a level above a SOAEL. This would result in a short-term impact classification of major adverse and would not be a significant adverse impact on health and quality of life as no impacts would occur above a SOAEL. These major adverse noise impacts would occur at receptors located:
  - On the southern side of Mains Lane facing onto the Scheme

- Nearest to the Scheme in the Moorfield Park Development
- Within 150m of the Lodge Lane underpass.

These impacts have been mitigated to a minimum through low noise surfacing on the new road and the implementation of barriers and environmental bunds (presented on Figure 11.4) along the Scheme alignment. Although mitigated to a minimum an adverse change in road traffic noise of this magnitude would be considered to be a significant environmental effect

- 154 dwellings and 2 other sensitive receptors are predicted to experience a 1dB to 2.9dB decrease in road traffic noise as a result of the Scheme, of these 17 occur at a level above a SOAEL. This would result in a short-term impact classification of minor beneficial but would not be a significant adverse impact on health and quality of life or give rise to a significant environmental effect due to the small magnitude of change. These minor beneficial noise impacts would occur at receptors located:
  - Approximately 200m north of Garstang New Road
  - East and west of the A588 in Skippool
- 45 dwellings and no other sensitive receptors are predicted to experience a 3.0dB to 4.9dB decrease in road traffic noise as a result of the Scheme, of these 25 occur at a level above a SOAEL. This would result in a short-term impact classification of moderate beneficial and would be a beneficial impact on health and quality of life where these impacts occur at receptors above a SOAEL. These moderate beneficial noise impacts would occur at receptors located:
  - Along the northern side of Mains Lane
  - Within 130m to 200m of Garstang New Road

  Changes in road traffic noise of this magnitude would be considered to be a significant environmental effect
- 95 dwellings and 3 other sensitive receptors are predicted to experience an decrease in road traffic noise of greater than 5dB(A) as a result of the Scheme, of these 57 occur at a level above a SOAEL. This would result in a short-term impact classification of major beneficial and would be a beneficial impact on health and quality of life where these impacts occur at receptors above a SOAEL. These major beneficial noise impacts would occur at receptors located
  - Along the northern side of Mains Lane,
  - Within 130m of Garstang New Road
  - In the North West of Little Singleton

  Changes in road traffic noise of this magnitude would be considered to be a significant environmental effect

11.7.22 The comparison of the opening year situation with and without the Scheme indicates a short-term net loss at 608 dwellings which are predicted to experience a perceptible increase in road traffic noise in the short term of greater than 1dB(A). However, of these 608 dwellings to experience a net loss only 19 occur at a level above a SOAEL. This is offset against the situation whereby the Scheme would reduce road traffic noise contribution at 99 dwellings in the Study Area currently predicted to experience road traffic noise levels in excess of a SOAEL.

11.7.23 Therefore, with reference to the information within Table 11-26, the decreases in road traffic noise predicted to occur above a SOAEL as a result of the Scheme occur at more dwellings, and are generally of a greater magnitude, than the corresponding predicted increases above a SOAEL.

11.7.24 Table 11-27 presents a comparison in road traffic noise levels at NIAs identified within the detailed calculation area. It is reiterated that as specified in paragraph 11.3.37 by the opening year of 2022 all roads within NIAs would have been resurfaced with a thin surfacing system. As such the benefits of such a system in terms of mitigating road traffic noise are inherent within the calculations.

Table 11-27: Noise and Vibration - Short-term impacts on Important Areas within the detailed study area without the Scheme

Defra Important Area ID Ref	Road Name	2022 Do-Minimum dB $L_{A10\ 18\ hour}$	2022 Do-Minimum dB $L_{A10\ 18\ hour}$	Change dB $L_{A10\ 18\ hour}$
IA10542	B5260	74.4	74.5	+0.1
IA6819	A585	72.7	62.2	-10.5
IA66	A585	71.2	61.6	-9.6
IA65	A585	74.5	71.4	-3.1
IA63	A585	74.5	71.5	-3.0
IA64	A585	73.8	68.3	-5.5
IA6820	A585	70.1	67.6	-2.5
IA67	A588	69.6	68.7	-0.9
IA68	A586	67.5	68.0	+0.5
IA69	A586	69.1	70.1	+1.0

11.7.25 The information presented in Table 11-27 indicates the following:

- Three NIAs would experience negligible changes in road traffic noise of less than 1dB(A)
- One NIA (IA69) would experience a minor adverse increase in road traffic noise level of 1.0dB(A) as a result of the Scheme
- One NIA (IA6820) would experience a minor beneficial decrease in road traffic noise level of between -1 and -2.9 dB(A) as a result of the Scheme
- Two NIAs would experience a moderate beneficial decrease in road traffic noise level of between -3.0 and -4.9 dB(A) as a result of the Scheme
- Three NIAs would experience a major beneficial decrease in road traffic noise level of greater than -5.0 dB(A) as a result of the Scheme

11.7.26 Adverse impacts would be limited to minor adverse and as such would not be significant. However, beneficial impacts at 5 NIAs would be greater than moderate beneficial in magnitude, and are therefore concluded to represent a significant beneficial effect at these NIAs within the detailed calculation area.

Short-Term Assessment Outside of Detailed Calculation Area

11.7.27 This section of the chapter considers the wider impacts of the Scheme in the short-term outside of the detailed calculation area but within the confines of the ARN. The specifics of this study area are detailed within Section 11.4.

11.7.28 Table 11-28 presents the results of the BNL calculations undertaken for the short-term comparison (2022 Do-Minimum versus 2022 Do-Something) on the ARN.

Table 11-28: Noise and Vibration – Short-term traffic noise impacts outside detailed study area with Scheme – by number of roads

Change in noise level		Number of roads
Increase in noise level, $L_{A10,18\text{-hour}}$	0.1 - 0.9	237
	1.0 - 2.9	0
	3.0 - 4.9	0
	>5	0
No Change	0	592
Decrease in noise level, $L_{A10,18\text{-hour}}$	0.1 - 0.9	231
	1.0 - 2.9	0
	3.0 - 4.9	0
	>5	0

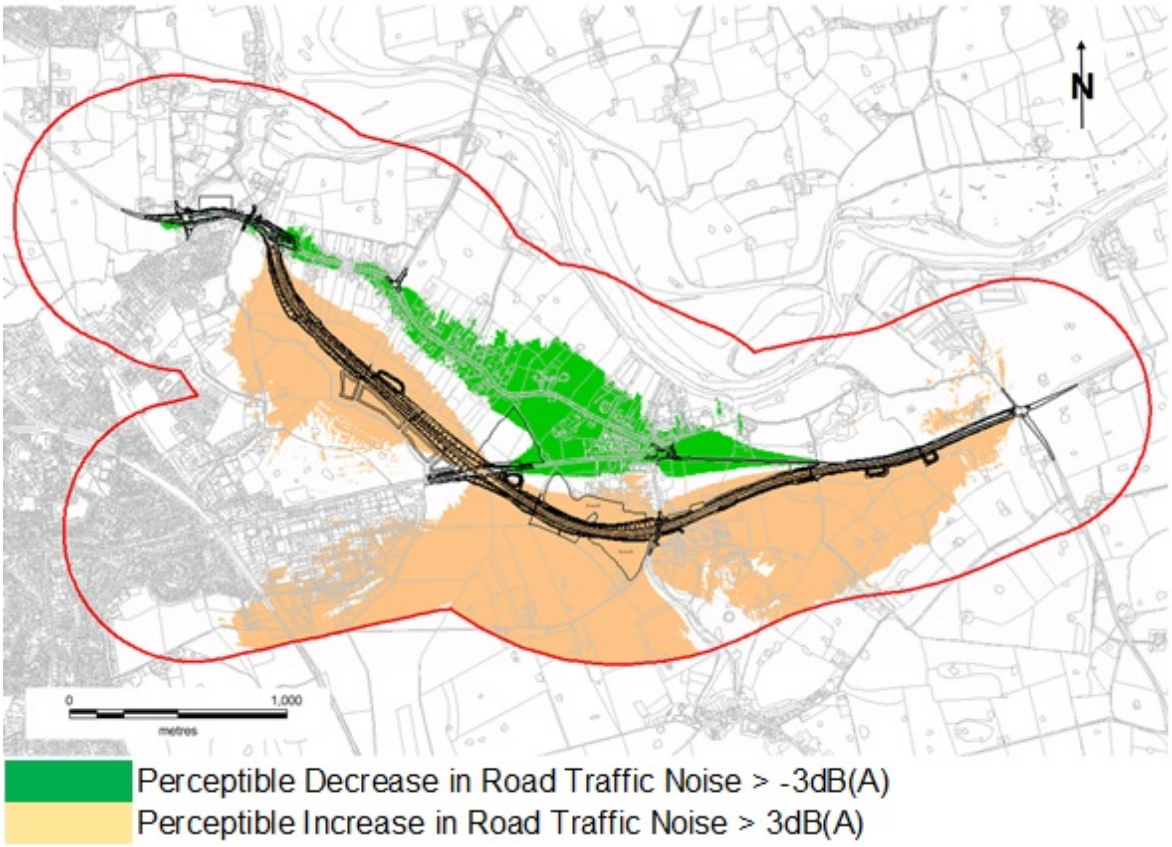
11.7.29 The BNL link flow calculations indicate that none of the roads considered would demonstrate short-term changes in road traffic noise level that exceed the perceptible short-term threshold criteria of 1dB. This would be concluded to represent a short-term impact classification of negligible and would not be considered a significant effect.

Long Term Operational Noise Impacts

11.7.30 To assess long-term road traffic noise impacts associated with the Scheme in accordance with the DMRB, a comparison has been made between the Do-Minimum opening year (2022) and Do-Something future assessment year (2037). This enables the consideration of the change in road traffic noise associated with the Scheme in the longer term.

11.7.31 Insert 11-6 presents a graphical representation of the areas of perceptible long-term noise increases in orange and decreases in green within the detailed calculation area in the future assessment year.

Insert 11-6: Noise and Vibration – Areas of Perceptible Change in Road Traffic Noise Level in Design Year



11.7.32 The predicted perceptible increases in road traffic noise levels within the detailed calculation area presented in Insert 11-6 are due to the following:

- Noise increases from the Scheme itself due to the new alignment passing through an area of existing low-level road traffic noise
- Increase of 65% in traffic flow along Garstang Road East as a result of the Scheme

11.7.33 The predicted perceptible decreases in road traffic noise levels within the detailed calculation area presented in Insert 11-6 are due to the following;

- The closure of part of Garstang New Road
- A reduction in operation traffic flow of 64% along Garstang Road, west of Little Singleton
- A reduction in operation traffic flow of 86% along Mains Lane

11.7.34 Further to the areas of perceptible change identified, Table 11-29 and Figure 11.6 present the changes in road traffic noise in this long-term comparison by dwelling numbers and OSRs in accordance with the magnitude of change prescribed within DMRB. For clarity, impacts that occur above and below a SOAEL have been presented separately.

Table 11-29: Noise and Vibration – Long-term traffic noise impacts inside detailed study area without Scheme (DM2022) versus with Scheme (DS2037)

Change in Noise Level		Daytime		Night-time
		Number of Dwellings	Number of Other Sensitive Receptors	Number of Dwellings
Noise Level Above SOAEL				
Increase in noise level, $L_{A10,18\text{-hour}}$	0.1 - 2.9	132	1	216
	3.0 - 4.9	0	0	0
	5.0- 9.9	0	0	0
	>10	0	0	0
No Change	0	3	0	13
Decrease in noise level, $L_{A10,18\text{-hour}}$	0.1 - 2.9	39	2	136
	3.0 - 4.9	23	0	0
	5.0- 9.9	55	0	0
	>10	0	0	0
Noise Level Below SOAEL				
Increase in noise level, $L_{A10,18\text{-hour}}$	0.1 - 2.9	1388	11	Assessment below night SOAEL (<55dBL_{Aeq}) not required in accordance with DMRB
	3.0 - 4.9	163	2	
	5.0- 9.9	120	4	
	>10	0	0	
No Change	0	45	1	
Decrease in noise level, $L_{A10,18\text{-hour}}$	0.1 - 2.9	400	6	
	3.0 - 4.9	24	0	
	5.0- 9.9	30	2	
	>10	0	1	

11.7.35 Further to the information presented within Table 11-29 above additional, specific assessment of each of the other sensitive receptors is presented in Table 11-30.

Table 11-30: Noise and Vibration – Long-term traffic noise impacts without scheme at Other Sensitive Receptors

ID	Name (Refer to Figure 11.2)	2022 Do-Minimum dB $L_{A10\ 18\ hour}$	2037 Do-Something dB $L_{A10\ 18\ hour}$	Difference
1	Windy Harbor Holiday Centre	53.7	55.7	+2.0
2	River Wyre Holiday Camp	58.2	52.0	-6.2
3	Singleton Stables	53.2	60.5	+7.3

ID	Name (Refer to Figure 11.2)	2022 Do-Minimum dB $L_{A10\ 18\ hour}$	2037 Do-Something dB $L_{A10\ 18\ hour}$	Difference
4	West Stables	49.5	57.2	+7.7
5	New Poulton Cemetery Mausoleum	59.7	61.1	+1.4
6	Brookfield School	51.6	55.4	+3.8
7	Breck Primary School	52.5	55.1	+2.6
8	Breck Caravan Park	71.7	73.3	+1.6
9	Poulton Golf Club	54.1	54.0	-0.1
10	Alexandra Nursing Home	49.5	51.6	+2.1
11	Primrose Bank Rest Home	63.1	62.7	-0.4
12	Poulton YMCA Swimming and Fitness Centre	53.8	53.8	+0.0
13	Poppy & Jack Nursery	69.0	68.5	-0.5
14	Poulton Guides HQ	66.0	65.5	-0.5
15	Hodgson Academy	46.9	48.0	+1.1
16	The Moorland Nursing Home	46.1	46.7	+0.6
17	Happy Days Nursery	44.8	45.9	+1.1
18	Carr Head Primary School	45.9	47.0	+1.1
19	Kingdom Hall of Jehovah's Witness	66.9	66.4	-0.5
20	St Johns primary school	65.0	64.5	-0.5
21	Nationwide Laboratories	67.8	56.1	-11.7
22	River Wyre Hotel	68.4	67.1	-1.3
23	St John Church	55.5	55.1	-0.4
24	Swans Rest Holiday Cottages	63.6	58.4	-5.2
25	Swans Rest Holiday Cottages	57.0	60.7	+3.7
26	Swans Rest Holiday Cottages	57.7	59.8	+2.1
27	Swans Rest Holiday Cottages	58.1	59.7	+1.6
28	Swans Rest Holiday Cottages	48.3	58.1	+9.8
29	Swans Rest Holiday Cottages	52.5	58.2	+5.7
30	Swans Rest Holiday Cottages	58.4	58.9	+0.5

11.7.36 The following is concluded with regard to the information presented in Table 11-29 and Table 11-30 in the opening year of the Scheme:

- 48 dwellings and 1 other sensitive receptor are predicted to experience no change in road traffic noise as a result of the scheme. This would result in a long-term impact classification of no change and would not be a significant adverse impact on health and quality of life or give rise to a significant environmental effect
- 1959 dwellings and 18 other sensitive receptors are predicted to experience a change of less than 2.9dB in road traffic noise as a result of the Scheme. This would result in a long-term impact classification of negligible and would not be a significant adverse impact on health and quality of life or give rise to a significant environmental effect
- 163 dwellings and 2 other sensitive receptors are predicted to experience a minor adverse increase in road traffic noise as a result of the scheme, of these none occur at a level above a daytime SOAEL but would not be considered to have a significant adverse impact on health and quality of life. These minor adverse noise impacts would occur at receptors located:
  - North of Garstang Road East within the Moorfield Development
  - South of the Lodge Lane Underpass

  It is considered that changes in road traffic noise of this magnitude would not result in changes to behaviour or response to road traffic noise that would give rise to a significant environmental effect.
- 120 dwellings and 4 other sensitive receptors are predicted to experience a moderate adverse increase in road traffic noise as a result of the Scheme, of these zero occur at a level above a daytime SOAEL and as such would not be considered to be a significant adverse impact on health and quality of life. These moderate adverse noise impacts would occur at receptors located:
  - On the southern side of Mains Lane facing onto the Scheme,
  - Nearest to the Scheme in the Moorfield Park Development
  - Approximately 100m south of the Lodge Lane underpass.

  These impacts have been mitigated to a minimum through low noise surfacing on the new road and the implementation of barriers and environmental bunds (presented on Figure 11.4) along the Scheme alignment. Although mitigated to a minimum an adverse change in road traffic noise of this magnitude would be considered to be a significant environmental effect
- 47 dwellings and zero other sensitive receptors are predicted to experience a minor beneficial decrease in road traffic noise as a result of the Scheme, of these 23 occur at a level above a SOAEL but would not be considered to be a significant beneficial impact on health and quality of life or give rise to a significant environmental effect. These minor beneficial noise impacts would occur at receptors located:
  - Approximately 200m north of Garstang New Road
  - North of Mains Lane

  Changes in road traffic noise of this magnitude would be considered to be a significant environmental effect
- 85 dwellings and 2 other sensitive receptors are predicted to experience a moderate beneficial decrease in road traffic noise as a result of the Scheme, of these 55 occur at a level above a SOAEL. This would be considered to be

a significant beneficial impact on health and quality of life. These moderate beneficial noise impacts would occur at receptors located:

- Along the northern side of Mains Lane
- Within 200m of Garstang New Road
- North West of Little Singleton

Changes in road traffic noise of this magnitude would be considered to be a significant environmental effect

11.7.37 The comparison of the future year situation with and without the Scheme indicates a long-term net loss of 151 additional dwellings which are predicted to experience a perceptible increase of greater than 3dB(A) in long-term road traffic noise level. However, of these increases none of these would occur above a SOAEL compared to 78 decreases which would also occur above a SOAEL.

11.7.38 The following is concluded with regard to the long-term assessment of night time road traffic noise levels as presented in Table 11-31:

- 2057 receptors are predicted to experience a future assessment year night time road traffic noise level of less than 55dB L_{Aeq}. As such these are not required to form part of the night time DMRB assessment
- 352 dwellings above a night-time SOAEL are predicted to experience a negligible change in road traffic noise as a result of the scheme during the night-time, but would not be of a magnitude to be considered to be a significant adverse impact on health and quality of life
- 13 receptors above a night-time SOAEL would experience no change in road traffic noise level
- Zero dwellings considered within the night-time assessment are predicted to experience an adverse change of greater than negligible during the night-time.
- Zero dwellings considered within the night-time assessment are predicted to experience a beneficial change of greater than negligible during the night-time.

11.7.39 Table 11-31 presents a comparison in road traffic noise levels in the long-term at NIAs identified within the detailed calculation area. It is reiterated that as specified in paragraph 11.3.37 by the opening year of 2022 all roads within NIAs would have been resurfaced with a thin surfacing system. As such the benefits of such a system in terms of mitigating road traffic noise are inherent within the calculations

Table 11-31: Noise and Vibration - Long-term impacts on Important Areas within the detailed study area without the Scheme

Defra Important Area ID Ref	Road Name	2022 Do-Minimum dB L_{A10} 18 hour	2037 Do-Minimum dB L_{A10} 18 hour	Change dB L_{A10} 18 hour
IA10542	B5260	74.4	74.9	+0.5
IA6819	A585	72.7	63.5	-9.2
IA66	A585	71.2	62.7	-8.5
IA65	A585	74.5	71.5	-3.0

Defra Important Area ID Ref	Road Name	2022 Do-Minimum dB $L_{A10\ 18\ hour}$	2037 Do-Minimum dB $L_{A10\ 18\ hour}$	Change dB $L_{A10\ 18\ hour}$
IA63	A585	74.5	72.2	-2.3
IA64	A585	73.8	68.5	-5.3
IA6820	A585	70.1	68.3	-1.8
IA67	A588	69.6	69.3	-0.3
IA68	A586	67.5	68.4	+0.9
IA69	A586	69.1	70.5	+1.4

11.7.40 The information presented in Table 11-31 indicates the following:

- Six NIAs would experience negligible changes in road traffic noise of less than 3dB(A)
- No NIAs considered within the assessment are predicted to experience an adverse change of greater than negligible magnitude
- One NIA (IA65) would experience a minor beneficial decrease in road traffic noise level as a result of the Scheme
- Three NIAs would experience a moderate beneficial decrease in road traffic noise level as a result of the Scheme

11.7.41 Adverse impacts would be limited to negligible and as such would not be significant. However beneficial impacts at 2 of the NIAs would be greater than moderate beneficial in magnitude, and therefore concluded to represent a significant beneficial effect at these NIAs within the detailed calculation area.

Long-term Assessment Outside of Detailed Calculation Area

11.7.42 This section of the Chapter considers the wider impacts of the Scheme in the long-term outside of the detailed calculation area but within the confines of the ARN. The specifics of this study area are detailed within Section 11.4.

11.7.43 Table 11-32 presents the results of the BNL calculations undertaken for the long-term comparison (2022 Do-Minimum versus 2037 Do-Something) on the ARN.

Table 11-32: Noise and Vibration – Long-term traffic noise impacts outside detailed study area with Scheme – by number of roads

Change in noise level		Number of roads
Increase in noise level, $L_{A10,18\text{-hour}}$	0.1 - 2.9	897
	3.0 - 4.9	0
	5.0- 9.9	0
	>10	0
No Change	0	75

Change in noise level		Number of roads
Decrease in noise level, $L_{A10,18\text{-hour}}$	0.1 - 2.9	88
	3.0 - 4.9	0
	5.0- 9.9	0
	>10	0

11.7.44 The BNL link flow calculations indicate that none of the roads considered would demonstrate long-term changes in road traffic noise level that exceed the perceptible long-term threshold criteria of 3dB. This would be concluded to represent a short-term impact classification of negligible and would not be considered a significant effect.

Road Traffic Noise Nuisance Assessment

11.7.45 Table 11-33 presents the results of the operational road traffic noise nuisance assessment in accordance with methodology contained within DMRB.

Table 11-33: Noise and Vibration – Long-term Road Traffic Noise Nuisance Assessment

Change in Noise Level		Do-Minimum	Do-Something
		Number of Dwellings	Number of Dwellings
Increase in nuisance level	< 10%	817	59
	10 < 20%	0	647
	20 < 30%	0	615
	30 < 40%	0	322
	≥ 40%	0	73
No Change		1583	330
Decrease in nuisance level	< 10%	22	300
	10 < 20%	0	50
	20 < 30%	0	26
	30 < 40%	0	0
	≥ 40%	0	0

11.7.46 With regards to the information presented in Table 11-, in the Do-Minimum situation, there are 817 dwellings predicted to experience an increase in nuisance, 22 dwellings predicted to experience a decrease in nuisance and 1583 predicted to experience no change in the percentage of people bothered very much or quite a lot by road traffic noise.

11.7.47 In the Do-Something scenario there are predicted to be 1,716 dwellings where there would be an increase in road traffic noise nuisance. This would represent a net

increase of 899 dwellings which would experience an increase in nuisance with the Scheme.

11.7.48 In addition to the predicted increases in road traffic noise nuisance there are also predicted to be 330 dwellings that experience no change in road traffic nuisance and 376 dwellings where there would be a decrease in road traffic noise nuisance. This would represent a net increase of 354 dwellings which would experience a decrease in road traffic noise nuisance with the Scheme.

11.7.49 With the Scheme there would be additional dwellings which would experience an increase in road traffic noise nuisance and additional dwellings which would experience a decrease in road traffic noise nuisance above the Do-Minimum scenario.

11.7.50 Results of this nature are considered typical for a bypass scheme where traffic noise contribution to an area is transferred from receptors/facades near the existing road network to receptors/facades adjacent to the Scheme in areas of previously low-level road traffic noise. This typically results in benefits and disbenefits depending on geographic settings of dwellings relative to existing road network and the Scheme.

Road Traffic Airborne Vibration Nuisance Assessment

11.7.51 Table 11-34 presents the results of the operational road traffic airborne vibration nuisance assessment in accordance with methodology contained within DMRB.

11.7.52 As previously stated, this assessment is only undertaken for receptors within 40m of an affected route and as such only 216 dwellings out of the 2,422 contained within the detailed calculation area have been considered.

Table 11-34: Noise and Vibration – Long-term Road Traffic Airborne Vibration Nuisance Assessment

Change in Nuisance Level		Do-Minimum	Do-Something
		Number of Dwellings	Number of Dwellings
Increase in nuisance level	< 10%	148	107
	10 < 20%	2	10
	20 < 30%	1	6
	30 < 40%	0	1
	≥ 40%	0	0
No Change		35	11
Decrease in nuisance level	< 10%	20	44
	10 < 20%	6	17
	20 < 30%	4	20
	30 < 40%	0	0
	≥ 40%	0	0

11.7.53 With regards to the information presented in Table 11-, in the Do-Minimum situation where the Scheme is not implemented, there are 151 dwellings predicted to experience an increase in airborne vibration nuisance, 30 dwellings predicted to experience a decrease in airborne vibration nuisance and 35 predicted to experience no change in the percentage of people bothered very much or quite a lot by traffic generated airborne vibration as a result of year on year traffic growth.

11.7.54 In the Do-Something scenario where the Scheme is implemented there are predicted to be 124 dwellings where there would be an increase in road traffic generated airborne vibration nuisance, and 81 dwellings predicted to experience a decrease in airborne vibration nuisance and 11 predicted to experience no change in the percentage of people bothered very much or quite a lot by traffic generated airborne vibration as a result of the Scheme.

11.7.55 Therefore, a comparison of the Do-Minimum (without Scheme) and Do-Something (with Scheme) scenarios concludes the following relative to the potential for airborne vibration nuisance:

- A net decrease of 27 dwellings which would experience an increase in traffic generated airborne vibration nuisance with the Scheme
- A net increase of 51 dwellings which would experience a decrease in traffic generated airborne vibration nuisance with the Scheme

11.7.56 From the information presented in Table 11-35 with the Scheme there would be fewer dwellings which would experience an increase in airborne vibration nuisance and more dwellings which would experience a decrease in airborne vibration nuisance.

11.7.57 Results of this nature are considered typical for a bypass scheme which moves traffic from constrained existing networks, from the perspective of the proximity of dwellings/facades to existing roads to less densely populated areas surrounding the new alignment.

Noise Insulation Regulations (NIR) Assessment

11.7.58 A Noise Insulation Regulations (NIR) assessment has been undertaken using the predicted noise levels obtained from the operational noise assessment which is presented in Appendix 11.3 (document reference TR010035/APP/6.11.3).

11.7.59 The results of the NIR assessment presented in Appendix 11.3 (document reference TR010035/APP/6.11.3) indicate that 1 residential dwelling would qualify for noise insulation under the NIR Regulations. This dwelling is identified as:

- North Lodge, Lodge Lane, Singleton, Lancashire, Poulton-Le-Fylde, FY6 8LT

Operational Significant Effects

National Policy

11.7.60 Based upon the assessments presented within the scope of this chapter it can be concluded that as a result of the implementation of the Scheme and mitigation inherent therein, the Scheme is demonstrated to accord with the primary aims of National policy (NN NPS, NPSE and NPPF) in relation to noise.

11.7.61 As a result of the mitigation implemented into the design of the Scheme any predicted increases in road traffic noise level which remain above a SOAEL, notwithstanding this mitigation provision, would be classified as no greater than minor adverse. With reference to Table 11 25 and Table 11 29 it is demonstrated that of the 2422 dwellings considered within the assessment this is the case at only 19 receptors in the opening year, reducing to zero dwellings in the future assessment year. Therefore these impacts would not be of a magnitude considered to have a significant adverse impact on health and quality of life, and through the mitigation inherent in the design have been reduced to a minimum.

11.7.62 Furthermore as a direct result of the Scheme itself and the mitigation implemented into the design of the Scheme, of the predicted decreases in road traffic noise levels attributed to the Scheme 82 dwellings in the short term and 55 dwellings in the long term which are above a SOAEL are predicted to experience beneficial changes of moderate or greater. Therefore, these dwellings would experience a significant beneficial impact on health and quality of life as a direct result of the Scheme.

Environmental Impact Assessment Regulations 2017

11.7.63 In terms of the EIA Regulations the likely significant environmental effects from the operation of the Scheme and their significance considering the short term and long-term operational road traffic noise assessments is presented in Table 11-35.

Table 11-35: Noise and Vibration – Likely Significant Environmental Effects During Operation

Receptor (or group of receptors)	Magnitude of Impact		Conclusion of Significance of Environmental Effect	Justification of Significance conclusion
	Short Term	Long Term		
Noise sensitive receptors located on the south of Mains Lane	Major/Moderate Adverse	Moderate Adverse	Not Significant	Although the increase in road traffic noise would be considered large, the increase would be between a LOAEL and SOAEL with the front façade (facing onto Mains Lane) of these properties experiencing a beneficial reduction of approximately the same magnitude as a result of the Scheme
Noise sensitive receptors located in Little Singleton	Moderate Beneficial	Minor Beneficial	Not Significant	Magnitude of reductions in road traffic noise becomes less significant in the long term with no change to the acoustic context as road traffic noise is the existing dominant noise source
Noise sensitive receptors located in Skippool	Minor Beneficial	Minor Beneficial	Not Significant	Magnitude of change not large enough to be considered significant with no change to the existing acoustic context
Noise sensitive receptors located in Little Poulton Lane, Moorway and The Spinney	Major/Moderate Adverse	Moderate Adverse	Not Significant	Although magnitude of change would be considered large the absolute level with the Scheme would be in the region of a LOAEL for road traffic noise. Road traffic noise would not change the acoustic context at these noise sensitive receptors
Noise sensitive receptors located in the vicinity of	Major/Moderate Adverse	Moderate Adverse	Significant (Adverse)	Large increase in road traffic noise to a level just below a SOAEL with adverse

Receptor (or group of receptors)	Magnitude of Impact		Conclusion of Significance of Environmental Effect	Justification of Significance conclusion
	Short Term	Long Term		
Lodge Lane underpass				changes to the acoustic context with road traffic noise becoming more apparent
Noise sensitive receptors located in the vicinity of Scheme tie-in with Main Lane	Major/Moderate Adverse	Moderate Adverse	Significant (Adverse)	Large increase in road traffic noise to a level just below a SOAEL with changes to the existing acoustic context with road traffic noise becoming more apparent
Noise sensitive receptors located in Moorfield Park Development	Major/Moderate Adverse	Moderate Adverse	Significant (Adverse)	Large increase in road traffic noise to a level below a SOAEL with adverse changes to the acoustic context with road traffic noise becoming more apparent
Noise sensitive receptors located on the north of Mains Lane	Major/Moderate Beneficial	Major/Moderate Beneficial	Significant (Beneficial)	Large reduction in road traffic noise predicted to occur at sensitive receptors already experiencing a road traffic noise above or near a SOAEL
Noise sensitive receptors located on Garstang New Road and in the North West of Little Singleton	Moderate Beneficial	Moderate Beneficial	Significant (Beneficial)	Reductions in road traffic noise level with significant change to the existing acoustic contest due to the closure of Garstang New Road

Population and Human Health Assessment

11.7.64 In accordance with NN NPS and NPSE noise and vibration levels generated by the construction phase of the Scheme have been predicted. At all sensitive receptors included within the assessment the construction noise level is predicted to remain below a SOAEL and as such would avoid significant adverse impacts on health and quality of life from noise as a result of the construction of the Scheme.

11.7.65 Construction noise and vibration impacts would be mitigated to a minimum through the implementation of Best Available Techniques (BAT) and strict adherence to the CEMP.

11.7.66 In accordance with NN NPS and NPSE short-term operational road traffic noise impacts at receptors located along Garstang New Road, Garstang Road west of Little Singleton and at receptors located on the north of Mains Lane would be of beneficial significance with 99 dwellings predicted to experience a beneficial change above a SOAEL. All other receptors assessed were predicted to experience no significant effects.

11.7.67 In accordance with NN NPS and NPSE long-term operational road traffic noise impacts would not be of beneficial significance at receptors located along Garstang New Road, Garstang Road west of Little Singleton and at receptors located on the north of Mains Lane with 78 dwellings predicted to experience a beneficial change above a SOAEL.

11.7.68 It is predicted that beneficial impacts would occur at 5 NIAs in the short -term and 3 NIAs in the long-term, therefore a significant beneficial effect is expected to occur at these NIAs.

11.7.69 Therefore, the overall operational effect from Noise and Vibration on population and human health is predicted to be Minor Beneficial.

11.8 Monitoring

Construction Phase

11.8.1 Noise monitoring during the construction phase would be required to ensure that any mitigation measures implemented during the construction phase are working and limiting construction noise levels to a minimum.

11.8.2 Prior to the commencement of construction, a programme of noise monitoring would be undertaken for a minimum of 10 days (to include 2 weekends) at the following locations (subject to agreement):

- Barton House, Skippool Road
- The Cottage, Old Mains Lane
- Meadow View Barn, 195 Mains Lane
- 36 Kevin Avenue
- 103 Mains Lane
- North Lodge, Lodge Lane
- Bankfield Manor, Poolfoot Lane

11.8.3 At each location the sound level meter would be required to be set to monitor the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} statistical parameters during the daytime, evening and

night-time periods.

11.8.4 The purpose of these surveys is to establish the existing baseline/ambient noise conditions immediately prior to the commencement of construction of the Scheme and to derive appropriate construction noise level limits based upon up to date data.

11.8.5 Noise monitoring at the locations described above would be repeated periodically during the construction phase to consider compliance issues and would be included within the noise and vibration management plan during construction contained within the CEMP.

11.8.6 This Noise and Vibration Management Plan would set out the duration and frequency of these noise surveys along with construction noise limits and would be drafted and consulted upon with the Environmental Health Departments of both Fylde Council and Wyre Council. The requirement for this plan is stipulated in the Outline CEMP (document reference TR010035/APP/7.2) and would be prepared by the contractor prior to construction commencing.

11.8.7 Should a monitored construction noise level exceed the agreed noise limits then a review of the construction working practises would be undertaken and further mitigation measures identified by the main works contractor to limit the construction noise level emitted from the Scheme to a minimum.

Operational Phase

11.8.8 Noise monitoring during the operational phase would be undertaken by Highways England to verify qualification under the NIR.

11.8.9 Based upon the results of the assessments undertaken only 1 dwelling is indicated to qualify for noise insulation under the NIR. As such noise monitoring would be undertaken for a minimum of 10 days at the following location:

- North Lodge, Lodge Lane

11.8.10 This requirement shall be secured through the DCO and the results of the post opening noise surveys presented to the Environmental Health Departments of Fylde Council and Wyre Council.

11.8.11 Outside of the scope of the consideration of qualification under the NIR operational phase noise monitoring cannot practicably and reasonably be used to check whether the magnitude and extent of any noise impacts resulting from the Scheme are greater or less than those reported in the assessment. This is because impacts of any road scheme are evaluated based purely upon road traffic noise contributions calculated from AAWT flow data, and measured levels are likely to be influenced by other non-related extraneous noise sources.

11.8.12 As a result of this DMRB and NN NPS recommend that in support of road scheme assessments, road traffic noise is predicted using the CRTN calculation methodology. With this regard paragraph A4.45 of DMRB explains: "*The preferred method for calculating noise levels from road traffic is by prediction rather than by measurement (CRTN, paragraph 3). There are several reasons why the prediction method is preferred. In particular noise levels, although generally dominated by traffic noise, can be affected by non-traffic sources. Unless the extraneous noise from other sources is edited the results may lead to an over-estimation of traffic noise levels. However there are occasions when it is necessary to resort to measurements (CRTN, paragraph 38).*"

11.8.13 For this reason, operational phase noise monitoring is only proposed in support of the NIR.

11.9 Summary

11.9.1 An assessment of temporary construction noise and vibration impacts has been undertaken following the guidance contained within BS5228. From the results of the assessment the following is concluded:

- Daytime construction noise levels would not exceed the relevant BS5228 significance threshold category or a construction noise SOAEL at any receptor, therefore no impacts upon on health and quality of life or significant environmental effects have been deemed to occur and as such daytime construction noise impacts would not be significant.
- Night-time construction noise levels would not exceed the relevant BS5228 significance threshold category or a construction noise SOAEL at any receptor, therefore no impacts upon on health and quality of life or significant environmental effects have be deemed to occur and as such night-time construction noise impacts would not be significant.
- Levels of vibration from piling activities have been predicted to range from negligible to slight adverse. A magnitude of slight adverse is defined, in terms of BS5228 as vibration being 'just perceptible in a residential environment' and would occur over a short duration. The magnitude of vibration would also not exceed a construction vibration SOAEL therefore no impacts upon on health and quality of life or significant environmental effects have be deemed to occur and as such construction vibration impacts would not be significant.
- Noise impacts from heavy vehicles using the local road network during the construction phase have been predicted to increase by no more than 1dB(A). A change of less than 1dB(A) would be a negligible increase in noise below that which is perceptible by the human ear, therefore no impacts upon health and quality of life or significant environmental effects have been deemed to occur and as such construction vehicle impacts using the local road network would not be significant.

11.9.2 An assessment of permanent operational road traffic noise has been undertaken in accordance with DMRB which has considered road traffic noise impacts in both the short-term in the year of opening and long-term 15 years after opening.

11.9.3 Short-term operational impacts in the opening year of the Scheme:

- In the short-term scenario adverse impacts from noise occur at receptors within close proximity of the new alignment and along Garstang Road East. Whilst adverse noise impacts of greater than moderate magnitude have been reported at 203 dwellings (of 2,242 assessed), there are no adverse changes greater than minor adverse predicted to occur at any receptors above a SOAEL. Therefore, in accordance with NN NPS and NPSE short-term operational road traffic noise impacts would not have significant adverse impact on health and quality of life.
- Short-term beneficial impacts are predicted to occur at receptors located along Garstang New Road, Garstang Road west of Little Singleton and at receptors located on the north of Mains Lane with 82 dwellings predicted to experience a moderate or greater beneficial change above a SOAEL. Changes of this

magnitude would represent a significant beneficial impact on health and quality of life.

11.9.4 Long-term operational impacts in the future assessment year of the Scheme:

- In the long-term scenario adverse impacts from noise occur at receptors within close proximity of the new alignment and along Garstang Road East. Whilst adverse noise impacts of moderate or greater have been reported at 120 dwellings (of 2,242 assessed), there are no adverse changes greater than negligible predicted to occur at any receptors above a SOAEL. Therefore, in accordance with NN NPS and NPSE short-term operational road traffic noise impacts would not have significant adverse impact on health and quality of life.
- Long-term beneficial impacts are predicted to occur at receptors located along Garstang New Road, Garstang Road west of Little Singleton and at receptors located on the north of Mains Lane with 55 dwellings predicted to experience a moderate or greater beneficial change above a SOAEL. Changes of this magnitude would represent a significant beneficial impact on health and quality of life.

11.9.5 Operational night-time noise impacts are only required to be assessed in the long-term scenario (Do-Minimum 2022 v Do-Something 2037) which concludes the following:

- With regard to the operational long-term assessment of night time road traffic noise levels (as required by DMRB) 365 of the 2,422 dwellings within the Study Area require assessment. Of these none are predicted to experience a change of greater than negligible during the night-time. Therefore, in accordance with NN NPS and NPSE short-term operational road traffic noise impacts would not have significant adverse impact on health and quality of life**.**

11.9.6 In terms of significant environmental noise effects beneficial significant effects have been predicted to occur at noise sensitive receptors located on the north of Mains Lane and on Garstang New Road.

11.9.7 Significant adverse environmental noise effects have been predicted to occur at noise sensitive receptors located in the vicinity of Lodge Lane underpass, the Scheme tie-in with Main Lane and Moorfield Park Development

11.9.8 Road traffic noise nuisance associated with the Scheme, concluded from the modelling that the Scheme would result in both increases and decreases in road traffic noise nuisance compared to the Do-Minimum scenario. This is typical for a bypass scheme where traffic noise contribution to an area is transferred from the existing road network to a new Scheme located in areas of previously low-level road traffic noise.

11.9.9 With regard to operational airborne vibration nuisance associated with the Scheme there would be fewer dwellings which would experience an increase in airborne vibration nuisance and more dwellings which would experience a decrease in airborne vibration nuisance than in the Do-Minimum (without Scheme) scenario. Results of this nature are considered typical for a bypass scheme which moves traffic from constrained existing networks, from the perspective of the proximity of dwellings/facades to existing roads to less densely populated areas surrounding the new alignment.

11.9.10 In consideration of NIAs within the Study Area adverse impacts would be limited to minor adverse and as such would not be significant. However, beneficial impacts at 5 NIAs in the short-term and 3 NIAs in the long-term would be greater than moderate beneficial in magnitude, and therefore concluded to represent a significant beneficial effect at these NIAs.

11.9.11 Outside of the detailed calculation area changes in road traffic noise level on roads within the ARN would be negligible in both the short-term and long-term. This provides a positive indication that noise impacts as a result of the Scheme would be localised to the immediate vicinity of the Scheme.

11.10 References

British Standard Institution (2013) *EN 61672-1 Electro-acoustics, Sound Level Meters, Specifications.*

British Standards Institution (2014) *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise*

British Standards Institution (2014) *BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Vibration*

Defra (2010) *Noise Policy Statement for England*

Department for Communities and Local Government (2018) *National Planning Policy Framework*

Department for Transport (2014) *National Networks National Policy Statement*

Department for Transport and Welsh Office (1988) *Calculation of Road Traffic Noise (CRTN),*

Highways England *et al* (2011) *Design Manual for Roads and Bridges, Volume 11 Section 3 Part 7 (HD213/11) 'Noise and Vibration'*

Highways England (2015) *IAN 185/15 Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3, Part 1 'Air Quality and Volume 11, Section 3. Part 7 Noise*

HMSO (1974) *Control of Pollution Act 1974*

HMSO (1990) *Environmental Protection Act 1990*

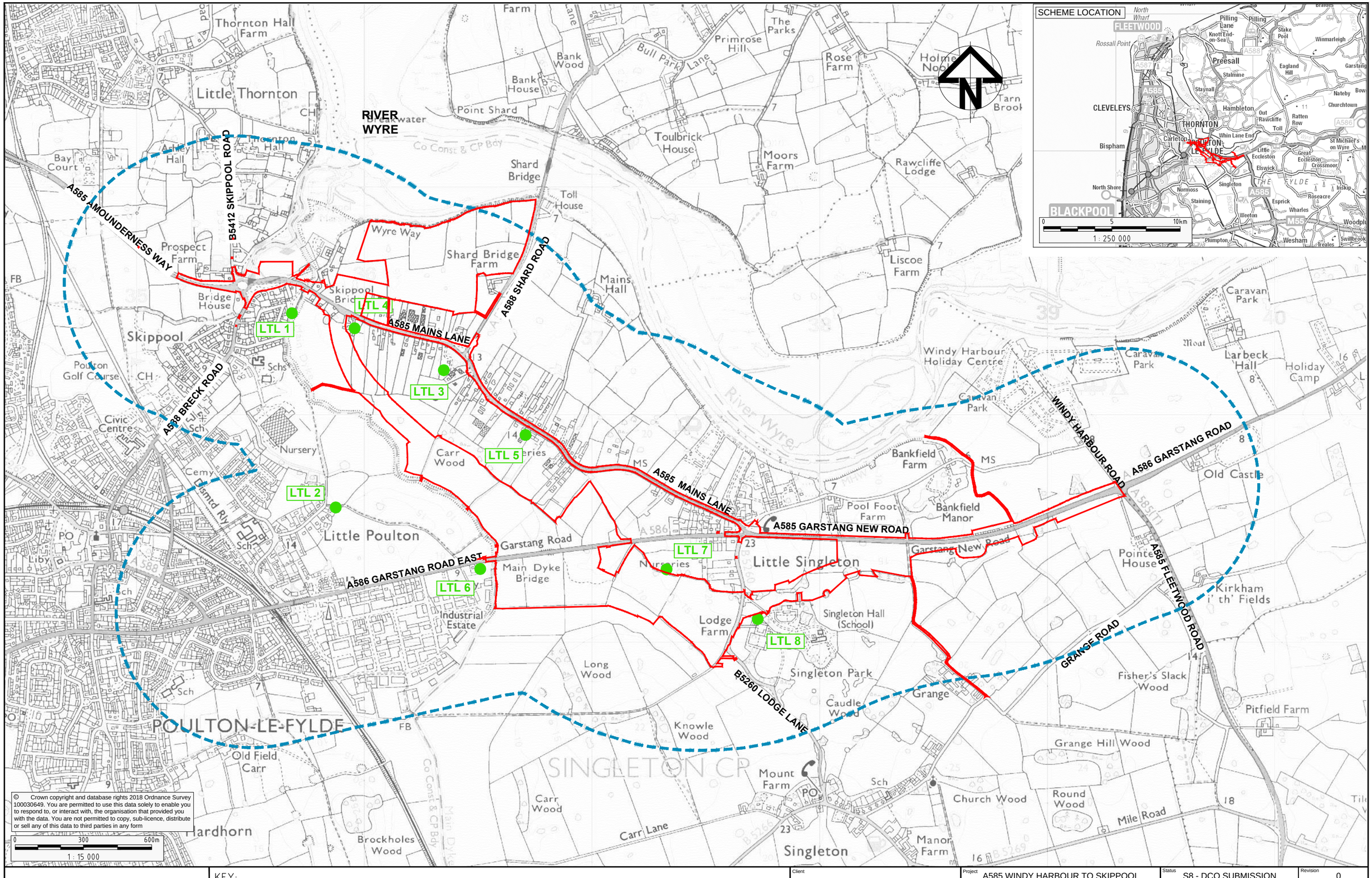
The Environmental Noise (England) Regulations 2006 implement the Assessment and Management of Noise Directive 2002/49/EC (the "Environmental Noise Directive" or "END")

Transport and Road Research Laboratory (1990) *Traffic induced vibration in buildings*

Transport Research Laboratory (1997) *TRL Report 328 Ground vibrations caused by road construction activities*

TRL limited, PR/SE/451/02 (2002) *Converting the UK traffic noise index LA10, 18h to EU noise indices for noise mapping*

11.11 Figures



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KEY:

- Draft Order Limits
- Noise Study Area
- Long Term Locations

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
0	S8	OCT18	S8 - DCO SUBMISSION	JN	KB	NH

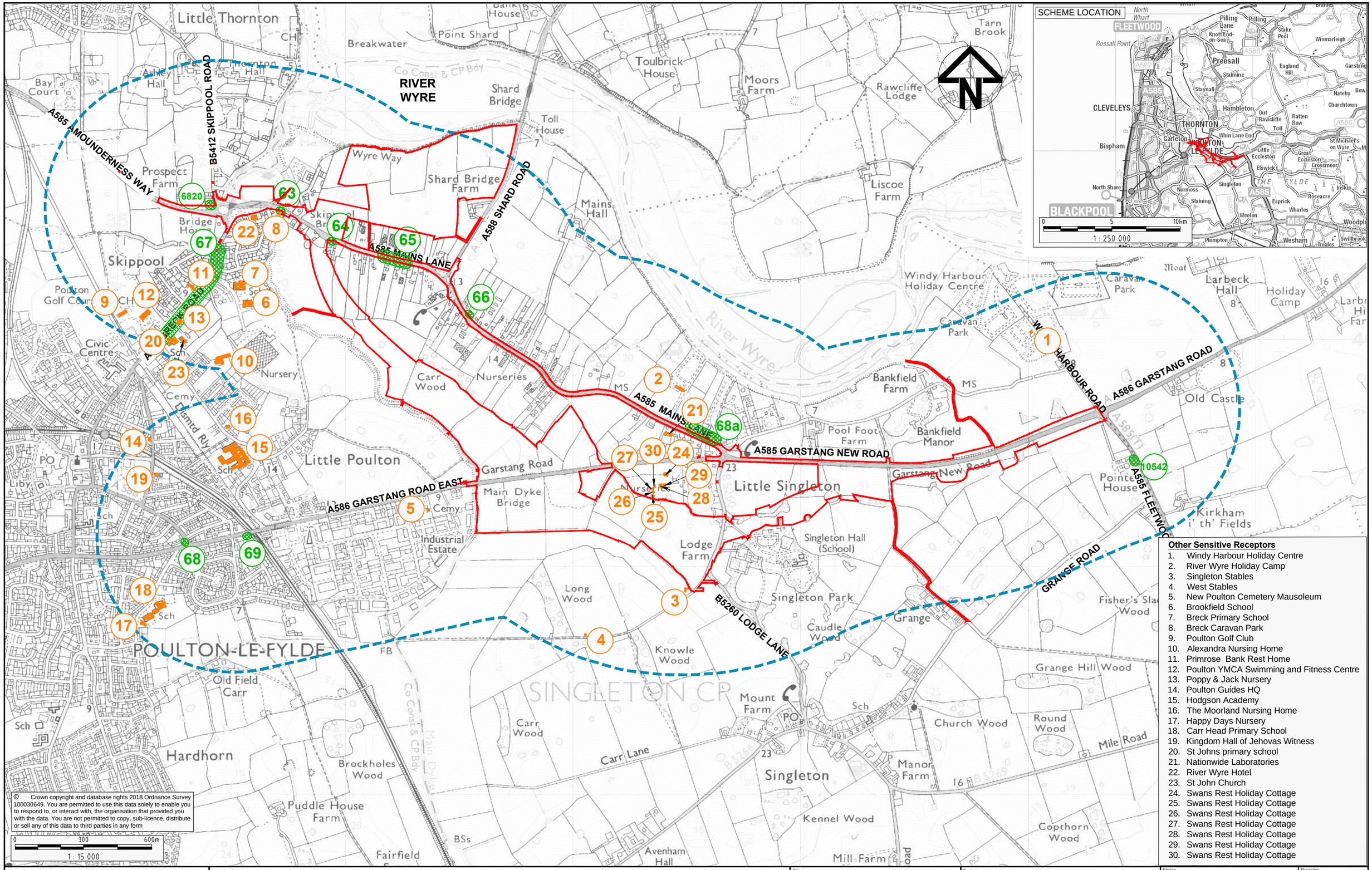
Client: highways england

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing Title: ENVIRONMENTAL STATEMENT REGULATION 5(2)(a) NOISE AND VIBRATION: NOISE MONITORING LOCATIONS WITHIN STUDY AREA

Status	S8 - DCO SUBMISSION	Revision	0
Scale	1:15 000 @ A3	Date	OCT 2018
Drawn By	J.NORMAN		
Checked By	K.BURROWS		
Approved By	N.HENDERSON		
PINS No.	TR010035		FIGURE 11.1

Drawing number (HE PIN | Originator | Volume | Location | Type | Role | Number): HE548643-ARC-EGN-SZ_ZZ_000-DR-LE-3070



Other Sensitive Receptors

1. Windy Harbour Holiday Centre
2. River Wyre Holiday Camp
3. Singleton Stables
4. West Stables
5. New Poulton Cemetery Mausoleum
6. Brookfield School
7. Breck Primary School
8. Breck Caravan Park
9. Poulton Golf Club
10. Alexandra Nursing Home
11. Primrose Bank Rest Home
12. Poulton YMCA Swimming and Fitness Centre
13. Poppy & Jack Nursery
14. Poulton Guides HQ
15. Hodgson Academy
16. The Moorland Nursing Home
17. Happy Days Nursery
18. Carr Head Primary School
19. Kingdom Hall of Jehovas Witness
20. St Johns primary school
21. Nationwide Laboratories
22. River Wyre Hotel
23. St John Church
24. Swans Rest Holiday Cottage
25. Swans Rest Holiday Cottage
26. Swans Rest Holiday Cottage
27. Swans Rest Holiday Cottage
28. Swans Rest Holiday Cottage
29. Swans Rest Holiday Cottage
30. Swans Rest Holiday Cottage

KEY:

- Draft Order Limits
- Noise Study Area
- Other Sensitive Receptors
- Noise Important Areas

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
0	S8	OCT18	S8 - DCO SUBMISSION	JN	KB	NH

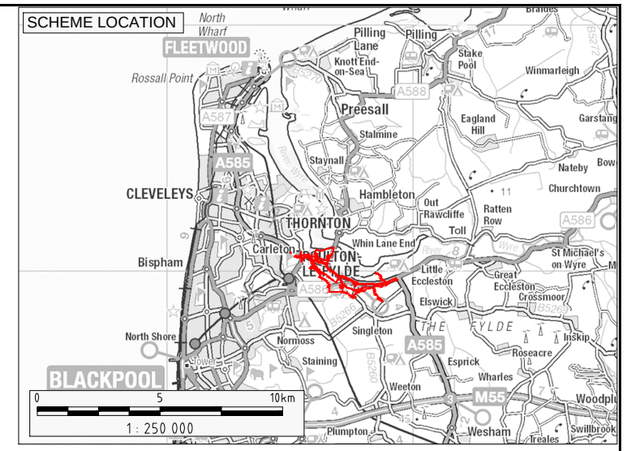
Client: highways england

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing Title: ENVIRONMENTAL STATEMENT REGULATION 5(2)(a) NOISE AND VIBRATION: STUDY AREA, NOISE IMPORTANT AREAS AND OTHER SENSITIVE RECEPTORS

Status	S8 - DCO SUBMISSION	Revision	0
Scale	1:15 000 @ A3	Date	OCT 2018
Drawn By	J.NORMAN		
Checked By	K.BURROWS		
Approved By	N.HENDERSON		
PINS No.	TR010035		FIGURE 11.2

Drawing number (HE PIN | Originator | Volume | Location | Type | Role | Number): HE548643-ARC-EGN-SZ_ZZ_000-DR-LE-3071



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KEY:

A585 Scheme Alignment

Noise Study Area

Day Level dB(A)	
>.- -10	No Change
>-5 - -9.9	>-0.1 - 2.9
>-3 - -4.9	>3 - 4.9
>-0.1 - -2.9	>5 - 9.9
	>10

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprvd
0	S8	OCT18	S8 - DCO SUBMISSION	JN	KB	DH

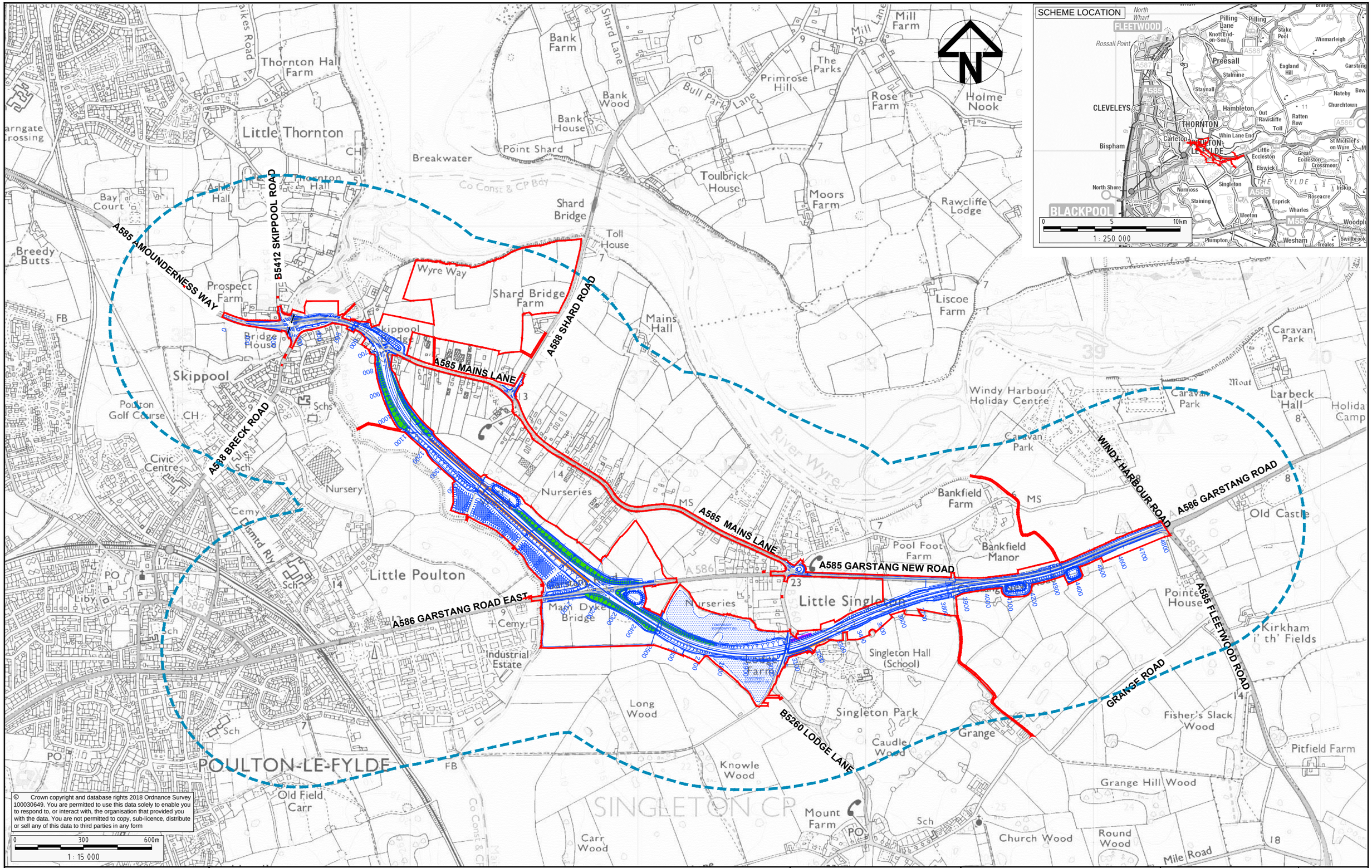
Client: highways england

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing Title: ENVIRONMENTAL STATEMENT REGULATION 5(2)(a) NOISE AND VIBRATION: FUTURE BASELINE CHANGE CONTOUR

Status	S8 - DCO SUBMISSION
Revision	0
Scale	1:25 000 @ A3
Date	OCT 2018
Drawn By	J.NORMAN
Checked By	K.BURROWS
Approved By	D.HOURD
PINS No.	TR010035
	FIGURE 11.3

Drawing number: HE548643-ARC-EGN-SZ_ZZ_000-DR-LE-3072



KEY:

- Draft Order Limits
- The Scheme
- Noise Study Area
- Environmental Bund
- 2m Noise Barrier
- 1m Noise Barrier

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
0	S8	OCT18	S8 - DCO SUBMISSION	JN	KB	NH

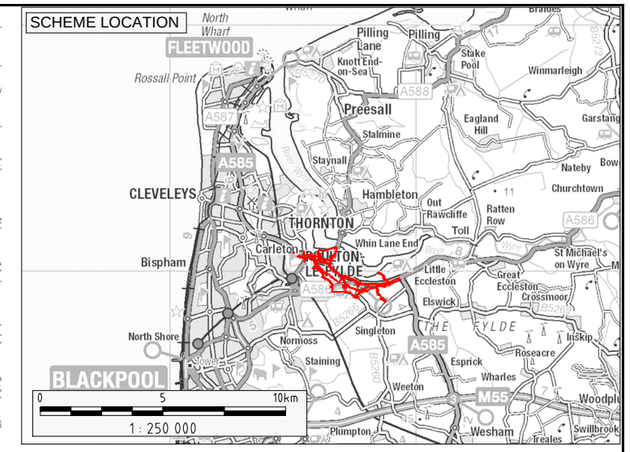
Client: highways england

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing Title: ENVIRONMENTAL STATEMENT REGULATION 5(2)(a) NOISE AND VIBRATION: NOISE MITIGATION

Status	S8 - DCO SUBMISSION	Revision	0
Scale	1:15 000 @ A3	Date	OCT 2018
Drawn By	J.NORMAN		
Checked By	K.BURROWS		
Approved By	N.HENDERSON		
PINS No.	TR010035		FIGURE 11.4

Drawing number (HE PIN | Originator | Volume | Location | Type | Role | Number): HE548643-ARC-EGN-SZ_ZZ_000-DR-LE-3073



0 300 600m
1 : 15 000

KEY:

- Draft Order Limits
- The Scheme
- Noise Study Area

Day Level dB(A)

>.- -5	No Change
>-3 - -4.9	>-0.1 - 0.9
>-1 - -2.9	>1 - 2.9
>-0.1 - -0.9	>3 - 4.9
	>5

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
0	S8	OCT18	S8 DCO - SUBMISSION	JN	KB	NH

Client: highways england

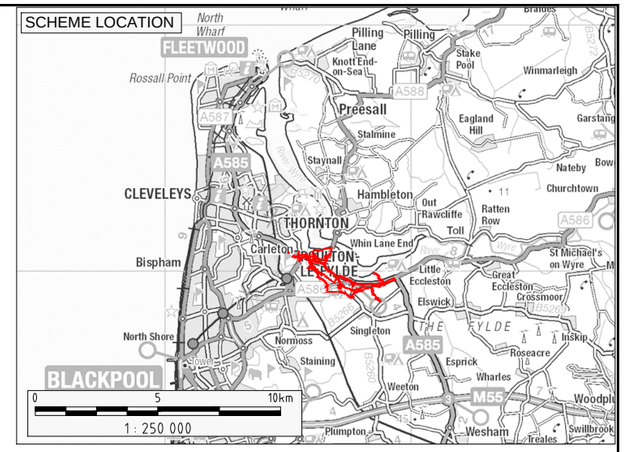
Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing Title: ENVIRONMENTAL STATEMENT REGULATION 5(2)(a) NOISE AND VIBRATION: SHORT-TERM NOISE CHANGE CONTOUR

Status	S8 - DCO SUBMISSION
Revision	0
Scale	1:15 000 @ A3
Date	OCT 2018
Drawn By	J.NORMAN
Checked By	K.BURROWS
Approved By	N.HENDERSON
PINS No.	TR010035
	FIGURE 11.5

Drawing number (HE PIN | Originator | Volume | Location | Type | Role | Number): HE548643-ARC-EGN-SZ_ZZ_000-DR-LE-3074

SCHEME LOCATION



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KEY:

- Draft Order Limits
- The Scheme
- Noise Study Area

Day Level dB(A)

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>-3 - -4.9	>3 - 4.9
>-0.1 - -2.9	>5 - 9.9
	>10

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
0	S8	OCT18	S8 - DCO SUBMISSION	JN	KB	NH

Client: highways england

Project: A585 WINDY HARBOUR TO SKIPPOOL IMPROVEMENT SCHEME

Drawing Title: ENVIRONMENTAL STATEMENT REGULATION 5(2)(a) NOISE AND VIBRATION: LONG-TERM NOISE CHANGE CONTOUR

Status	S8 - DCO SUBMISSION	Revision	0
Scale	1:15 000 @ A3	Date	OCT 2018
Drawn By	J.NORMAN		
Checked By	K.BURROWS		
Approved By	N.HENDERSON		
PINS No.	TR010035		FIGURE 11.6

Drawing number: HE548643-ARC-EGN-SZ_ZZ_000-DR-LE-3075