Our ref: NIA/8648/19/8773/v2 Barnsley West Roundabouts

18th December 2019

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Dear Sir

NOISE IMPACT ASSESSMENT FOR PROPOSED NEW ROUNDABOUTS BARUGH GREEN ROAD AND HIGHAM COMMON ROAD, BARNSLEY

1.00 INTRODUCTION

1.01 Environmental Noise Solutions has been commissioned by Pegasus Group, on behalf of its client Strata Sterling Barnsley West Limited, to carry out an operational noise impact assessment for the proposed new roundabouts on Barugh Green Road and Higham Common Road, Barnsley (hereafter referred to as the Scheme).

1.02 The objectives of the noise impact assessment were to:

- Identify the noise-sensitive receptors (NSRs) likely to be affected by the Scheme.
- Determine the noise impact of the Scheme with reference to pertinent guidelines.

1.03 This report details the methodology and results of the assessment.

1.04 This report has been prepared for Strata Sterling Barnsley West Limited for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult Strata Sterling Barnsley West Limited (applicant), Pegasus Group (applicant's agent) and ENS as to the extent to which the findings may be appropriate for their use.

1.05 A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

2.00 NOISE IMPACT ASSESSMENT CRITERIA

The Design Manual for Roads and Bridges (DMRB): Volume 11: Environmental Assessment

2.01 Section 3 Part 7 of this document is that which is pertinent to noise and vibration and was published by the Department of Transport in 1993 with later amendments, the latest of which is November 2019. This document sets out procedures for undertaking the environmental assessment of new road schemes, including the assessment of noise effects from road traffic. In particular, Section 3 Part 7 describes a method for categorising the magnitude of impact due to a new road scheme. In undertaking a DMRB assessment, the calculation of traffic noise levels uses the methodology contained within the Calculation of Road Traffic Noise (CRTN) document as described below.

2.02 Although the DMRB strictly applies to new road schemes, the principles of the approach contained within the document can also be applied to the assessment of noise from road traffic in general. The Scheme has the potential to affect road traffic noise levels along existing roads, hence the need for this assessment.

2.03 The DMRB assessment suggests that the magnitude of noise changes from a project should be classified into levels of impact. The November 2019 amendment to Section 3 Part 7 gives detailed consideration to how impact magnitude will be affected by whether a noise level change will occur in the short term (e.g. as a result of a sudden opening of a scheme), or whether the noise level change would occur in the long term (e.g. gradually over time, such as that associated with natural traffic growth).

2.04 The two example classification scales are duplicated in Tables 2.1 (short term) and 2.2 (long term) below.

Table 2.1 – Classification of Magnitude of Noise Effects in the Short Term

Noise Change, $L_{A10,\ 18h}$, dB	Magnitude of Impact
Less than 1.0	Negligible
1.0 to 2.9	Minor
3.0 to 4.9	Moderate
5.0+	Major

Table 2.2 – Classification of Magnitude of Noise Effects in the Long Term

Noise Change, $L_{A10,\ 18h}$, dB	Magnitude of Impact
Less than 3.0	Negligible
3.0 to 4.9	Minor
5.0 to 9.9	Moderate
10.0+	Major

2.05 The DMRB confirms that the above scales apply to the impact magnitude, not the impact significance. The impact significance will depend upon both the impact magnitude and the sensitivity of the receiving environment.

2.06 The DMRB also provides methods for carrying out Simple and Detailed Assessments of the impact. The DMRB **Simple** Assessment requires comparisons of the following sets of data:

- Do-Minimum scenario (without the Scheme) in the baseline year against Do-Something scenario (with the Scheme) in the baseline year (short term).
- Do-Minimum scenario in the baseline year against Do-Something scenario in the future assessment year (long term).

Calculation of Road Traffic Noise (CRTN) 1988

2.07 Published by the Department of Transport and the Welsh Office in 1988, this document sets out standard procedures for calculating noise levels from road traffic. The calculation methods use a number of input variables, including traffic flow volume, average vehicle speed, percentage of heavy goods vehicles, type of road surface, site geometry and the presence of noise barriers or acoustically absorbent ground. CRTN predicts the $L_{10\ (18hour)}$ dB(A) or $L_{10\ (1hour)}$ dB(A) noise level for any receptor point at a given distance, up to 300 m, from the road.

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3.00 PROPOSED SCHEME

3.01 The proposed Scheme comprises:

- A new four-arm roundabout linking Barugh Green Road to 'Barnsley West' (a proposed mixed-use development to the south of Barugh Green Road) and to Claycliffe Business Park (an existing industrial estate to the north of Barugh Green Road) via Cannon Way.

- A new four-arm roundabout linking Higham Common Road to Barnsley West – Link Road and Barnsley West – Employment Uses

3.02 As part of the wider Barnsley West development, a new link road is also proposed between the two roundabouts. Although this is outside the scope of the proposed Scheme, the use of the link road is intrinsically linked to the Scheme, and therefore the impact of the link road is considered within the assessment.

3.03 Additionally, the Scheme will lead to changes on existing road links by way of development-led traffic associated with Barnsley West and the associated link road, which are also considered within the assessment.

3.04 Traffic flows produced by Fore Consulting Limited for the wider Barnsley West development designates the proposed roundabouts as Location 2 and Location 8 respectively.

3.05 An annotated layout for the Barugh Green Road roundabout is provided in Figure 3.1 below.

Figure 3.1 – Road Sections (Barugh Green Road Roundabout)



3.06 The nearest noise sensitive receptors (NSRs) which have the potential to be affected by the Barugh Green Road roundabout are considered to be Nos. 166 and 220 Barugh Green Road.

3.07 Site plans indicate that the Barugh Green Road roundabout is set back circa **40 metres** from No. 220 Barugh Green Road (to the east) and circa **80 metres** from No. 166 Barugh Green Road (to the west). Both properties are positioned with the gable-end facing the roundabout.

3.08 An annotated layout for the Higham Common Road roundabout is provided in Figure 3.2 below.

Figure 3.2 – Road Sections (Higham Common Road Roundabout)



3.09 The nearest NSRs which have the potential to be affected by the Higham Common Road roundabout are considered to be dwellings on Hermit Lane and Nos. 446–510 (evens) Higham Common Road.

3.10 Site plans indicate that the Higham Common Road roundabout is set back at least **28 metres** from dwellings on Hermit Lane. As the proposed roundabout does not result in any material changes to the position of the road relative to dwellings on Higham Common Road, this is assessed as an *existing* road link, in terms of changes to traffic flows and composition.

3.11 The nearest NSRs which have the potential to be affected by the link road are considered to be residential dwellings on St. John's Avenue and Welland Court. Site plans indicate that the link road is set back at least **130 metres** from dwellings at Welland Court and at least **145 metres** from dwellings at St. John's Avenue.

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4.00 BASELINE NOISE SURVEY

4.01 In order to establish the baseline ambient noise levels at the NSRs, noise monitoring was carried out between Tuesday 8th October and Wednesday 9th October 2019.

4.02 For the purpose of the assessment, the following noise monitoring positions were adopted (the approximate locations of the noise monitoring positions are contained in Appendix 2 for reference):

- MPA was located in the vicinity of existing residential dwellings on St. John's Avenue (also considered representative of the **rear** façades of residential dwellings on Barugh Green Road).
- MPB was located in the vicinity of existing residential dwellings on Welland Court.
- MPC was located in the vicinity of existing residential dwellings on Hermit Lane.

4.03 Noise measurements were undertaken using a Bruel & Kjaer 2250 Type 1 integrating sound level meter. The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration level was noted. A windshield was fitted for all measurements. All noise measurements were made in a free field environment at a height of circa 1.5 metres above local ground level.

4.04 The noted weather conditions during the survey were generally dry / slightly damp, mild and calm (with average wind speeds ≤ 5 m/s). Weather conditions were therefore considered appropriate for noise monitoring.

4.05 Measurements consisted of A–weighted broadband parameters. The following table contains a summary of the measurement data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 4.1 – Summary of Noise Measurement Data

Position	Date	Time	$L_{Aeq,T}$ (dB)	$L_{A10,T}$ (dB)	Comment
MPA	08/10/19	1117–1132	53	54	Distant M1 motorway dominant.
MPA	08/10/19	1132–1147	53	56	
MPA	09/10/19	1123–1138	49	52	
MPA	09/10/19	1138–1153	47	49	
MPB	08/10/19	1201–1216	53	54	Distant M1 motorway dominant.
MPB	08/10/19	1216–1231	53	55	
MPB	09/10/19	1156–1211	51	52	
MPB	09/10/19	1211–1226	50	52	
MPC	08/10/19	1238–1253	59	61	M1 motorway dominant.
MPC	08/10/19	1253–1308	59	61	
MPC	09/10/19	1231–1246	57	59	
MPC	09/10/19	1246–1301	56	59	
MPA circa 53 dB $L_{A10,T}$ during the daytime; MPB circa 53 dB $L_{A10,T}$ during the daytime; MPC circa 60 dB $L_{A10,T}$ during the daytime.					

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4.06 The ambient noise climate at the application site was dominated by road traffic on the M1 motorway.

4.07 For the prediction of daytime road traffic noise, the CRTN explains that the following shortened measurement procedure may be used. Measurements of L_{A10} are made over any three consecutive hours between 10:00 and 17:00 hours. Using $L_{A10\ (3\ hour)}$ as the arithmetic mean of the three consecutive values of hourly L_{A10}, the $L_{A10\ (18\ hour)}$ can be calculated from the equation:

(i) $L_{A10\ (18\ hour)} = L_{A10\ (3\ hour)} - 1$ dB

4.08 Although the measurement procedure was not strictly followed, shorter measurement samples were taken over two days in order to derive an average, and this is considered representative of the $L_{A10\ (3\ hour)}$.

4.09 Based on the above, the existing $L_{A10\ (18\ hour)}$ at the nearest NSRs are calculated at:

- **52 dB $L_{A10\ (18\ hour)}$** at existing residential dwellings on St. John's Avenue.
- **52 dB $L_{A10\ (18\ hour)}$** at the rears of residential dwellings on Barugh Green Road.
- **52 dB $L_{A10\ (18\ hour)}$** at existing residential dwellings on Welland Court.
- **60 dB $L_{A10\ (18\ hour)}$** existing residential dwellings on Hermit Lane.

5.00 NOISE IMPACT ASSESSMENT

5.01 The noise impacts of the Scheme on existing receptors may be categorised as:

- Operational traffic using the Scheme and associated Link Road.
- Operational development-led traffic using existing road links.

5.02 18-hour AAWT traffic flows have been provided by Fore Consulting for:

- **2021** – The opening year of the Scheme (adopted as 'baseline year'); and

- **2033** – Future period following implementation of the Scheme, including the wider Barnsley West development and link road (which will be the subject of a later planning application). Adopted as 'future assessment year'.

<u>Operational Traffic Using the Proposed Roundabouts and Link Road</u>

5.03 Although the Scheme is set to open in 2021, the purpose of the roundabouts is to provide access to the wider Barnsley West development (Phase 1 completion due for 2026) and/or the link road (completion due for 2033). As such, there are no changes to $L_{A10\ (18\ hour)}$ levels at the façades of the nearest NSRs to the Scheme in the opening year (2021) and therefore the short-term magnitude of impact is classified as 'No Change' in accordance with the DMRB.

5.04 The future year (2033) $L_{A10\ (18\ hour)}$ levels at the façades of the nearest NSRs to the Scheme (and link road) are modelled in accordance with the procedure contained in the CRTN, using traffic data prepared by Fore Consulting. These levels may then be compared against the existing $L_{A10\ (18\ hour)}$ levels at the nearest NSRs (as described in Paragraph 4.09; and adopted as opening year (2021)) in order to determine the long-term magnitude of impact.

5.05 Tables 5.1 and 5.2 overleaf summarise the long-term magnitude of impact for the Scheme for two possible scenarios.

5.06 The first scenario (detailed in Table 5.1) includes the Scheme and the completed link road, but without the wider Barnsley West housing development. In this scenario, it is assumed that existing dwellings on St. John's Avenue and Welland Court will be unscreened from the link road.

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5.07 The second scenario (detailed in Table 5.2) includes the Scheme, the completed link road and the wider Barnsley West development. In this scenario, it is assumed that existing dwellings on St. John's Avenue and Welland Court will be screened from the link road by the intervening Barnsley West development itself. Screening attenuation is conservatively taken as circa 10 decibels, in accordance with BS 5228:2009 Part 1 'Noise Control on Construction and Open Sites' (BS 5228).

Table 5.1 – Do-Minimum scenario in the baseline year against Do-Something scenario in the future assessment year without Barnsley West development

Noise sensitive receptor(s)	Road Section	2021 Do-Minimum $L_{A10, 18h}$	2033 Do-Something $L_{A10, 18h}$	Change in $L_{A10, 18h}$	Magnitude of Impact
220 Barugh Green Road	Barugh Green Road – Site Access	52.0 dB	55.6 dB	+3.6 dB	Minor
166 Barugh Green Road	Barugh Green Road – Site Access	52.0 dB	54.0 dB	+2.0 dB	Negligible
Dwellings on St. John's Avenue	Barugh Green Road – Site Access	52.0 dB	54.2 dB	+2.2 dB	Negligible
Dwellings on Welland Court	Higham Common Road – Link Road	52.0 dB	54.2 dB	+2.2 dB	Negligible
Dwellings on Hermit Lane	Higham Common Road – Link Road	59.0 dB	61.5 dB	+2.5 dB	Negligible

Table 5.2 – Do-Minimum scenario in the baseline year against Do-Something scenario in the future assessment year with Barnsley West development

Noise sensitive receptor(s)	Road Section	2021 Do-Minimum $L_{A10, 18h}$	2033 Do-Something $L_{A10, 18h}$	Change in $L_{A10, 18h}$	Magnitude of Impact
220 Barugh Green Road	Barugh Green Road – Site Access	52.0 dB	56.7 dB	+4.7 dB	Minor
166 Barugh Green Road	Barugh Green Road – Site Access	52.0 dB	54.6 dB	+2.6 dB	Negligible
Dwellings on St. John's Avenue	Barugh Green Road – Site Access	52.0 dB	53.7 dB *	+1.7 dB	Negligible
Dwellings on Welland Court	Higham Common Road – Link Road	52.0 dB	53.8 dB *	+1.8 dB	Negligible
Dwellings on Hermit Lane	Higham Common Road – Link Road	59.0 dB	62.7 dB	+3.7 dB	Minor

* *Calculations include 10 dB screening afforded by proposed residential development*

5.08 In terms of the **long-term** noise impact with the wider Barnsley West housing development completed, the calculations indicate:

- Up to +4.7 dB increase at 220 Barugh Green Road. This represents a **minor** impact in accordance with the DMRB.
- Up to +3.7 dB increase at properties on Hermit Lane. This represents a **minor** impact in accordance with the DMRB.

5.09 Consideration should be given to providing mitigation in the form of localised screening (bunding and/or acoustic fencing) alongside the proposed link road carriageway to screen the above properties from the Scheme. See Appendix 3 for locations of screening.

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5.10 Assuming a conservative 10 decibels attenuation for the screening (in accordance with BS 5228), the following table summarises the long-term noise impact, including the completed Barnsley West development and mitigation.

Table 5.3 – Do-Minimum scenario in the baseline year against Do-Something scenario in the future assessment year (long term with development + mitigation)

Noise sensitive receptor(s)	Road Section	2021 Do-Minimum $L_{A10, 18h}$	2033 Do-Something $L_{A10, 18h}$	Change in $L_{A10, 18h}$	Magnitude of Impact
220 Barugh Green Road	Barugh Green Road – Site Access	52.0 dB	53.3 dB **	+1.3 dB	Negligible
166 Barugh Green Road	Barugh Green Road – Site Access	52.0 dB	54.6 dB	+2.6 dB	Negligible
Dwellings on St. John's Avenue	Barugh Green Road – Site Access	52.0 dB	53.7 dB *	+1.7 dB	Negligible
Dwellings on Welland Court	Higham Common Road – Link Road	52.0 dB	53.8 dB *	+1.8 dB	Negligible
Dwellings on Hermit Lane	Higham Common Road – Link Road	59.0 dB	60.1 dB **	+1.1 dB	Negligible

* *Calculations include 10 dB screening afforded by proposed residential development*

** *Calculations include 10 dB screening afforded by proposed mitigation (screening)*

5.11 With the provision of the localised screening, the long-term magnitude of impact is **negligible** at all existing NSRs in the vicinity of the Scheme.

Operational Development-Led Traffic Using Existing Road Links

5.12 Site plans indicate that there are no material changes to the alignment of any existing roads in the vicinity of the Scheme, and it is presumed that existing speed limits will be maintained. However, changes to both traffic volume and composition (proportion of heavy vehicles) on existing roads are anticipated, and these will lead to changes in $L_{A10\ (18\ hour)}$.

5.13 Traffic flow data indicates that there are no changes to traffic volumes or composition in the opening year (2021) of the Scheme. Therefore, the short-term magnitude of impact is classified as 'No Change' in accordance with the DMRB.

5.14 The long-term change in $L_{A10\ (18\ hour)}$ levels along existing road links is calculated using the guidance set out in CRTN, in accordance with traffic flows and HGV percentages provided, and assuming that vehicle speed limits are to remain unchanged. The results of the calculations are summarised in Appendix 4.

5.15 With the exception of 'Capitol Close', the traffic data prepared by Fore Consulting illustrate that the Scheme will give rise to < 3 dB increase in $L_{A10\ (18\ hour)}$ levels at all existing road links in the **long term**, which corresponds to a **negligible** impact.

5.16 Whilst Capitol Close is set to experience a +8.5 dB increase in $L_{A10\ (18\ hour)}$ levels in the long-term, this is an industrial estate road (not residential) and the increase is due to the new road junction with Higham Lane, which re-routes industrial estate traffic.

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6.00 CONCLUSIONS

6.01 A noise impact assessment has been carried out for proposed new roundabouts on Barugh Green Road and Higham Common Road, Barnsley

6.02 The **short-term** magnitude of impact is classified as 'No Change' in accordance with the DMRB.

6.03 In accordance with the DMRB, without mitigation the Scheme has a 'negligible' **long term** noise impact at all properties except 220 Barugh Green Road and properties on Hermit Lane.

6.04 Long term noise impacts at 220 Barugh Green Road and Hermit Lane may be mitigated via localised acoustic screening, which will reduce the noise impacts to '**negligible**'.

6.05 In conclusion, subject to the implementation of the mitigation identified above, it is considered that noise associated with the Scheme would not give rise to any significant effects.

I trust the foregoing is sufficient for your needs. Should you have any queries regarding the above, please do not hesitate to contact me.

Yours sincerely

Thomas Crabb
MIOA, Diploma in Acoustics and Noise Control
Environmental Noise Solutions Limited

Appendix 1
Glossary of Acoustic Terms

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 µPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 µPa).

A-weighting Network

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T, has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T. $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

$L_{AF\ max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

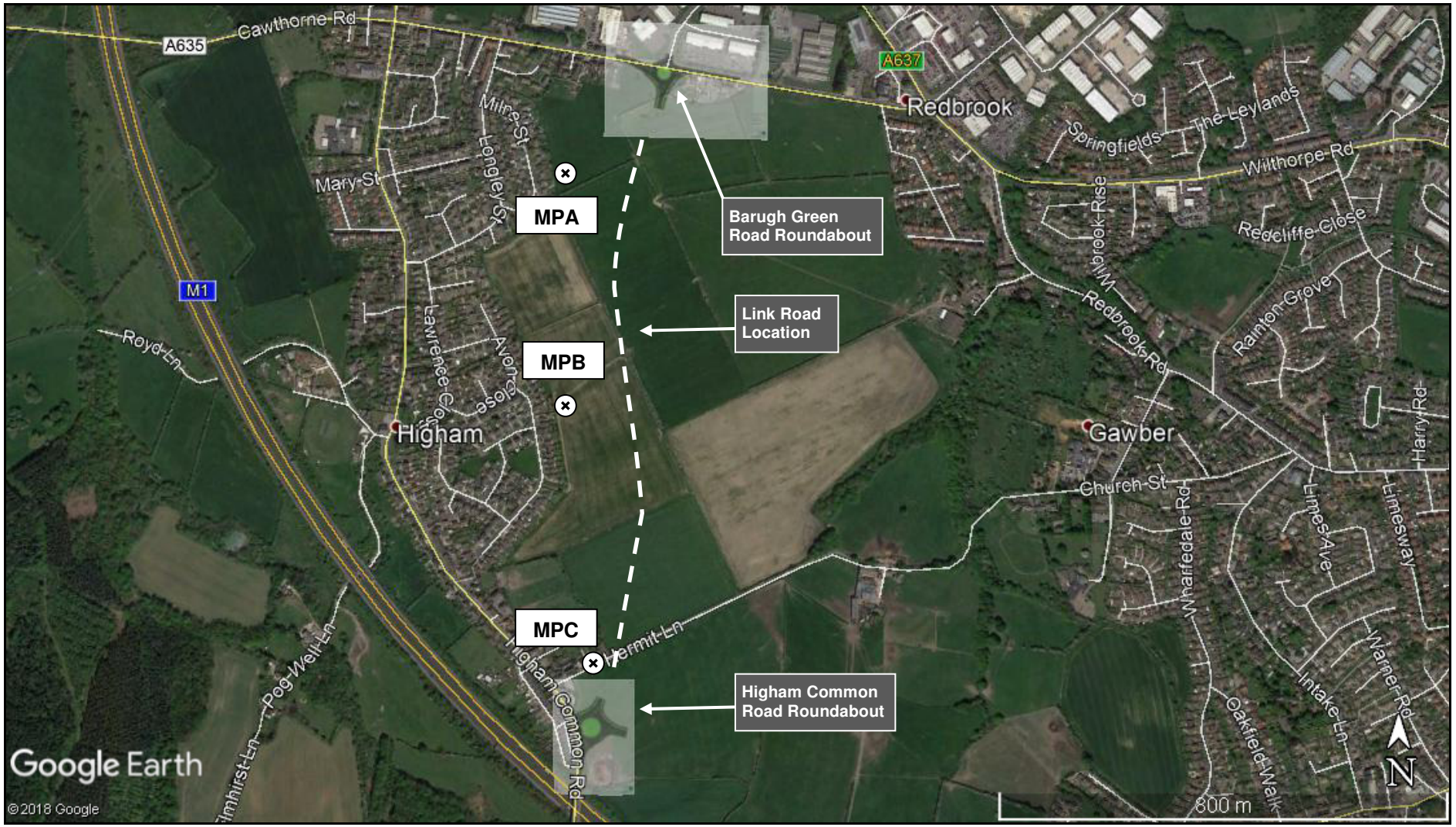
Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparison between different noise events which occur over different lengths of time.

Weighted Sound Reduction Index (R_W)

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_W is used to characterise the insulation of a material or product that has been measured in a laboratory).

Appendix 2
Site Location Plan and Approximate Monitoring Positions



Appendix 3
Proposed Acoustic Screening – Barugh Green Road Roundabout



Appendix 3
Proposed Acoustic Screening – Higham Common Road Roundabout



Appendix 4
Long Term Changes to $L_{A10(18\ hour)}$ on Existing Road Links

Location		Link	2021 Opening Year		2033 With Development		Total Change in $L_{A10\ (18\ hour)}$
			2-Way Flow	HGV %	2-Way Flow	HGV %	
1	Cawthorne Rd / B6428 Barugh Lane / Barugh Green Rd / Higham Common Rd	Cawthorne Road	8,764	2%	9,168	3%	+ 0.4
		B6428 Barugh Lane	8,542	4%	6,018	7%	- 0.6
		Barugh Green Road	9,013	4%	7,350	5%	- 0.6
		Higham Common Road	6,793	3%	5,371	7%	+ 0.1
2	Barugh Green Rd / Cannon Way / Site Access	Barugh Green Road west	9,752	3%	9,339	4%	- 0.1
		Cannon Way	2,279	6%	2,426	6%	+ 0.2
		Barugh Green Road east	10,124	4%	22,607	2%	+ 2.9
3	Barugh Green Rd / Whaley Rd / Claycliffe Rd / A635	Barugh Green Road west	10,537	3%	22,108	2%	+ 2.9
		A637 Claycliffe Road	14,817	2%	21,100	1%	+ 1.4
		Whaley Road	4,640	3%	5,159	3%	+ 0.4
		A635	24,442	2%	30,702	2%	+ 1.0
4	M1 Junction 37	M1 southbound off slip	7,568	3%	9,420	3%	+ 0.9
		A628 Dodworth Road	27,730	3%	32,153	3%	+ 0.6
		M1 southbound on slip	12,756	3%	16,008	3%	+ 1.0
		M1 northbound off slip	12,399	4%	15,847	4%	+ 1.0
		Whinby Road	26,520	4%	40,274	3%	+ 1.7
		M1 northbound on slip	7,937	3%	10,133	3%	+ 1.0
5	Whinby Rd / B6449 Roundabout	Whinby Road east	25,659	4%	39,653	3%	+ 1.8
		B6449	9,694	1%	15,064	1%	+ 1.8
		Whinby Road north	20,247	5%	32,710	4%	+ 1.9
6	Whinby Rd / Capitol Close Roundabout	Capitol Close	2,417	4%	19,401	2%	+ 8.5
		Whinby Road south	20,340	5%	32,769	4%	+ 1.9
		Whinby Road west	18,863	5%	14,151	6%	- 0.9
7	Whinby Rd / Higham Lane Roundabout	Higham Lane	9,399	3%	5,712	5%	- 1.6
		Whinby Road east	19,102	5%	15,019	6%	- 0.7
		Whinby Road west	15,309	5%	18,494	4%	+ 0.7
8	Higham Common Rd / Site Access	Higham Common Road north	9,484	2%	7,457	3%	- 0.8
		Higham Common Road south	9,484	2%	7,457	3%	- 0.8