M1 J37 Phase 2 Higham Lane

Road Traffic Noise Assessment

Barnsley Metropolitan Borough Council

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1. Introduction

1.1 AECOM has been commissioned to undertake a road traffic noise assessment for the proposed highway improvements along Higham Lane, Capitol Close and the A628 Whinby Road off Junction 37 of the M1, Dodworth, Barnsley, in South Yorkshire.

1.2 Capitol Close is currently a no-through road primarily used for access to commercial premises at Capitol Park. The Proposed Scheme introduces a roundabout at the northern end of Capitol Close to form a new junction with Higham Lane, allowing more direct access between Junction 37 and Higham village to the north.

1.3 Construction of the new roundabout requires demolition of Lane Head Farm bungalow. The scheme also includes minor realignment of Higham Lane north of the proposed new roundabout junction, and minor refinements to the alignment of Capitol Close and Whinby Road.

1.4 The scope of this assessment has been discussed with the Environmental Health Department at Barnsley Metropolitan Borough Council (BMBC). The assessment has been prepared with reference to the latest Design Manual for Roads and Bridges (DMRB) LA111 (Ref. 1) methodology. The objective of the assessment is to identify potentially significant effects at noise sensitive receptors (NSRs) within the vicinity of the scheme that are likely to arise during operation.

1.5 This version of the report presents minor revisions to the assessment findings taking into account updated traffic flow data for Hermit Lane to the north of the Proposed Scheme.

2. Policy & Legislation

National Policy

2.1 The following planning guidance and legislation have been considered in determining the assessment methodology, receptor selection and sensitivity, potentially significant environmental effects, and mitigation:

- National Planning Policy Framework (NPPF);
- Noise Policy Statement for England (NPSE); and
- Planning Practice Guidance on Noise (PPG-N).

The National Planning Policy Framework 2019

2.2 The NPPF (Ref. 2) was first published in 2012 and most recently revised in June 2019. This document sets out the Government's planning policies for England and how these are expected to be applied.

2.3 The Framework provides for the production of distinctive local and neighbourhood plans by Local Authorities, in consultation with local people, which should be developed to reflect the needs and priorities of their communities.

2.4 Applications for planning permission must be determined in accordance with the Local Authority development plan (which includes any local plan or neighbourhood plans which have been adopted for the area), unless material considerations indicate otherwise. The NPPF must be taken into account in the preparation of local and neighbourhood plans, and is a material consideration in the determination of planning applications. Planning policies and decisions must also reflect, and where appropriate promote, relevant EU obligations and statutory requirements.

2.5 The NPPF states that "planning policies and decisions should contribute to and enhance the natural and local environment by:

i. preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."

2.6 "Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

ii. mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development - and avoid noise giving rise to significant adverse impacts on health and the quality of life;… [and]

iii. identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason".

2.7 With regard to 'adverse impacts' and 'significant adverse impacts' the NPPF refers to the NPSE Explanatory Note.

Noise Policy Statement for England 2010

2.8 The NSPE (Ref. 3) sets out the long-term vision of the Government's noise policy, which is to "promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development". This long-term vision is supported by the three aims, as listed under NPPF, and is designed to enable decisions to be made regarding what is an acceptable noise burden to place on society.

2.9 The Explanatory Note to the NSPE informs the assessment methodology in terms of the guidance on *adverse impacts* and *significant adverse impacts* through the introduction of the following concepts:

- No Observed Effect Level (NOEL): the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
- Lowest Observable Adverse Effect Level (LOAEL): the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL): the level above which significant adverse effects on health and quality of life occur.

2.10 The NPSE recognises that *'it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations'*. The levels are likely to be different for different noise sources, for different receptors and at different times of the day, therefore the assessment methodology outlines the proposed LOAEL and SOAEL for different situations. The setting of these levels has been informed by the additional guidance in the Planning Practice Guidance on Noise (PPG-N) (Ref 4).

Planning Practice Guidance 2014 (Updated 2019) (PPG)

2.11 In March 2014, the Department for Communities and Local Government (DCLG) released its PPG (Ref. 4) web-based resource to support the NPPF. The guidance advises that local planning authorities should consider:

i. whether or not a significant adverse effect is occurring or likely to occur;
ii. whether or not an adverse effect is occurring or likely to occur; and
iii. whether or not a good standard of amenity can be achieved.

2.12 This guidance introduced the additional concepts of NOAEL (No Observed Adverse Effect Level) and UAEL (Unacceptable Adverse Effect Level).

2.13 Factors to be considered in determining if noise is a concern are identified, including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative impacts.

National Legislation

Environmental Noise (England) Regulations

2.14 The UK Government Environmental Noise (England) Regulations 2006 (Ref. 5) (as amended 2008, 2009, 2010) were introduced in England to implement European Union, Assessment and Management of Noise Directive 2002/49/EC (known as the Environmental Noise Directive - END) (Ref. 6). The aims of the END are to define a common approach in order to avoid, prevent or reduce the harmful effects of environmental noise. Under the END, strategic noise mapping of major roads, railways, airports and agglomerations has been completed across England.

2.15 A number of 'Noise Important Areas' (NIAs - those areas across England most exposed to noise) have been identified in the vicinity of the scheme including:

- north of the scheme between the M1 and Higham Common Road;
- north of the scheme between the M1 and Royd Lane; and
- south east of the scheme along Dodworth Road (A628) and Dodworth Roundabout (M1, Junction 37).

2.16 These are shown on Figure 1. None of the NIAs fall within the Proposed Scheme boundary.

2.17 Responsibility for assessing the potential for implementing cost effective noise mitigation measures within NIAs rests with either Highways England or the local Highways Authority, depending on who is responsible for the road.

Land Compensation Act 1973

2.18 In general noise is recognised as both a common law nuisance (either private or public) and a statutory nuisance. However, this does not apply to noise from road traffic. As a result, the UK Government Land Compensation Act 1973 (Ref. 7) and the UK Government Noise Insulation Regulations 1975 (as amended 1988) (Ref. 8) are used in respect of road traffic noise.

2.19 The Land Compensation Act 1973 Part I provides a means by which compensation can be paid to owners of land or property which has experienced a loss in value caused by the use of public works, such as new or altered roads. Noise and vibration are two of the factors which would be considered in any claims for compensation; however, the claim should consider all changes and effects, including betterment.

Noise Insulation Regulations 1975 (as amended 1988)

2.20 The Noise Insulation Regulations 1975 (as amended 1988) were made under Part II of the Land Compensation Act 1973. Regulation 3 imposes a duty, and Regulation 4 a power, on the relevant Highway Authority to undertake or make a grant in respect of the cost of undertaking noise insulation work in eligible buildings affected by a new or altered highway. This is subject to meeting a range of criteria on road traffic noise levels as specified in the regulations. Regulation 5 also provides discretionary powers to undertake or make a grant in respect of the cost of undertaking noise insulation work in eligible buildings with respect to construction noise.

Control of Pollution Act 1974

2.21 Under Section 60 of the UK Government Control of Pollution Act 1974 (CoPA) (Ref. 9) the local authority can serve a notice specifying how construction works should be carried out, including working hours and noise/vibration limits. Breaching the terms of the notice is an offence.

2.22 Section 61 of the CoPA can be used by the contractor completing demolition or construction works to apply in advance to the local authority for 'prior consent'. Section 61 prior consent acts as a defence against a Section 60 notice. The application must detail how noise and vibration is to be managed on-site based on the principles of Best Practicable Means (BPM).

Local Policy

2.23 Barnsley Core Strategy, adopted in September 2011 (Ref 10), provides a spatial strategy for the future development of Barnsley up to the year 2026. The Core Strategy includes the following policy which is relevant to noise and vibration:

- CSP 40 Pollution Control and Protection

Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air, surface water and groundwater, noise, smell, dust, vibration, light or other pollution which would unacceptably affect or cause a nuisance to the natural and built environment or to people.

We will not allow development of new housing or other environmentally sensitive development where existing air pollution, noise, smell, dust, vibration, light or other pollution levels are unacceptable and there is no reasonable prospect that these can be mitigated against.

Developers will be expected to minimise the effects of any possible pollution and provide mitigation measures where appropriate.

3. Assessment Methodology

Construction Noise and Vibration Assessment

3.1 Details regarding construction plant and programme are unavailable at this stage, hence a quantitative assessment of the likely construction noise and vibration impacts cannot be undertaken with accuracy. As a result, it was discussed and agreed with BMBC's Environmental Health Department that noise and vibration during construction could be controlled through planning conditions where necessary.

3.2 Future assessment or construction noise and vibration limits should refer to the guidance contained in BS 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites' (Ref. 11) and DMRB LA111. The assessment should consider the proximity of receptors to the works, the potential works involved, potential working hours/duration, existing noise levels, and best practice mitigation measures.

Operational Assessment

3.3 The general principle of DMRB is to allocate an assessment method according to risk. This process uses two levels of assessment:

- Initial 'Scoping Assessment'; and, if necessary,
- 'Further Assessment'.

3.4 As a local authority scheme there is no requirement to follow the DMRB methodology in whole or in part. Nevertheless, in order to undertake assessment with reference to a recognised method, the assessment presented here refers to the Further Assessment approach whilst aiming to remain proportionate to the nature and scale of the scheme. The assessment considers both the short-term and long-term noise impacts of the scheme within a defined study area around the scheme.

Defining Magnitude of Noise Impacts

3.5 Noise from a flow of road traffic is generated by both the vehicle engines and the interaction of tyres with the road surface. The traffic noise level at a receptor, such as an observer at the roadside or residents within a property, is influenced by a number of factors including traffic flow, speed, composition (percentage of heavy goods vehicles (HGV)), gradient, type of road surface, distance from the road and the presence of any obstructions between the road and the receptor.

3.6 Noise from a stream of traffic is not constant, but to assess the noise impact a single figure estimate of the overall noise level is necessary. The index adopted by the Government in Calculation of Road Traffic Noise (CRTN) (Ref. 12) to assess traffic noise levels is the $L_{A10,18hr}$. This value is determined by taking the highest 10% of the noise levels in each of the 18 one-hour periods between 06:00 and 00:00, and then calculating the arithmetic mean. As recorded in DMRB, a reasonably good correlation has been shown to exist between this index and the perception of traffic noise by residents over a wide range of noise exposures.

3.7 CRTN provides the standard methodology for predicting the $L_{A10,18hr}$ road traffic noise level. Noise levels are predicted at a point measured 1 m horizontally from the external façade of buildings.

3.8 DMRB also requires an assessment of night-time (i.e. between 23:00 and 07:00) traffic noise levels ($L_{night,outside}$). However, this parameter is not calculated by the standard CRTN methodology. DMRB refers to methods for calculating night-time traffic noise levels developed by the Transport Research Laboratory (TRL) (2002). The most widely used is 'Method 3' which factors the $L_{night,outside}$ from the $L_{A10,18hr}$, based on the typical diurnal pattern of traffic flows in the UK for motorways and non-motorways. This method has been used in this assessment.

3.9 Noise level calculations at NSRs are undertaken for the Do-Minimum (DM - without scheme) and Do-Something (DS - with scheme) scenarios for both the Opening Year (OY) and Future Year (FY - 15 years after scheme opening). In addition, a further DS scenario has been considered to represent the situation with additional development at the Barnsley West site in place in the Future Year. A summary of the scenarios is presented below:

- DMOY – Year 2021 (based upon the existing road network layout);
- DSOY – Year 2021, including changes to the existing road network layout to represent the M1 J37 Phase 2 Higham Lane scheme;
- DMFY – Year 2036 (based upon the existing road network layout);
- DSFY – Year 2036, plus changes to the existing road network layout to represent the M1 J37 Phase 2 Higham Lane scheme; and
- DSFY+ – Year 2036, plus changes to the existing road network to represent the M1 J37 Phase 2 Higham Lane scheme and the Barnsley West development further north.

3.10 The calculations for each scenario are based on modelled/forecast traffic flows, speeds (km/h) and % Heavy Duty Vehicles (HDV) relative to that scenario, in the form of 18 Hour AAWT (Annual Average Weekday Traffic) flows, as supplied by the project Transport Consultant (AECOM).

3.11 The objective of the assessment, as set out in DMRB, is to gain an overall appreciation of the noise environment, both in the Do-Something and Do-Minimum scenarios in the Opening Year and Future Year,

in order to identify where noise impacts may occur and to determine where mitigation to reduce these impacts may be appropriate.

3.12 The following three comparisons are made within the DMRB assessment:

- Long-term: DMOY vs DMFY (non-project noise change i.e. change predicted irrespective of the Proposed Scheme);
- Short-term: DMOY vs DSOY (change due to the project); and
- Long-term: DMOY vs DSFY (change due to the project)

3.13 Different façades of the same property can experience different changes in road traffic noise level depending on their orientation to the noise source. DMRB requires that each of the above comparisons of traffic noise levels is based on the façade which experiences the least beneficial change; that being the largest increase, or, if all façades undergo a decrease, the smallest decrease.

3.14 DMRB provides two example classifications for the magnitude of traffic noise impacts of a proposed road scheme, as shown in Table 1. These relate to short-term and long-term changes in noise levels. The classifications detailed in Table 1 have been used in the assessment of the scheme.

Table 1: Magnitude Criteria for Traffic Noise Impacts

Short-term Change		Long-term Change	
Noise Level Change (rounded to 0.1dB) $L_{A10,18hr}$ dB	Magnitude of Impact	Noise Level Change (rounded to 0.1dB) $L_{A10,18hr}$ dB	Magnitude of Impact
<1.0	Negligible	<3.0	Negligible
1.0 – 2.9	Minor	3.0 – 4.9	Minor
3.0 – 4.9	Moderate	5.0 – 9.9	Moderate
≥5	Major	≥10.0	Major

Predicting Traffic Noise Levels - Noise Modelling

3.15 All road traffic noise levels have been calculated using a 3-D noise model of the Proposed Scheme and surrounding areas created in CadnaA© 2019 noise prediction software. This version of the report incorporates results from revised DS noise models based upon updated ground height information for the proposed scheme. The software predicts the $L_{A10,18hr}$ traffic noise level in accordance with CRTN. The noise predictions are based on 18-hour AAWT (Annual Average Weekday Traffic) traffic data provided by AECOM transport team.

3.16 CadnaA© models have been built for the DM and DS scenarios as described above. Noise levels have been calculated at over 8500 receiver points around approximately 1000 NSR building facades in each modelled scenario.

Study Area

3.17 The study area for this assessment of operational noise impacts at NSR is defined by a 600 m boundary around the Proposed Scheme corridor and the existing routes being bypassed or improved by the scheme (namely Higham Lane, Capitol Close and Whinby Road). Noise levels are predicted at all identified NSRs within the 600 m study area boundary. However, the geographic extent of the noise model is greater than the 600 m study area boundary to allow more accurate prediction of absolute road traffic noise levels from roads more distant from the scheme.

3.18 The 600 m study area boundary used in the noise model is shown on Figures 1 - 5.

Assessing Significance of Noise Effects

3.19 DMRB adopts a staged approach to defining the significance of noise effects at NSRs.

3.20 According to DMRB, an initial assessment of the short-term (DMOY vs DSOY) road traffic noise level change concludes that negligible and minor changes at NSRs should not give rise to likely significant effects.

3.21 However, moderate and major road traffic noise level changes in the short-term are likely to be significant and minor changes may result in either not significant or significant noise effects, depending upon consideration of other circumstances.

3.22 As part of the process for defining significance of effect, DMRB suggests the following road traffic noise LOAELs and SOAELs for all NSRs. These LOAELs and SOAELs are used to consider both the significance of effect with respect to environmental impact assessment, as well as how the Proposed Scheme complies with the three policy aims in the NPPF, within the context of Government policy on sustainable development.

Table 2. Operational Road Traffic Noise LOAELs and SOAELs for all NSRs

Time Period	LOAEL	SOAEL
Day (06:00 – 24:00)	55 dB $L_{A10,18hr}$ (façade)	68 dB $L_{A10,18hr}$ (façade)
Night (23:00 – 07:00)	40 dB $L_{night,\ outside}$ (free-field)	55 dB $L_{night,outside}$ (free-field)

3.23 NSRs with predicted minor, moderate and major noise level changes are subject to consideration of further local circumstances, which may influence the overall significance judgement. The predicted absolute noise levels relative to the LOAEL and SOAEL, and the change in noise level, are considered together with factors including:

- the predicted noise level change position within the noise level change band
- the location of the sensitive parts of the receptors
- the acoustic context of the environment
- the likely perception of change by the residents

3.24 Within this consideration, DMRB suggests that where DSOY traffic noise levels are high (above the SOAEL as defined above), even small changes in traffic noise in the short-term (1.0 dB $L_{A10,18hr}$ or more) result in likely significant effects.

3.25 Where necessary, the assessment sets out the mitigation measures that have been incorporated into the Proposed Scheme to meet the three policy aims of the NPPF, and also any measures which were not considered reasonable or practical to include.

Vibration

3.26 Vibration from traffic can be transmitted through the air or through the ground. Airborne vibration is produced by the engines and exhausts of road vehicles, with dominant frequencies typically in the range of 50 - 100 hertz (Hz). Ground borne vibration is produced by the interaction of the vehicle tyres and the road surface with dominant frequencies typically in the range of 8 - 20 Hz. The passage of vehicles over irregularities in the road surface can also be a source of ground borne vibration.

3.27 Former DMRB document HD213/11 Rev 1 (Ref. 13) reports that extensive research on a wide range of buildings found no evidence of traffic induced ground borne vibration being a source of significant damage to buildings and no evidence that exposure to airborne vibration has caused even minor damage. It was also stated that perceptible vibration only occurs in rare cases and identifies that the normal use of a building, such as closing doors and operating domestic appliances, can generate similar levels of vibration to that from traffic in most circumstances. Paragraph A5.26 of DMRB HD213/11 Rev 1 went on to state, in relation to ground borne vibration that “Such vibrations are unlikely to be important when considering disturbance from new roads and an assessment will only be necessary in exceptional circumstances”.

3.28 Building upon this former guidance, the current version of DMRB (LA111) scopes out the assessment of vibration on the basis that a “maintained road surface will be free from irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects”.

3.29 On this basis, no further consideration is given to operational vibration within this report.

Assessment Assumptions and Limitations

3.30 Assumptions and limitations associated with the operational noise assessment are set out below:

- For existing low noise (thin) surfacing in the Opening Year, a correction factor of -2.5 dB for speeds ≥75 kph has been used as a conservative approach on the assumption that it is part worn. In the Future Year, a correction factor of -3.5 dB for speeds ≥75 kph has been used. Only the M1 is modelled with speeds ≥75 kph, therefore the Opening Year assumption will lead to a conservative assessment of noise level change at NSRs in the vicinity of the scheme. For the Future Year assessment a correction of -3.5 dB for thin surfacing is considered more appropriate, based upon improvements in surfacing technology over time.
- For standard impervious bitumen (e.g. hot rolled asphalt) the corresponding correction at speeds ≥75 kph is -0.5 dB in both assessment years, based upon an assumed 1.5 mm texture depth.
- At speeds <75 kph the correction is -1 dB for all surfaces in both assessment years.
- Buildings classifications have been identified by cross-referencing OS MasterMap building footprints with Ordnance Survey AddressBase data. NSRs have been defined as residential dwellings, hotels, health, education and other community facility buildings.
- Building heights and number of floors within each building have been defined based upon a review of available on-line mapping and Ordnance Survey building height data.
- Noise levels have been calculated at the highest identified floor of each residential and non-residential NSR modelled within the 600 m study area boundary.

3.31 The accuracy of the CadnaA noise model has been assessed in part by comparing the predicted $L_{A10,18hr}$ levels with the measured sound level collected at the monitoring location. This is discussed further in Section 5.

4. Mitigation Measures

4.1 As set out in the previous section, in the absence of detailed construction plant, construction traffic routes and programme it has not been possible to undertake a detailed quantitative assessment of construction noise and vibration effects. These details, including measures to minimise construction noise and vibration, would be determined by the appointed contractor at the construction stage.

4.2 'Best Practicable Means' (as defined under the Control of Pollution Act 1974 and the Environmental Protection Act 1990) are expected to be applied by the contractor, in order that noise and vibration levels resulting from the construction of the scheme are minimised as far as reasonably practicable. Examples of 'Best Practicable Means' include:

- Monitoring of existing ambient noise levels prior to works commencing;
- Review of construction programme and methodology to consider low noise/low vibration methods (including non-vibratory compaction plant and low vibration piling methods, where required);
- Optimal location of equipment on site to minimise noise disturbance;
- Provision of acoustic enclosures around static plant, where necessary;
- Use of less intrusive alarms, such as broadband vehicle reversing warnings;
- Local screening of equipment and employment of perimeter hoarding;
- Agreeing of Section 61 'Prior Consent' with Local Authority prior to works commencing, if required;
- Communicating details of any noisy works or those likely to cause vibration to neighbours prior to works commencing; and
- Monitoring of noise/vibration levels during the construction works, where necessary.

4.3 With regard to the operation of the scheme, the road realignment adjacent to residential NSRs on Higham Lane moves traffic further from the properties, which helps to reduce potential noise increases due to increases in traffic with the scheme in place, or potential improve existing road traffic noise levels.

5. Baseline Conditions

5.1 The existing noise climate in the vicinity of the Proposed Scheme is dominated by road traffic from the existing Higham Lane and the M1. No noise sources other than road traffic noise were considered to be significant in the vicinity of NSRs on Higham Lane during a visit to the scheme location on Wednesday 20 November 2019.

5.2 The area surrounding the Proposed Scheme comprises a mixture of sensitive and non-sensitive receptors. Approximately 160 m to the north of the Proposed Scheme, beyond the M1, is the village of Higham comprising residential and other NSRs including Higham Methodist Church. Immediately east of the southern section of Proposed Scheme is Capitol Park business park, and approximately 140 m south of the Proposed Scheme is a residential area surrounding Barnsley Road including other NSRs such as the Holiday Inn hotel. West of the Proposed Scheme is predominantly agricultural fields with a wooded area, beyond which is located the Dodworth Business Park approximately 500 m to the west.

5.3 In addition to the areas of NSRs described above, the closest identified NSRs to the Proposed Scheme comprise two residential properties (Higham Manor and Lane Side Farm), situated to the east of Higham Lane towards the northern end of the Proposed Scheme. A third residential property currently located on Higham Lane (Lane Head Farm Bungalow) is to be demolished as part of the construction of the Proposed Scheme roundabout.

Noise Monitoring

5.4 Existing noise levels have been measured in proximity to the two NSRs (Higham Manor and Lane Side Farm) on Higham Lane.

5.5 The measurement protocol was discussed with BMBC in advance of the survey. The specific measurement location was identified on-site by AECOM during the surveys to take account of local conditions.

5.6 Attended measurements were undertaken over three consecutive 1-hour periods between 13:00 and 16:00 on Wednesday 20 November 2019. Data from two of the 1-hour periods required to be excluded to remove the contribution of noise from off-road vehicles manoeuvring within close proximity of the measurement location. A minimum of 40-minutes of noise level data were collected in each of these two 1-hour periods. Nevertheless, the noise level measured during the three consecutive hours was very consistent and, based upon the traffic flows on Higham Lane, this duration is adequate to define road traffic noise levels in accordance with CRTN.

5.7 The monitoring location and descriptions of the dominant or secondary observed noise sources are included within Table 3 below. Photographs and a map showing the monitoring location are included in Appendix A and in Figure 1.

Table 3: Monitoring Locations

Location	Details	Dominant Noise Sources	Secondary Noise Sources
ML1	Near ‘Higham Manor’ and ‘Lane Side Farm’ (NSRs on Higham Lane)	Road traffic on Higham Lane and the M1	N/A

Noise Survey Instrumentation

5.8 Information relating to the noise survey instrumentation used can be found in Appendix B.

Meteorological Conditions

5.9 Throughout the survey period, meteorological conditions were dry, and mostly still (within acceptable limits for noise measurement). The road surface appeared slightly damp from the previous day’s rain although there was no standing water or observation of increased noise that might be associated with tyre rolling noise on wet road surfaces, and therefore the measured levels are not considered to have been significantly influenced.

Monitoring Results

5.10 Further details of the noise monitoring results, including the noise levels derived for each of the three consecutive 1-hour periods, are provided in Appendix B.

5.11 Table 4 presents the calculated $L_{A10,18hr}$ value derived from the measurements in accordance with the CRTN shortened measurement procedure.

Table 4: $L_{A10,18hr}$ and L_{night} values for ML1.

Date	Measurement Location	$L_{A10,18hr}$ (dB)* (06:00 – 00:00)
Wednesday 20 November 2019	ML1	69.8

*Value derived using $L_{10,3hr}$ to $L_{10,18hr}$ correction stated within CRTN

5.12 Whilst the DMRB assessment is based upon prediction, the $L_{A10\ 18hr}$ level derived from the measurement has been compared against a predicted level from the noise model at the measurement location. The comparison is presented in Table 5 below.

Table 5: Comparison between modelled and measured $L_{A10,18hr}$ (dB) levels at monitoring locations

Monitoring location	Modelled $L_{A10,18hr}$ (dB) (06:00 – 00:00)	Measured $L_{A10,18hr}$ (dB) (06:00 – 00:00)
ML1	68.1	69.8

5.13 The $L_{A10,18hr}$ levels derived from the measurements at ML1 correlate well with the noise model predictions, being within 1.7 dB of the predicted level from the noise model.

5.14 In addition to calculating existing road traffic noise levels at the monitoring location, $L_{A10,18hr}$ and $L_{night,outside}$ levels have also been predicted at all sensitive receptors within the 600 m study area boundary without the scheme, to represent future baseline conditions in both the DMOY and DMFY scenarios.

5.15 The results are summarised in Table 6. These levels have been used to provide an understanding of how the noise environment may change over time without the Proposed Scheme in place and is one of the three noise level comparisons suggested in DMRB.

Table 6: Long-term Change in Non-Project Noise Impacts (DMOY to DMFY)

Change in noise level		Daytime		Night-time	
		Number of Residential Buildings	Number of Other Sensitive Receptors	Number of Residential Buildings	Number of Other Sensitive Receptors
Increase in noise level dB $L_{A10,18hr}$ / $L_{night, outside}$	<3.0	478	4	225	3
	3.0 - 4.9	0	0	0	0
	5.0 - 9.9	0	0	0	0
	≥ 10	0	0	0	0
No change	0	70	0	66	0
Decrease in noise level dB $L_{A10,18hr}$ / $L_{night, outside}$	>3.0	455	0	712	1
	3.0 - 4.9	0	0	0	0
	5.0 - 9.9	0	0	0	0
	≥ 10	0	0	0	0

5.16 Approximately 1000 NSR buildings have been identified and modelled within the 600 m study area boundary. Of these, all are identified as residential with the exception of four NSRs of Saint John the Baptist Church, Higham Methodist Church, Aspire in the Community (Medical Facility) and NAS Earlybird Centre (Medical Facility – although understood to be permanently closed), all located to the south east of the Proposed Scheme around Barnsley Road.

5.17 The noise changes from the DMOY to DMFY are presented as a noise difference plot in Figure 2. The map is based on free-field noise levels at first floor level, 4m above ground. It should be noted that the noise difference plots are based on a 10 m x 10 m grid and are provided for illustration purposes only.

5.18 In this long-term comparison, without the Proposed Scheme in place, 478 and 225 residential NSRs are predicted to experience a negligible increase in noise during the day and night-time periods respectively. A negligible decrease is predicted at 455 and 712 residential NSRs during the daytime and night-time respectively. 70 and 66 of the residential properties are predicted to experience no change in daytime and night-time noise level respectively in the long-term without the scheme being implemented.

6. Assessment of Effects

Operation

Short-term Assessment

6.1 The short-term change in predicted daytime road traffic noise levels between the DMOY and DSOY scenarios, at both residential and non-residential NSRs, are summarised in Table 7.

Table 7: Short-term Change in Daytime and Night-time Noise Impacts (DMOY to DSOY)

Change in noise level		Daytime		Night-time	
		Number of Residential Buildings	Number of Other Sensitive Receptors	Number of Residential Buildings	Number of Other Sensitive Receptors
Increase in noise level dB $L_{A10,18hr}$ / $L_{night, outside}$	<1.0	490	4	440	4
	1.0 - 2.9	35	0	20	0
	3.0 - 4.9	0	0	0	0
	≥ 5	0	0	0	0
No change	0	400	0	486	0
Decrease in noise level dB $L_{A10,18hr}$ / $L_{night, outside}$	<1.0	77	0	57	0
	1.0 - 2.9	1	0	0	0
	3.0 - 4.9	0	0	0	0
	≥ 5	0	0	0	0

6.2 The noise changes due to the Proposed Scheme in the short-term (DMOY to DSOY) and long-term (DMOY to DSFY) are presented as noise difference contour plots in Figures 3 and 4 respectively. These maps are based on free-field traffic noise levels at first floor level. These plots are based on a 10 m x 10 m grid and are provided for illustration purposes only.

6.3 In the short-term, 525 residential NSRs are expected to experience an increase in daytime noise levels due to the Proposed Scheme. Of these, 35 of these are expected to experience a minor increase in noise level resulting in an **initial assessment of effects** of **not significant** in accordance with DMRB. The remaining 490 are expected to experience a negligible increase in noise level, resulting in a **not significant effect** in accordance with DMRB.

6.4 Similar results are predicted for the night-time assessment, with 460 residential buildings expected to experience an increase in night-time noise levels due to the Proposed Scheme. Of these, 20 are expected to experience a minor increase in noise level resulting in an **initial assessment of effects** of **not significant**. The remaining 440 are predicted to experience a negligible impact, resulting in **not significant effects**.

6.5 All non-residential sensitive receptors identified within the 600 m study area boundary are expected to experience a negligible adverse increase in noise in the short-term during the both daytime and night-time due to the Proposed Scheme. This would result in **effects** that are **not significant**.

6.6 The remainder of the approximate 1000 NSRs within the 600 m study area boundary are predicted to experience no change in noise levels or negligible to minor reductions in noise, and therefore experience **effects** that are **not significant**.

Long-term Assessment

6.7 The long-term change in predicted daytime and night-time road traffic noise levels from DMOY to DSFY, at both residential and non-residential NSRs, are summarised in Table 8.

Table 8: Long-term Change in Daytime and Night-time Noise Impacts (DMOY to DSFY)

Change in noise level		Daytime		Night-time	
		Number of Residential Buildings	Number of Other Sensitive Receptors	Number of Residential Buildings	Number of Other Sensitive Receptors
Increase in noise level dB $L_{A10,18hr}$ / $L_{night, outside}$	<3.0	441	4	296	4
	3.0 - 4.9	0	0	0	0
	5.0 - 9.9	0	0	0	0
	≥ 10	0	0	0	0
No change	0	90	0	27	0
Decrease in noise level dB $L_{A10,18hr}$ / $L_{night, outside}$	>3.0	472	0	680	0
	3.0 - 4.9	0	0	0	0
	5.0 - 9.9	0	0	0	0
	≥ 10	0	0	0	0

6.8 In the long-term, 441 and 296 residential buildings are expected to experience a negligible increase in traffic noise level, during both the day and night respectively, resulting in an **effect** that is **not significant**. Maximum increases predicted are 2.0 dB $L_{A10,18hr}$ during the day and 1.7 dB $L_{night,outside}$.

6.9 Similar to the short-term assessment, the majority of these properties are located on Barnsley Road, as well as Welfare View, Mitchelson Avenue, Higham Common Road, Higham Lane, The Gate, Castle View, and Hawthorne Crescent.

6.10 All non-residential NSRs within the 600 m study area boundary are expected to experience a negligible increase in noise in the long-term with the Proposed Scheme in place, resulting in an **effect** that is **not significant**.

6.11 The remainder of the approximate 1000 NSRs within the 600 m study area boundary are predicted to experience no change in noise levels or negligible reductions in noise, and therefore experience effects that are **not significant**.

Determination of Overall Significance of Effects at NSRs

6.12 DMRB requires the overall operational significance of effects on NSRs is determined taking into consideration the magnitude of the noise level change, together with local circumstances including comparing the predicted DSOY absolute noise level with the SOAEL.

6.13 The final significance of effect judgements (with respect to environmental assessment) are summarised below:

- Predicted noise level changes at the vast majority of NSRs assessed fall into the no change or negligible increase/decrease magnitude categories resulting in **effects** that are **not significant**.
- Predicted noise level changes at Higham Manor and Lane Side Farm fall into the negligible decrease band in the short-term and long-term, during both the day and night, resulting in an **effect** that is **not significant**.

- Of the 35 properties (predominantly on Barnsley Road) predicted to experience a minor increase during the daytime in the short-term, the DSOY absolute noise levels at nine properties are below the SOAEL. There are no other local circumstances considered as part of the DMRB assessment that would change the initial assessment outcome, at these nine properties, from an **effect** that is **not significant**.
- For the remaining 26 of the 35 properties predicted to experience a minor increase in noise levels during the daytime in the short-term, the predicted DSOY noise levels are above the SOAEL and there is at least a 1.0 dB increase in the short-term (up to 1.5 dB increase during the day and up to 1.3 dB increase at night). The location of these 26 properties is shown in Figure 3. Whilst these increases are at the lower end of the 1.0 – 2.9 dB magnitude of change band, given that noise levels are above the SOAEL, in accordance with DMRB, this results in a likely **significant adverse effect**.
- Of the 20 NSRs on Barnsley Road predicted to experience a minor increase in noise levels during the night-time in the short-term, the predicted DSOY absolute noise level at two NSRs are below the SOAEL. There are no other local circumstances considered as part of the DMRB assessment that would change the initial assessment outcome, at these two NSRs, from an **effect** that is **not significant**.
- For the remaining 18 of the 20 NSRs predicted to experience a minor increase in noise levels during the night-time in the short-term, the predicted DSOY noise levels are above the SOAEL and there is at least a 1.0 dB increase in the short-term. In accordance with DMRB this results in a likely **significant adverse effect**.

6.14 However, the context is that the NSRs identified with likely adverse significant effects due to DSOY noise levels being above the SOAEL, together with at least a 1.0 dB increase in the short-term, are located in the vicinity of Barnsley Road to the southwest of the scheme and outside the Proposed Scheme design boundary. This same area of NSRs is predicted to experience an increase in traffic in the long-term irrespective of the scheme. Furthermore, given the location of the NSRs, it is not possible to implement noise mitigation within the scheme design boundary which would reduce noise levels at these more distance locations.

Compliance with National Noise Policy

6.15 DMRB also requires assessments to report in relation to compliance with relevant sections of the NPSE, NPPF and the Government's associated planning guidance on noise; in particular with respect to the three aims to "avoid" and "mitigate/minimise" significant adverse effects, and "improve where possible" health and quality of life, in the context of Sustainable Development.

6.16 When identifying sustainable mitigation measures, factors including the cost versus the benefit, engineering practicality and any other impacts (such as landscape/visual) should be considered.

6.17 With regards to the first and second aims to "avoid" and "mitigate/minimise" significant adverse effects, the NSRs predicted to experience DSOY noise levels above the SOAEL and have at least a 1.0 dB change in noise levels are located on Barnsley Road, outside the Proposed Scheme design. All of the remaining residential NSRs above the SOAEL following the opening of the Proposed Scheme are located in close proximity to main roads. Such routes are already above the SOAEL without the Proposed Scheme and experience only a negligible change in traffic noise levels with the Proposed Scheme in place. The introduction of mitigation measures along existing roads which already experience high noise levels, to mitigate the negligible effect of the scheme, is not sustainable or practical within the scope of the Proposed Scheme. For roads located at major road junctions or roundabouts, mitigation measures such as barriers are not a practical engineering option and would have other adverse impacts including visual and access difficulties.

6.18 With regard to the third aim to 'improve where possible', the only two NSRs close to the Proposed Scheme, namely Lane Side Farm and Higham Manor, are already expected to experience a reduction in noise levels both in the short-term and long-term assessment years and therefore no further mitigation is considered necessary.

Cumulative Effects Assessment including Barnsley West Development

6.19 As described in section 3, an additional future year scenario (DSFY+) has also been modelled and the DMRB assessment undertaken to show the potential changes in noise levels at the NSRs within the 600 m study area boundary. The DSFY+ scenario predicts the cumulative effects of the proposed Barnsley

West scheme, which includes introduction of a new roundabout, a link road and on-site residential and commercial development. The development will generate additional traffic on the local road network, including along the proposed Higham Lane scheme roads.

6.20 The long-term changes in predicted daytime and night-time road traffic noise levels between the DMOY and DSFY+ at both residential and non-residential NSRs within the 600 m study area boundary are summarised in Table 9.

Table 9: Long-term Change in Daytime and Night-time Noise Impacts (DMOY to DSFY+)

Change in noise level		Daytime		Night-time	
		Number of Residential Buildings	Number of Other Sensitive Receptors	Number of Residential Buildings	Number of Other Sensitive Receptors
Increase in noise level dB $L_{A10,18hr}$ / $L_{night, outside}$	<3.0	563	4	282	3
	3.0 - 4.9	2	0	1	0
	5.0 - 9.9	1	0	0	0
	≥ 10	0	0	0	0
No change	0	72	0	60	0
Decrease in noise level dB $L_{A10,18hr}$ / $L_{night, outside}$	>3.0	365	0	660	1
	3.0 - 4.9	0	0	0	0
	5.0 - 9.9	0	0	0	0
	≥ 10	0	0	0	0

6.21 The noise changes due to the cumulative effects of the Barnsley West development in the long-term (DMOY to DSFY+) are presented in a noise difference contour plot in Figure 5. The map is based on free-field traffic noise levels at first floor level. The plot is based on a 10 m x 10 m grid and are provided for illustration purposes only.

6.22 In the DSFY+ scenario, the vast majority of NSRs with the 600 m study area boundary are predicted to experience either a negligible increase, no change or reductions in traffic noise level, during both the day and night, resulting in **effects** that are **not significant**.

6.23 The facades of three properties north of the M1 (27 and 29 Hermit Lane and 417 Higham Common Road) facing towards the proposed new link road through the Barnsley West site are predicted to experience greater impacts in the minor and moderate adverse magnitude categories. These will be considered within the Planning Applications for the Barnsley West development.

6.24 The two closest properties to the proposed Higham Lane Improvement scheme, Higham Manor and Lane Side Farm, both fall into the negligible increase band, and the predicted absolute noise levels are below the day and night-time SOAEL in the DSFY+ scenario. Therefore, the overall outcome of the DMRB assessment for the proposed Higham Lane scheme in the long-term DSFY scenario of a **not significant effects** is unchanged by the cumulative effects assessment in the DSFY+ scenario.

7. Summary and Conclusions

7.1 A road traffic noise assessment has been undertaken for the proposed highway improvements along Higham Lane, Capitol Close and the A628 Whinby Road off Junction 37 of the M1, Dodworth, Barnsley, in South Yorkshire. The assessment has been prepared with reference to the latest Design Manual for Roads and Bridges (DMRB) LA111 methodology. This version of the report presents minor revisions to the assessment findings taking into account updated traffic flow data for Hermit Lane to the north of the Proposed Scheme.

7.2 The overall significance of effect judgements (with respect to environmental assessment) related to this Proposed Scheme, which remain materially unchanged from the Draft v2 report, are summarised below:

- All predicted noise level changes at NSRs that fall into no change or negligible increase or decrease magnitude categories are classified as **not significant effects**. The vast majority of NSRs assessed fall within these categories.
- Predicted noise level changes at Higham Manor and Lane Side Farm, the two residential NSRs closest to the Proposed Scheme on Higham Lane, fall into the negligible decrease band in the short-term and long-term, during both the day and night, resulting in an **effect** that is **not significant**.
- 35 NSRs predominantly on Barnsley Road are predicted to experience a minor increase in noise levels during the daytime in the short-term. In the DSOY, absolute noise levels at nine NSRs are below the SOAEL. There are no other local circumstances considered as part of the DMRB assessment that would change the initial assessment outcome, at these nine NSRs, from an **effect** that is **not significant**.
- However, for the remaining 26 of the 35 NSRs predicted to experience a minor increase in noise levels during the daytime in the short-term, the predicted DSOY noise levels are above the SOAEL and there is at least a 1.0 dB increase in the short-term (up to 1.5 dB increase during the day and up to 1.3 dB increase at night). Whilst these increases are at the lower end of the 1.0 – 2.9 dB magnitude of change band, given that noise levels are above the SOAEL, in accordance with DMRB, this results in a likely **significant adverse effect**.
- 20 NSRs on Barnsley Road are predicted to experience a minor increase in noise levels during the night-time in the short-term. The predicted DSOY absolute noise levels at two NSRs are below the SOAEL. There are no other local circumstances considered as part of the DMRB assessment that would change the initial assessment outcome, at these two NSRs, from an **effect** that is **not significant**.
- However, for the remaining 18 of the 20 NSRs predicted to experience a minor increase in noise levels during the night-time in the short-term, the predicted DSOY noise levels are above the SOAEL and there is at least 1.0 dB increase in the short-term. In accordance with DMRB this results in a likely **significant adverse effect**.

7.3 The NSRs identified with likely significant adverse effects around Barnsley Road are located in the south western part of the 600 m study area. However, the context is that these NSRs are located outside the Proposed Scheme design boundary and the same area of NSRs is predicted to experience an increase in traffic in the long-term irrespective of the scheme. Given the location of these NSRs it is not possible to implement noise mitigation within the scheme design boundary which would reduce noise levels at these more distance NSR locations.

7.4 An additional ‘cumulative’ effects assessment has been undertaken to consider the potential effects of noise level change at NSRs within the 600 m study area following opening of the Barnsley West development in the future assessment year. Again, **effects** are predicted to be **not significant** at the majority of NSRs assessed (including Higham Manor and Lane Side Farm on Higham Lane). However, minor/moderate increases in traffic noise levels are predicted at three NSRs north of the M1 close to the new roundabout and link road at the Barnsley West development. Minor increases in traffic noise levels may be classified as significant adverse effects, depending upon other circumstances. Moderate increases are classified as **significant adverse effects**. Nevertheless, given the location of the NSRs, consideration will be given to mitigation requirements within the Planning Applications for the Barnsley West development.

8. References

Ref. 1 Highways Agency (2019) Design Manual for Road and Bridges Volume 11 Section 3 Part 7 LA 111 (Revision 0) Noise and Vibration

Ref. 2 Department for Communities and Local Government (2019) National Planning Policy Framework

Ref. 3 Department for Environment, Food & Rural Affairs (2010) Noise Policy Statement for England (NPSE)

Ref. 4 Department for Communities and Local Government (DCLG) (2019) Planning Practice Guidance

Ref. 5 The Environmental Noise (England) Regulations (2006) Statutory Instrument No. 2238 (as amended 2008, 2009, 2010)

Ref. 6 The European Parliament and Council of the European Union (2002) Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise – Declaration by the Commission in the Conciliation Committee on the Directive relating to the assessment and management of environmental noise

Ref. 7 HM Government (1973) Land Compensation Act 1973

Ref. 8 The Noise Insulation Regulations (1975), Statutory Instrument No. 1763 (as amended 1988)

Ref. 9 Her Majesty's Stationery Office (1974) Control of Pollution Act 1974

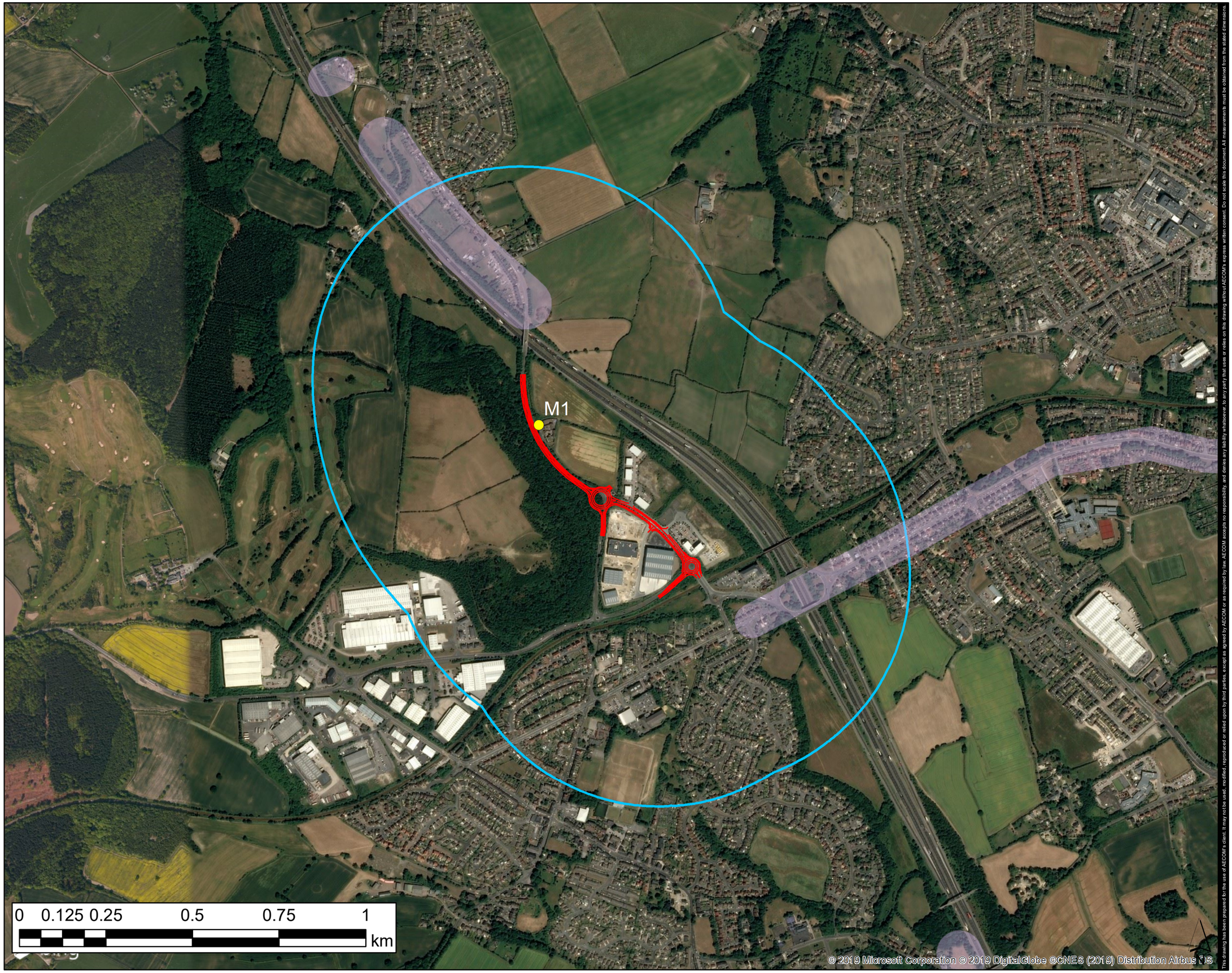
Ref. 10 Barnsley MBC (2011), Core Strategy

Ref. 11 British Standards Institute (2014) BS 5228-1:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. Part 1: Noise

Ref. 12 Department of Transport/Welsh Office (1998) Calculation of Road Traffic Noise (CRTN)

Ref. 13 Highways Agency (2011) Design Manual for Road and Bridges Volume 11 Section 3 Part 7 HD 213/11 (Revision 1) Noise and Vibration

9. Figures



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Project Title:

M1 J37 PHASE 2
HIGHAM LANE

Client:

BARNSLEY
METROPOLITAN
BOROUGH COUNCIL

LEGEND

- Noise Important Areas
- Monitoring Location
- 600m Study Area
- Scheme Outline

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Drawing Title:

Noise Important Areas and
Monitoring Locations
Baseline Noise Survey

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FIGURE 1	001

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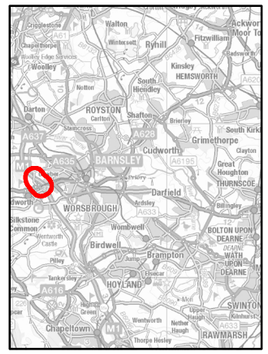
M1 J37 PHASE 2
HIGHAM LANE

Client:

BARNSLEY
METROPOLITAN
BOROUGH COUNCIL

LEGEND

- 600m Study Area Boundary
- <=-10.0 Major decrease
- -5.0 to -9.9 Moderate decrease
- -3.0 to -4.9 Minor decrease
- <-0.1 to -2.9 Negligible decrease
- No Change
- 0.1 to +2.9 Negligible increase
- +3.0 to +4.9 Minor increase
- +5.0 to +9.9 Moderate increase
- >=10 Major increase



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Drawing Title:

Long-term Change in Traffic Noise Levels (dB $L_{A10,18hr}$) (DM2021 to DM2036)

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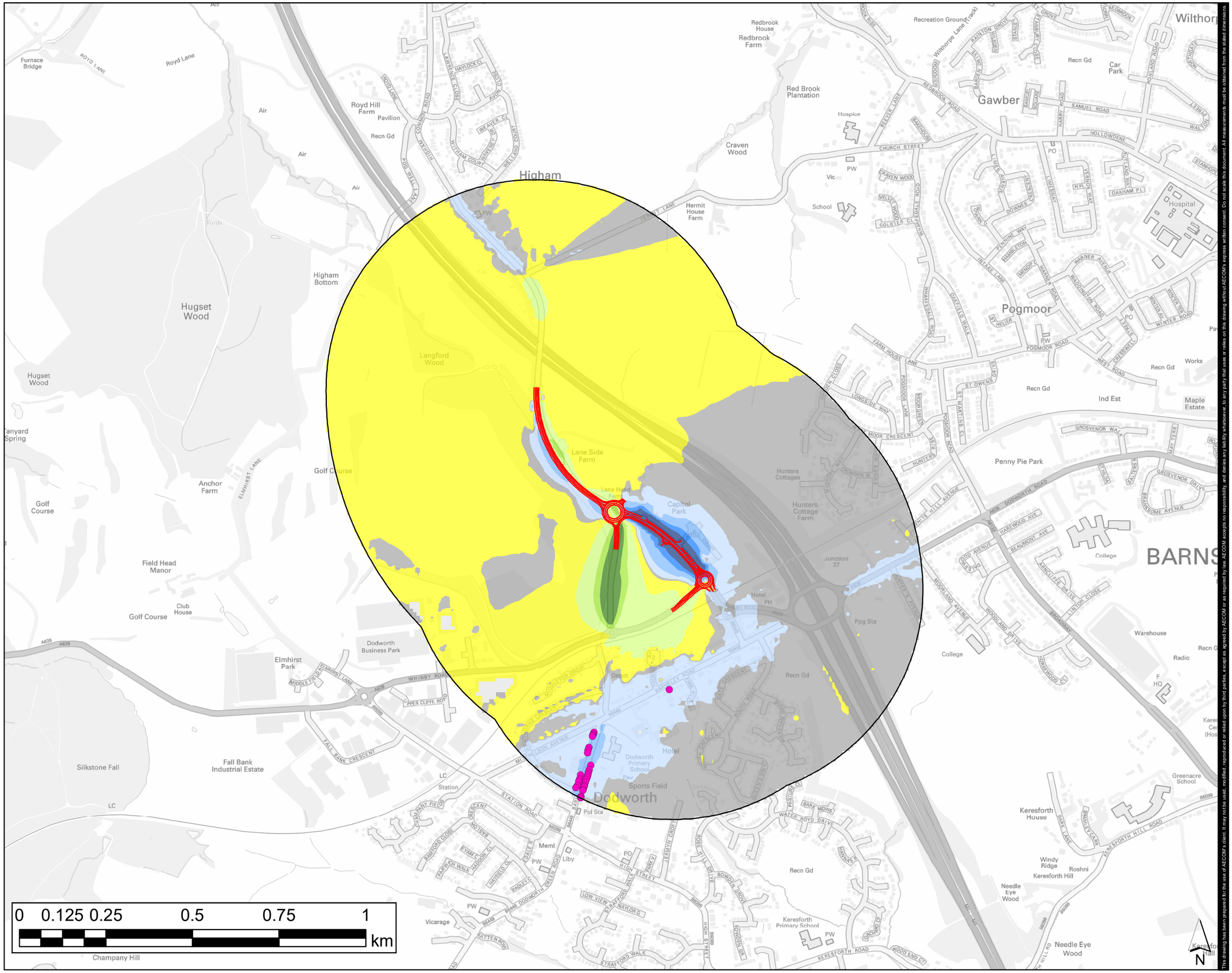
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FIGURE 2			002
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LB	JE	JE	20/05/20

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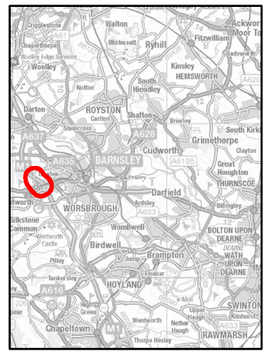
M1 J37 PHASE 2
HIGHAM LANE

Client:

BARNSLEY METROPOLITAN BOROUGH COUNCIL

LEGEND

- 600m Study Area Boundary
- Scheme Outline
- Properties predicted with 1.0dB increase and absolute noise levels >=68.0dB
- <=-5.0 Major decrease
- -3.0 to -4.9 Moderate decrease
- -1.0 to -2.9 Minor decrease
- <-0.1 to -0.9 Negligible decrease
- No Change
- 0.1 to +0.9 Negligible increase
- +1.0 to +2.9 Minor increase
- +3.0 to +4.9 Moderate increase
- >=5 Major increase



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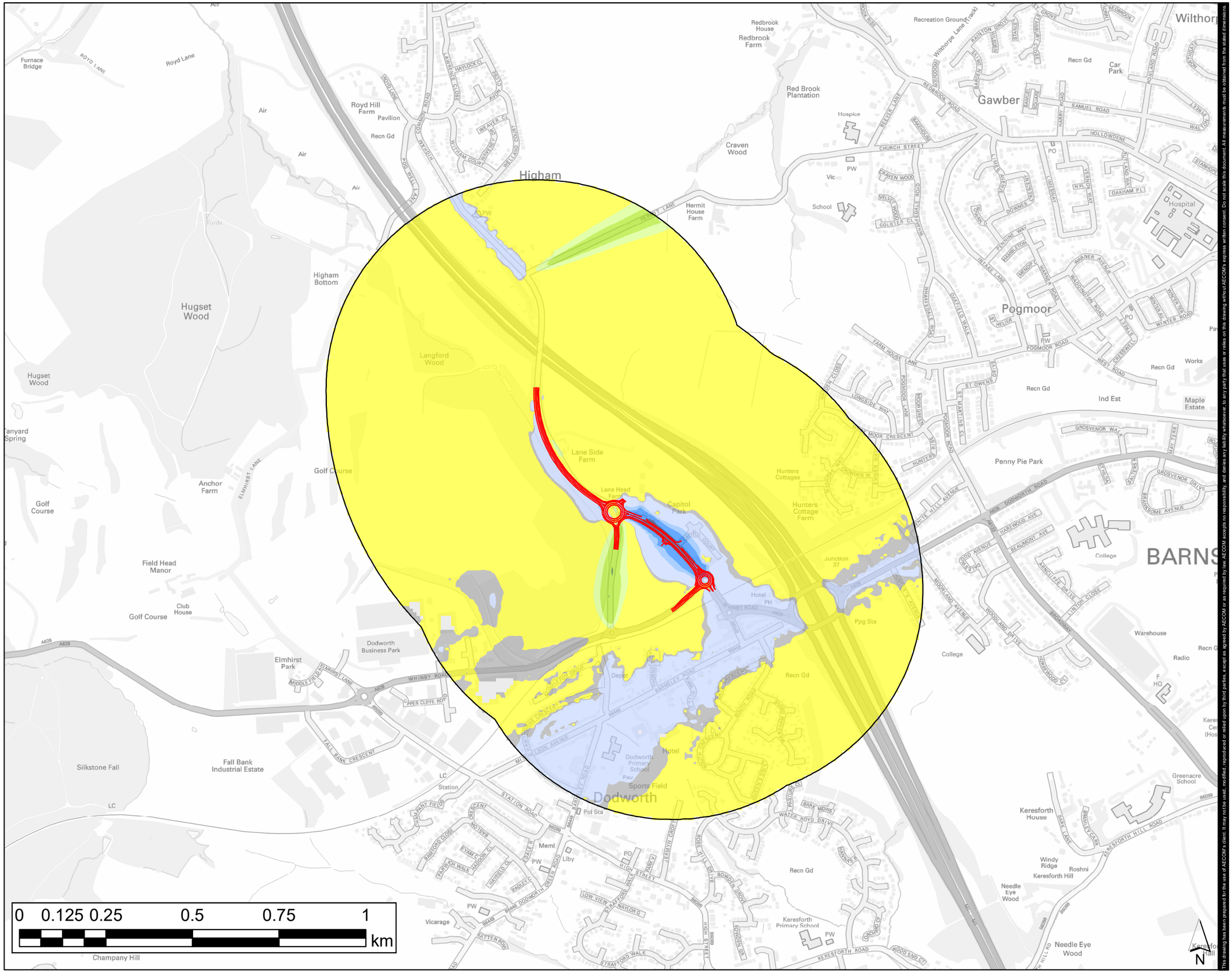
Short-term Change in Traffic Noise Levels (dB $L_{A10,18hr}$) (DM2021 to DS2021)

Scale at A3: 1:10,000

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FIGURE 3			002
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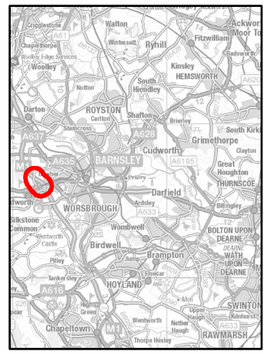
M1 J37 PHASE 2
HIGHAM LANE

Client:

BARNSLEY METROPOLITAN BOROUGH COUNCIL

LEGEND

- 600m Study Area Boundary
- Scheme Outline
- <=-10.0 Major decrease
- -5.0 to -9.9 Moderate decrease
- -3.0 to -4.9 Minor decrease
- <-0.1 to -2.9 Negligible decrease
- No Change
- 0.1 to +2.9 Negligible increase
- +3.0 to +4.9 Minor increase
- +5.0 to +9.9 Moderate increase
- >=10 Major increase



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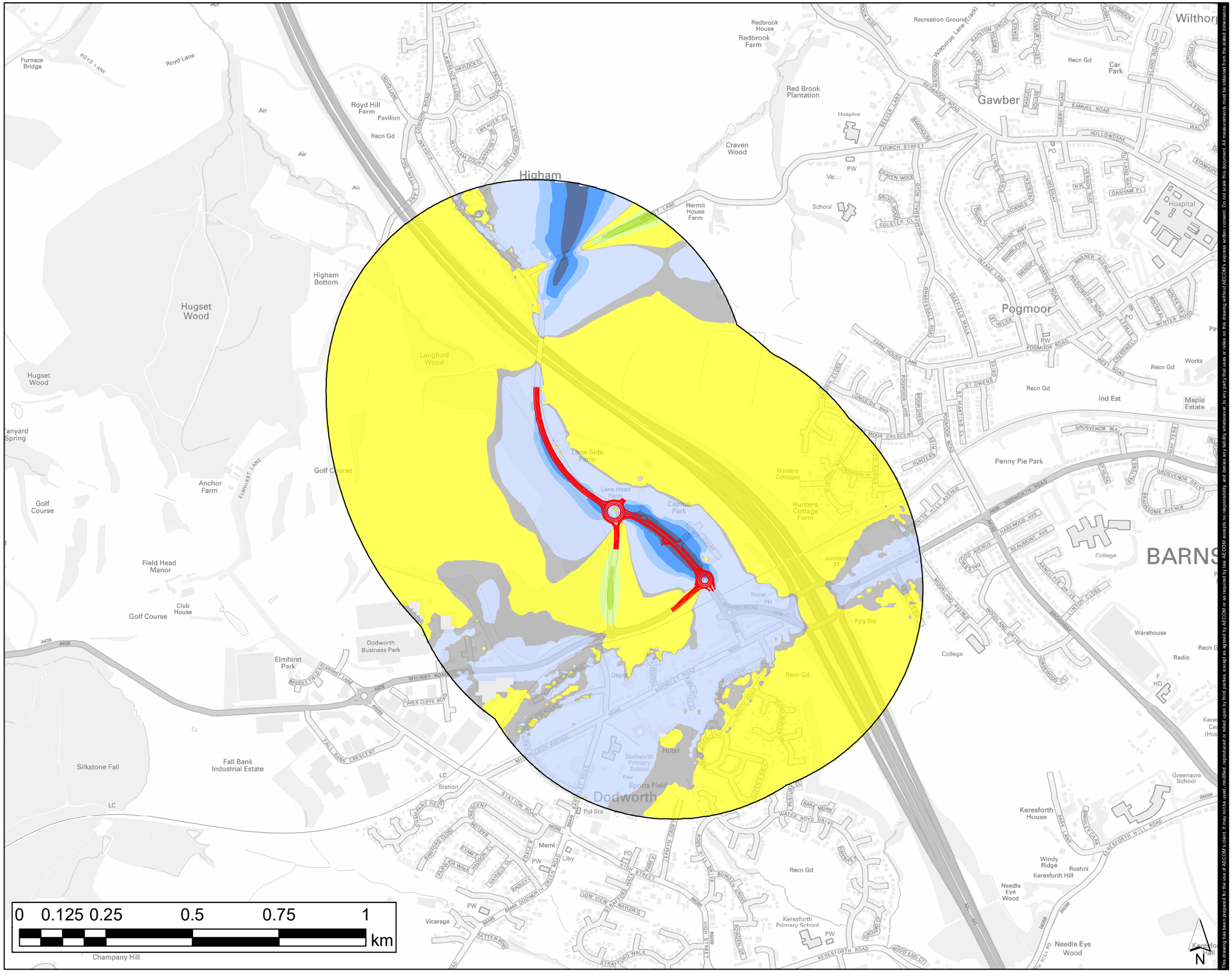
Long-term Change in Traffic Noise Levels (dB $L_{A10,18hr}$) (DM2021 to DS2036)

Scale at A3: 1:10,000

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FIGURE 4			002
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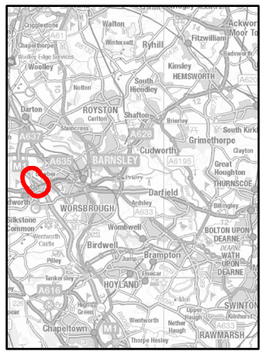
M1 J37 PHASE 2
HIGHAM LANE

Client:

BARNSLEY METROPOLITAN BOROUGH COUNCIL

LEGEND

- 600m Study Area Boundary
- Scheme Outline
- <=-10.0 Major decrease
- -5.0 to -9.9 Moderate decrease
- -3.0 to -4.9 Minor decrease
- <-0.1 to -2.9 Negligible decrease
- No Change
- 0.1 to +2.9 Negligible increase
- +3.0 to +4.9 Minor increase
- +5.0 to +9.9 Moderate increase
- >=10 Major increase



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Ordnance Survey
0100031673.

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60618572

Drawing Title:

Long-term Change in Traffic Noise Levels (dB $L_{A10,18hr}$) (DM2021 to DS2036+)

Scale at A3: 1:10,000

Drawing No: 1	Rev:
FIGURE 5	002

Drawn:	Chk'd:	App'd:	Date:
LB	JE	JE	20/05/20

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Filename: Y:\Newproje\ACOUSTICS\Barnsley Higham Ln_Capitol Cl\Maps Drawings and Information\Comparison_Scenario_Figures\Figure 5 DMBY v DSFY+_Barnsley_HighamLane .mxd

Appendix A – Measurement Survey Photographs

ML1 – Higham Lane







Figure 1: Imagery ©2019 Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map data ©2019.

Appendix B - Measurement Survey

Noise Survey Instrumentation

Information relating to the noise survey instrumentation is presented in Table B1.

Table B1 Noise Survey Instrumentation

Instrument	*Manufacture*	*Model*	*Serial Number*
Acoustic Field Calibrator	B&K	Type 4231	2217877
Class 1 Sound Level Meter ML1	Rion	NL-52	00386762

Calibration of the sound level meters before and after the surveys exhibited no significant drift (no more than +/- 0.2 dB).

Results

Table B.2 presents the 3 x 1-hour consecutive interval data over the measurement period.

Table B.2: Attended Noise Monitoring Results at ML1

Date	Start Time	$L_{Aeq,1hr}$ dB	$L_{Amax,T}$ dB	$L_{A10,1hr}$ dB	$L_{A90,1hr}$ dB
20 November 2019	13:00	65.7	82.8	**70.3**	54.4
	14:00	66.0	80.4	**70.8**	54.9
	15:00	66.9	82.5	**71.3**	56.5