Extra MSA Group

Warrington Motorway Service Area, J11 M62

Environmental Statement

Part 2 – Noise and Vibration Technical Paper 7

Revision 1.1 26th July 2019

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1. Introduction

1.1. Wardell Armstrong was instructed by Extra MSA Group to prepare a noise and vibration assessment to support the planning application for a proposed Motorway Service Area (MSA) as detailed in the main supporting documents. This report assesses the noise and vibration impacts of the proposed MSA.

1.2. In particular it considers:

- The potential effects of noise and vibration from the construction of the proposed MSA on existing and future sensitive receptors;
- The potential impact of changes in road traffic noise at existing and future sensitive receptors during the operational phase of the MSA; and,
- Noise from the operational phase of the MSA from any externally mounted plant and vehicle movements within the MSA Site at existing and proposed noise sensitive receptors (i.e. the Hotel constructed as part of the MSA.

1.3. This assessment describes the methods used to assess the noise and vibration impacts, the baseline conditions currently existing at the Site and surroundings, the potential direct and indirect effects of the development arising from noise and vibration, the mitigation measures required to prevent, reduce, or offset the impacts and the residual effects.

2. Documents Consulted

2.1. This noise and vibration assessment has considered the suitability of the Site for the proposed noise sensitive uses, and proposed sources of noise. The noise assessment has taken into account current guidance including:

- National Planning Policy Framework, 2019[I];
- Noise Policy Statement for England 2010[II];
- National Planning Guidance - Noise, 2019[III];
- British Standard 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites- Parts 1 & 2: Noise and Vibration[IV];
- Department of Transport's technical memorandum Calculation of Road Traffic Noise 1988[V];
- Design Manual for Roads and Bridges – 2011[VI];
- Traffic Research Laboratory Converting the UK traffic noise index LA10,18h to EU noise indices for noise mapping[VII];
- British Standard 4142: 2014+A1:2019 Methods for rating and assessing industrial and commercial sound[VIII]; and,
- British Standard 8233: 2014 Guidance on Sound Insulation and noise reduction for buildings[IX].

National Planning Policy Framework 2019

2.2. In February 2019 a revised 'National Planning Policy Framework' (NPPF) was published to provide the Government's planning policies and how they are expected to be applied.

2.3. Paragraph 180 of the NPPF states;

> *'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:

a) 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;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;…'

2.4. Paragraph 182 of the NPPF states;

'Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

Noise Policy Statement for England 2010

2.5. With regard to 'adverse impacts' the NPPF refers to the 'Noise Policy Statement for England'[II], which defines three categories, as follows:

'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 occur'.

2.6. The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided. The second aim refers to the situation where the impact lies somewhere

between LOAEL and SOAEL, and it requires that all reasonable steps are taken to mitigate and minimise the adverse effects of noise. However, the requirement to mitigate and minimise the adverse effects of noise does not mean that such adverse effects cannot occur.

2.7. The Planning Practice Guidance[III] provides further detail about how the effect levels can be recognised. Above the NOEL noise becomes noticeable, however it has no adverse effect as it does not cause any change in behavior or attitude. Once noise crosses the LOAEL threshold it begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. Increasing noise exposure further might cause the SOAEL threshold to be crossed. If the exposure is above this level the planning process should be used to avoid the effect occurring by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused. At the highest extreme the situation should be prevented from occurring regardless of the benefits which might arise. Table 7.1 summarises the noise exposure hierarchy.

Response	Examples of Outcomes	Increasing Effect Level	Action
Not present	No effect	No Observed Effect	No specific measures required
Present 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	
Present and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, eg 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
		Significant Observed Adverse Effect Level	
Present and disruptive	The noise causes a material change in behaviour and/or attitude, eg 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
Present 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

Table 7.1 – PPG noise exposure hierarchy

Noise from Earthworks and Construction Phase Activities

2.8. The activities associated with the earthworks and construction phase of the proposed development will have the potential to generate noise and create an impact on the surrounding area. Guidance on the prediction and assessment of noise from development sites is in BS5228-1+A1:2014.

2.9. Construction noise can have disturbing effects on the surrounding neighbourhood. The effects are varied and are complicated further by the nature of the site works, which will be characterised by noise sources which will change location throughout the construction period. The duration of site operations is also an important consideration. Higher noise levels may be acceptable if it is known that the levels will occur for a limited period. Details of the nearest representative sensitive receptors to the development are described in Table 7.10 and shown on Figure 7.1 in Appendix 7.3

2.10. The demolition and construction phases will be restricted to daytime hours, and likely to be between 0700 and 1800 hours Monday to Friday and 0700 to 1300 hours on a Saturday, with no work permitted on Sundays or Bank Holidays.

2.11. Under Section 60 of the Control of Pollution Act 1974 (COPA) Act the local authority has the power to serve a notice which could impose requirements as to the way in which works are to be carried out. This could specify times of operation, maximum levels of noise which should be emitted and the type of plant which should or should not be used. This is a common way of enforcing reasonable levels of construction noise.

2.12. However, it may be preferable for the chosen contractor to obtain prior consent under Section 61 of COPA 1974. Section 61, enables anyone who intends to carry out works to apply to the local authority for consent. Under Section 61 the local authorities and those responsible for construction work, have an opportunity to settle any problems, relating to the potential noise, before work starts.

2.13. In addition to COPA 1974, BS5228-1 provides guidance on significance criteria for assessing the potential noise impacts associated with the construction phase of large projects. For the purposes of this noise assessment, the noise likely to be generated by the earthworks and construction phase, have been assessed against significance criteria established, using the BS5228-1 ABC Method.

2.14. The ABC method for determining significance criteria requires the ambient noise levels at existing sensitive receptors to be determined. The ambient noise levels at each existing receptor location are then rounded to the nearest 5dB(A) to determine the appropriate threshold value in accordance with the category value, A B or C, as detailed in Table 7.2 below.

Assessment Category and Threshold Value Period (LAeq)	Threshold Value, in decibels (dB)		
	Category A *1	Category B *2	Category C *3
Daytime (0700 to 1900 hours) and Saturdays (0700 to 1300 hours)	65	70	75
*1 Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than this value.			
*2 Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.			
*3 Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category B values.			

Table 7.2: Thresholds of Significant Impact from Construction Noise at Residential Receptors in accordance with the ABC Method of BS5228-1

2.15. For the purposes of this Paper it is possible to estimate the degree of impact from the site works (earthworks and construction), according to the suggested standards, by reference to the time periods during which noise levels may occur in excess of the quoted values. These levels can be seen in Table 7.12.

2.16. The noise assessment for the construction phase details baseline daytime noise levels measured at similar locations to the sensitive receptor locations identified in Table 7.12. It also sets out details of 'best practice' management and control measures to ensure that impacts are minimised as far as possible.

2.17. The construction phase has only been considered for existing sensitive receptors close to the Site boundary. It is considered very likely that all areas of the Proposed Development will be constructed concurrently, and the Hotel will only be occupied once all construction works have been completed. Therefore, construction phase noise and vibration has not been considered at proposed receptors.

2.18. Based on the ambient noise levels measured during the daytime period, the appropriate category value has been determined for each of the sensitive receptors, as detailed in Table 7.10. Details of the noise survey carried out at the sensitive receptors are is set out in

Appendix 7.1. The assessment is shown in Table 7.10 and shown on Figure 7.1 In Appendix 7.3 of this technical paper.

Noise from Construction Vehicles

2.19. In addition to the earthworks and construction activities, vehicle movements to and from the Proposed Development have the potential to generate noise at existing sensitive receptors, in the immediate vicinity of the local road network.

2.20. In relation to construction phase vehicles movements, where possible:

- All deliveries of materials and plant to the Site and the removal of waste should be carried out within normal Site hours;
- A competent banksman should be employed to assist in the movement of vehicles on and off the Site;
- The Site layout should be designed to minimise potential effects on neighbours;
- No daytime or night-time parking of lorries will be permitted outside agreed areas; and,
- Vehicle deliveries should be planned so as to minimise queuing outside the Site.

2.21. At this stage, the exact, final number and routing of construction phase vehicles is yet to be confirmed. However, calculations have been undertaken by i-Transport, the appointed transport consultant, using a worst-case approach, to estimate the number of vehicles that may be expected to access the Proposed Development Site during the construction phase.

2.22. The following assumptions have been made by the appointed transport consultant in these calculations:

- It has been assumed that up to 42,000m3 of material will be exported off the Site. Based on an average load of 15m3, there will be 2,800 off-site HGV movements in total. These will be spread over a 6 months period resulting in 22 HGVs in and 22 HGVs out per day. As the working day is 08:00 - 18:00 this will result in an average of 2 HGVs in and 2 HGVs out per hour.

- The requirement for material for drainage purposes will lead to an importation of approximately 45,700m3 of engineering fill. With an average load of 15m^3 per HGV the number of movements on and off the site will be 3,047 in each direction. This will take place over a six months period resulting in 23 HGVs in and 23 HGVs out per day. As the working day is 08:00 – 18:00 this will result in an average of 2 HGVs in and 2 HGVs out per hour.

- Extra MSA Group advises that general construction deliveries will include 20 vehicle movements in and 20 movements out per day. This will result in an average of 2HGVs in and 2HGVs out per hour.

- Extra MSA Group advises that up to 300 staff will be on site during the construction works. Assuming an average vehicle occupancy of 2.0, and with no allowance for access by non-car modes, this results in 150 arrivals and 150 departures per day. Arrivals will be spread over the morning peak period with departures over the evening peak period.

2.23. Construction phase traffic is likely to access the site via the M62, therefore, any changes in baseline flows, as a result of the construction of the Proposed Development, are not significant in relation to existing flows. In addition, the temporary nature of these changes should be noted.

2.24. The potential noise impacts and significance of effects associated with vehicles during the construction phase is not therefore considered to be significant and has not been assessed further.

Vibration from the Earthworks and Construction Phase

2.25. Work involving heavy plant on an open Site is likely to generate vibration, which may, in certain circumstances, propagate beyond the boundary of the Site. In situations where particularly heavy plant, vibrating compaction equipment or piling rigs are being used close to the Site boundary, nearby properties may experience ground-borne vibration. However, any vibration would be time limited.

2.26. The existing sensitive receptors most likely to be affected by vibration generated by the earthworks and construction phase works of the development are detailed in Table 7.10 and shown on Figure 7.1 and Appendix 7.3.

2.27. Guidance on the assessment of vibration from development sites is given in British Standard 5228 -2:2009 "Code of Practice for noise and vibration control on construction and open sites – Part 2: Vibration" (BS5228-2). BS5228-2 2009 indicates that vibration can have disturbing effects on the surrounding neighbourhood; especially where particularly sensitive operations may be taking place. The significance of vibration levels which may be experienced adjacent to a Site is dependent upon the nature of the source.

2.28. It is not possible to mitigate vibration emissions from an open site. It is important therefore to examine the proposed working method to ascertain what, if any, operations would be likely to cause unacceptable levels of vibration at nearby sensitive locations. It is possible that these operations could be modified to reduce their vibration impacts.

2.29. BS5228-2 indicates that the threshold of perception is generally accepted to be between a peak particle velocity (PPV) of 0.14 and 0.3mm/sec. In an urban situation it is unlikely that such vibration levels would be noticed. BS5228 also indicates that it is likely that vibration of 1.0 mm/s in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents. The standard also indicates that 10 mm/s is likely to be intolerable for any more than a very brief exposure to this level.

2.30. The Highways Agency Research report No. 53 "Ground Vibration caused by Civil Engineering Works" 1986 suggests that, when vibration levels from an unusual source exceed the human threshold of perception, complaints may occur. The onset of complaints due to continuous vibration is probable when the PPV exceeds 3mm/sec.

2.31. British Standard BS6472: 2008 "Guide to Evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting" (BS6472-1) suggests that adverse comments or complaints due to continuous vibration are rare in residential situations below a PPV of 0.8mm/sec. Continuous vibration is defined as "vibration which continues uninterrupted for either a daytime period of 16 hours or a night-time period of 8 hours". Our experience of other similar development shows that the proposed earthworks and construction works at the Site will not cause continuous vibration for an 8 hour period as defined in BS6472-1.

2.32. Human perception of vibration is extremely sensitive. People can detect and be annoyed by vibration before there is any risk of structural damage. Cases where damage to a building has

been attributed to the effects of vibration alone are extremely rare; even when vibration has been considered to be intolerable by the occupants.

2.33. It is not possible to establish exact vibration damage thresholds that may be applied in all situations. The likelihood of vibration induced damage or nuisance will depend upon the nature of the source, the characteristics of the intervening solid and drift geology and the response pattern of the structures around the Site. Most of these variables are too complex to quantify accurately and thresholds of damage, or nuisance, are therefore conservative estimates based on a knowledge of engineering.

2.34. Where ground vibration is of a relatively continuous nature, there is a greater likelihood of structural damage occurring, compared to transient vibration; for example, that caused by transiting vehicles.

2.35. BS5228-2 2009 suggests that the onset of cosmetic damage is 15mm/sec (15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz for residential or light commercial type buildings).

Road Traffic Noise and Existing Sensitive Receptors

2.36. The proposed MSA is not considered to be a significant generator of traffic. Typically, MSAs are used by motorists travelling between point A and point B. However, employees at the MSA and some local residents may visit the MSA from their home address. Therefore, the MSA will generate, or more likely re-route, some road traffic, which is likely to be small and not significant. Therefore, an assessment of development led road traffic at existing receptors has been undertaken.

2.37. The current and future traffic noise levels at all sensitive receptors both with and without the development in place, have been predicted using SoundPLAN noise modelling software.

2.38. SoundPLAN uses calculation procedures set out in CRTN. The memorandum was prepared to enable entitlement under the Noise Insulation Regulations 1975 to be determined; but it is stated in the document, that the guidance is equally appropriate for the calculation of traffic noise for land use planning purposes.

2.39. The procedures outlined in CRTN assume typical traffic and noise propagation conditions that are consistent with moderately adverse wind velocities and directions during specified periods. In CRTN, all noise levels can be expressed in terms of the index $L_{10(18\ hour)}$ dB(A).

2.40. For this noise assessment, CRTN has been used to determine the noise levels at the existing sensitive receptors, and the proposed Hotel.

2.41. The traffic information for the proposed development has been derived from the work undertaken by i-Transport LLP has been provided as 18-hour AAWT flows as shown within Appendix 7.2 (18 hour AAWT traffic data). HGV percentage flows have also been provided. The traffic data has been provided in scenarios which include future years with and without the development.

2.42. The existing sensitive receptors used in the assessment of road traffic noise with and without development traffic in place are detailed in Table 7.10. Impacts will also be felt at receptors adjacent to and beyond those listed.

2.43. A number of committed developments have been included in the traffic data used in the noise assessment. These comprise the B2/B8 development at The Quadrant at Birchwood Park (2014/23358) and the B1/B2/B8 development on the eastern edge of Birchwood Park (2015/26044).

Guidance Noise Levels at Proposed Sensitive Receptors

2.44. The Noise Policy Statement for England refers to the World Health Organisation (WHO) when discussing noise impacts. The WHO Guidelines for Community Noise 1999 suggest guideline values for internal noise exposure which take into consideration the identified health effects and are set, based on the lowest effect levels for general populations. Guideline values for annoyance which relate to external noise exposure are set at 50 or 55 dB(A), representing day time levels below which a majority of the adult population will be protected from becoming moderately or seriously annoyed respectively.

2.45. The following guideline values are suggested by WHO:

- 35dB $L_{Aeq,16hour}$ during the daytime in noise sensitive rooms.
- 30dB $L_{Aeq,8hour}$ during the night-time in bedroom areas.
- 45dB $L_{Af,max}$ should not be exceeded during the night-time in bedroom areas.

British Standard 4142:2014+A1:2019 [VIII]***, Method for rating and assessing industrial and commercial sound***

2.46. BS4142 is used to rate and assess sound of an industrial and/or commercial nature including:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that on or around an industrial and/or commercial site.

2.47. The standard is applicable to the determination of the following levels at outdoor locations:

- rating levels for sources of sound of an industrial and/or commercial nature; and
- ambient, background and residual sound levels, for the purposes of:

1) Investigating complaints;

2) Assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and

3) Assessing sound at proposed new dwellings or premises used for residential purposes.

2.48. The purpose of the BS4142 assessment procedure is to assess the significance of sound of an industrial and/or commercial nature.

2.49. BS4142 refers to noise from the industrial source as the 'specific noise' and this is the term used in this report to refer to noise which is predicted to occur due to equipment associated with proposed sources of industrial noise. Proposed sources of industrial noise will be limited in relation to the future background noise level to reduce the potential for a noise impact.

2.50. BS4142 assesses the significance of impacts by comparing the specific noise level to the background noise level (L_{A90}). Appendix 7.1 provides details of the background noise survey undertaken.

2.51. Certain acoustic features can increase the significance of impacts over that expected from a simple comparison between the specific noise level and the background noise level. In particular BS4142 identifies that the absolute level of sound, the character, and the residual sound and the sensitivity of receptor should all be taken into consideration. BS4142 includes allowances for a rating penalty to be added if it is found that the specific noise source contains a tone, impulse and/or other characteristic, or is expected to be present. The specific noise level along with any applicable correction is referred to as the 'rating level'.

2.52. The greater the increase between the rating level over the background noise level, the greater the magnitude of the impact. The assessment criteria given by BS4142 are as follows:

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

2.53. During the daytime, BS4142 requires that noise levels are assessed over 1-hour periods. However, during the night-time, noise levels are required to be assessed over 15-minute periods.

2.54. Where the initial estimate of the impact needs to be modified due to context, BS4142 states that all pertinent factors should be taken into consideration, including:

- The absolute level of sound;

- The character and level of the residual sound compared to the character and level of the specific sound; and

- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

3. Consultations

3.1. The Site is within the administrative area of Warrington Borough Council (WBC). Prior to carrying out this noise and vibration assessment, the potential impacts of the proposed development and general principles of the assessment methodology were discussed and agreed with Steve Smith - Principal Officer (Environmental Protection) at Warrington Borough Council at (WBC). Details of the discussions are detailed in Table 7.3.

Theme / Issue	Date	Consultee	Method	Summary of Discussion	Outcome / Output
Noise and Vibration	18-01-2019	Steve Smith - Principal Officer (Environmental Protection) at Warrington Borough Council	E-mail	Comments regarding assessment methodology for the noise and vibration assessment	Mr Smith confirmed that he had responded to the scoping opinion, and that nothing unusual would be required for the assessment
Noise and Vibration	18-01-2019	Steve Smith - Principal Officer (Environmental Protection) at Warrington Borough Council	Response to scoping opinion	Response to the scoping opinion.	The response requested that • HS2 be included in the assessment; • Receptors were over 300m from the Site and were unlikely to be affected by construction noise; and, • '*The* (assessment) *proposals put forwards appear to be satisfactory.*'
Noise and Vibration	21-01-2019	Steve Smith - Principal Officer (Environmental Protection) at Warrington Borough Council	E-mail	Response to the scoping opinion, and comment upon the assessment methodology for the noise and vibration assessment	Confirmation that Mr Smith is happy with our assessment criteria. The response requested that HS2 be included in the assessment and included recommended construction time periods.
Public Consultation Events	4th, 6th, 7th and 12th April 2019	General Public	Attended event	Some residents were concerned that the proposed MSA would cause noise pollution at existing residents	Assessment of noise undertaken
Noise and Vibration Public Protection Comments	13th May 2019	Mrs Vicky Simcott, Public Protection Services Manager, Warrington Borough Council	Internal Memorandum (part of pre-application response)	• Noise is elevated due to M62; • Site may generate noise, BS4142 assessment required; • Nearest receptors located circa 300m away, proposals not likely to be an issue; • If required, physical mitigation could be secured through a planning condition; • Noise during the construction phase should be considered.	The noise assessment includes a consideration of noise from the M62 at the development, and noise from construction and operational phases of the development at existing receptors.

Table 7.3 – Details of the Consultation with the Local Authority

3.2. The Scoping Request Report and Scoping Opinion Document is included in full at Appendix 17 and 18 respectively of the ES Part 1 Report.

3.3. Extra MSA Group has undertaken an extensive programme of pre-application consultation and has sought to engage with the Local Planning Authority, Local Councillors and MPs, key stakeholders, statutory consultees, other developers, local community interest groups, local businesses and local residents prior to the submission of this outline planning application.

3.4. This process has involved pre-application meetings with WBC and Statutory Consultees; briefing letters, emails and meetings for Local Councillors and MPs; meetings with key stakeholders and local interest groups; the creation of a website providing details of the development and the opportunity to comment online; and the provision of brochures and free post return comments cards.

3.5. Extra MSA Group has therefore involved the community and stakeholders in the development of the application proposals for the Site at an early stage and in the formulation of the planning application proposals. The feedback received from the pre-application programme has been considered in detail and the key outcomes of this process are set out in the ES Part 1 Report and also outlined in the Statement of Community Involvement submitted to support the planning application along with a summary of any subsequent amendments that have been made to the scheme.

4. Methodology and Approach

4.1. Baseline noise monitoring has been conducted, and consisted of continuous unattended measurements of noise, with audio recording during the daytime and night-time. The measurements have been used in the assessment to establish the prevailing ambient and background levels at existing and proposed sensitive receptors.

4.2. Characterising the local noise environment allows the impact of the proposed development to be assessed, including determining whether the operational phase of the development is likely to have a significant effect on the identified receptors.

4.3. There are receptors to the north, north-east, south and south-west and approximately 300m from the development site. Therefore, noise and vibration from the construction and operational phases of the development has been considered at existing and proposed sensitive receptors.

4.4. Noise from road traffic during the operational phase of the development have been considered at existing sensitive receptors with and without the traffic associated with the proposed MSA. The change in noise have been assessed in accordance with DMRB.

4.5. Proposed industrial sources of noise associated with the proposed MSA have been assessed in accordance with BS4142. Recommendations for noise mitigation have been made as appropriate. As the proposals are in outline, full details of the development proposals are not available, therefore a detailed assessment of specific noise sources at the proposed MSA is not possible. However, the noise modelling software and WA archives include a database of noise levels, including for Fuel Filling Stations (FFS), Therefore, the noise from the proposed MSA has been predicted at the future sensitive receptors based upon the noise modelling, and previous experience of noise from motorway service areas.

4.6. The suitability of the prevailing local noise environment has been assessed in accordance with National Planning Policy Framework[I] and the Noise Policy Statement for England[II] for noise sensitive aspects of the proposed development. Consideration has been given to the noise mitigation measures that will be required to ensure compliance with appropriate internal and external noise level criteria adopted from BS8233.

HS2

4.7. It has not been possible to include any assessment of construction noise associated with HS2 as this information is not yet available. Further details of the cumulative developments considered within the assessment, and the derivation of the traffic data, are provided in Section 10 of this Technical Paper.

4.8. Furthermore, the Hotel is located well away from the proposed HS2 route. The noise contour plots provided by HS2 Limited suggest that noise from the passage of trains will not be significant and therefore the potential effect has not been considered further.

4.9. The categorisation of the receptors is given below in Table 7.4

Receptors

Designation	Receptors
International	Receptors with the highest sensitivity to noise including internationally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
National	Receptors of very high sensitivity to noise including hospitals and residential care homes. Nationally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
Regional	Receptors of high sensitivity including places of worship and places of quiet recreation (e.g. Country Parks). Regionally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
County *(Proposed residential receptors (i.e. the Hotel))*	Receptors of moderate to high sensitivity including residential dwellings, schools, and play areas. Locally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
Borough / District	Receptors of moderate sensitivity to noise including offices and play areas. Locally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
Local/Neighbourhood	Receptors of the lowest sensitivity to noise (e.g. industrial estates).

Table 7.4: Receptors

4.10. When considering the significance of internal or external noise levels for a specific proposed use (such as internal noise levels for dwellings, or construction noise) a comparison will be made between the predicted noise levels and the relevant guideline or policy level.

4.11. The table below defines the magnitude of the effect. Together with the sensitivity of the receptor, as detailed above, it is used to determine the level of significance.

Environmental Impacts

4.12. Table 7.5 should be used to determine the magnitude of impact for the construction and operational phase of the development the magnitude of impact criteria have been determined using good practice.

Magnitude of Impact	Criteria for assessing Construction Noise Impact
High / Substantial	Noise levels exceed the Assessment Category threshold level for the duration of the construction works.
Moderate	Noise levels exceed the Assessment Category threshold level for periods of more than one month, but for significantly less than the whole duration of the construction works.
Minor	Noise levels exceed the Assessment Category threshold level for periods of less than one month.
Negligible	Noise levels do not exceed the Assessment Category threshold level during any period.

Table 7.5 Construction Noise Assessment Significance Criteria

4.13. The magnitude of the vibration impacts during the construction phase are assessed against the criteria set out in Table 7.6 below the magnitude of impact criteria have been determined using good practice.

Magnitude of Impact	Criteria for assessing Construction Vibration Impact
High / Substantial	> 10mm per sec. Vibration likely to be intolerable for more than brief exposure. Approaching the level at which cosmetic damage may occur in light structures.
Moderate	5mm – 10mm per second. Tolerance less likely even with prior warning and explanation.
Minor	1mm – 5mm per second. Complaints are likely, but can be tolerated if prior warning and explanation given.
Negligible	<1mm per second. Below level at which complaints are likely.

Table 7.6 Construction Vibration Assessment Significance Criteria

4.14. The changes in road traffic noise levels have been assessed against the significance criteria shown in Table 7.7 the magnitude of impact criteria have been determined using a combination of good practice and the criteria detailed in DMRB. The criteria are based upon guidance contained within DMRB for the assessment of changes in road traffic noise. The criteria do not relate to the actual existing noise levels (i.e. traffic noise due to the current residential development). It relates only to the predicted changes in road traffic noise likely to result from the Proposed Development, and any committed developments.

Magnitude of Impact	Criteria for Assessing Road Traffic Noise
High / Substantial	> 10.0 dB increase in traffic noise (equating to a clearly perceptible increase in the loudness of noise).
Moderate	5.0 – 9.9 dB increase in traffic noise (equating to an increase in the loudness of the noise which is at or about the threshold of perception)
Minor	3.0 – 4.9 dB increase in traffic noise
Negligible	0.1 – 2.9 dB increase in traffic noise.
No Change	<0.1dB

Table 7.7 Road Traffic Noise Assessment Impact Criteria

4.15. The noise impact of the proposed development at existing sensitive receptors has been assessed using the methodology in BS4142 and the magnitude of the impact shown in Table 7.8 below.

Magnitude of Impact	Criteria for Assessing Proposed Commercial Noise
High / Substantial	The margin of exceedance of the rating level over the background noise level is 10dB or more.
Moderate	The margin of exceedance of the rating level over the background noise level is between +0 and +10dB.
Minor	The margin of exceedance of the rating level over the background noise level is 0dB or less
Negligible	The margin of exceedance of the rating level over the background noise level is -5dB or less
High / Substantial	The margin of exceedance of the rating level over the background noise level is -10dB or less

Table 7.8 Proposed Commercial Noise Impact Criteria

4.16. The noise impact of the existing and proposed sources of noise at the proposed Hotel has been assessed using the methodology in BS8233 and the magnitude of the impact shown in Table 7.9 below.

Magnitude of Impact	Criteria for Assessing Noise at Proposed Residential Receptors
High / Substantial	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.
Moderate	The noise causes a material change in behaviour and/or attitude, eg 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.
Minor	Noise can be heard and causes small changes in behaviour and/or attitude, eg 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.
Negligible	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.

Table 7.9 Proposed Commercial Noise Impact Criteria

4.17. The potential noise effects associated with the Proposed Development have been assessed in accordance with the above guidance to determine whether noise and vibration impacts occur at receptors. Where likely adverse effects are identified, appropriate mitigation measures are proposed to avoid, reduce or compensate for the adverse effects.

4.18. The significance of an environmental effect will be determined not only by the magnitude of the impact, as shown in Table 7.5 Tables 7.6, and 7.7, but also by the sensitivity of the receptor, as described in Table 7.10 relates to the IEMA guidance but have been developed together in order to accommodate the noise criteria detailed within appropriate guidance as the DMRB, BS5228 and BS8233, in order to inform the EIA.

Sensitivity	Description
High / Substantial	Impact resulting in a considerable change in baseline environmental conditions predicted either to cause statutory objectives to be significantly exceeded or to result in severe undesirable/desirable consequences on the receiving environment.
Moderate	Impact resulting in a discernible change in baseline environmental conditions predicted either to cause statutory objectives to be marginally exceeded or to result in undesirable/desirable consequences on the receiving environment.
Minor	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions that can be tolerated
Negligible	No discernible change in the baseline environmental conditions, within margins of error of measurement

Table 7.10 Magnitude of Noise Impact

Significance of Effects

4.19. The significance of effect is determined using the significance matrix in Section 6 of the Environmental Statement Part 1 Report. This identifies the receptor level across the top of the matrix and the magnitude of environmental impact down the side and where they meet within the matrix identifies the significance of the effect.

Impact Prediction Confidence

4.20. It is also of value to attribute a level of confidence by which the predicted impact has been assessed. The criteria for these definitions are set out below in Table 7.11:

Confidence Level	Description
High	The predicted impact is either certain i.e. a direct impact, or believed to be very likely to occur, based on reliable information or previous experience.
Low	The predicted impact and its levels are best estimates, generally derived from first principles of relevant theory and experience of the assessor. More information may be needed to improve confidence levels.

Table 7.11: Confidence Levels

5. Baseline Information

Desk Study

5.1. The potential major sources of noise contributing to baseline conditions were identified through a desktop study of the Site and surrounding land uses using available maps and aerial photography.

Sensitive Receptors Considered in the Assessment

5.2. The following sensitive receptors have been considered as those most likely to be affected by noise from the proposed MSA. Other receptors may be impacted by the development, but the impact will be less. The receptors are detailed in Table 7.12 and shown on Figure 7.1 in Appendix 7.3.

Receptor		Grid Co-ordinates		Bearing from Site	Distance to Site
		Easting	Northing		
ESR1	Franks Farm, Holcroft Lane, Warrington. WA3 5AW	367280	394404	North	553m
ESR2	Willowbrook, Holcroft Lane, Warrington. WA3 5AN	367713	394330	North-east	803m
ESR3	Hole Mill Farm, Holcroft Lane, Warrington. WA3 5AP	368132	394044	North-east	1km
ESR4	102 Inglewood Close, Warrington. WA3 6UJ	366947	393018	South	350m
ESR5	48 Howard Road, Warrington. WA3 5EG	366362	394584	North-west	850m

Table 7.12: Existing Sensitive Receptors

Noise Survey

5.3. Wardell Armstrong has carried out unattended noise monitoring adjacent to the M62, to assess the impact of road traffic noise at the Development Site. Monitoring has also been undertaken to measure representative ambient and background sound level at existing sensitive receptors.

5.4. The monitoring locations are as follows and are shown on Figure 7.1 in Appendix 7.3;

- ***Monitoring Location 1:*** In the southern part of the Site, and adjacent to the M62. The noise monitoring location was chosen to measure noise from road traffic at the development site, and has been used to calibrate the noise model;

- ***Monitoring Location 2:*** In the central part of the Site, and at the location of the proposed Hotel. The noise monitoring location was chosen to measure noise from road traffic at the development site, and has been used to calibrate the noise model;

- ***Monitoring Location 3:*** In the northern part of the Site. The monitoring location is away from the noise from the M62 Motorway, and therefore considered to be representative of the existing sensitive receptors ESR1, ESR2, ESR3, and ESR5.

- ***Monitoring Location 4:*** South of the southern Site boundary and the M62 Motorway. The monitoring location was chosen to be representative of the existing sensitive receptor ESR4.

5.5. The noise measurements were made using a Class 1, integrating sound level meters. The microphones were mounted on tripods 1.5m above the ground with the diaphragm positioned horizontally, and more than 3.5 meters from any other reflecting surfaces.

5.6. The sound level meters were calibrated to a reference level of 94dB at 1kHz both before, and on completion of, the noise survey. No significant drift in calibration was measured during the survey.

5.7. For the purpose of this assessment daytime hours are taken to be 0700 to 2300 hours and night-time hours to be 2300 to 0700 hours.

5.8. A-weighted L_{eq} noise levels were measured to comply with the requirements of WHO. A-weighted L_{90} to comply with BS4142 and L_{10} noise levels, together with the maximum and minimum sound pressure levels, were also measured to provide additional information. The measured noise levels are set out in full in Appendix 7.1.

5.9. The noise monitoring was carried out unattended, however, observations and audio recordings were used to identify the major sources of noise were made during the set-up, and removal of the equipment. The Site observations identified the significant noise sources affecting the Site to be as follows.

Road Traffic: Road traffic on the M62 Motorway was the dominant source of noise at ML1, ML2, and ML4, and was audible at ML3.

Other Noise Sources: Noise was frequently audible from aircraft. Birdsong was occasionally audible

5.10. All noise monitoring took place during the following weather conditions.

- No rain
- Low wind speed, less than 2m/s
- Damp ground
- Approximately 10°C
- 70% cloud cover.

5.11. To reduce measurement uncertainty the following steps have been taken:

- The background noise measurement locations were selected to be representative of the background noise level at the closest point of the receptors to the proposed development. In accordance with guidance, the microphones were mounted on tripods 1.5m above the ground with the diaphragm positioned horizontally, and more than 3.5 meters from any other reflecting surfaces;
- The distances between the source and nearest receptors have been modelled using scale drawings showing the locations of each building;
- The background noise measurements were undertaken during dry weather and with wind speeds of less than 5m/s;
- The results of each measurement period were reported to the nearest 0.1dB; and,
- Noise measurements were made using a Class 1, integrating sound level meter

Existing Noise Levels

5.12. The measured noise levels for the monitoring location have been divided into daytime (0700-2300 hours) and night-time (2300-0700 hours) categories. The individual levels have then been arithmetically averaged and then rounded up to give a single daytime and night-time level for each location. The results for the noise monitoring are presented in Table 7.13.

Monitoring Location	Time	Average Measured Noise Level Leq	Average Background Noise Level, L90	10th Highest LAf,Max Noise Level
1	Daytime (0700-2300)	74.3	69.9	--
	Night-time (2300-0700)	70.3	52.9	79.4
2	Daytime (0700-2300)	54.1	51.5	--
	Night-time (2300-0700)	49.5	41.9	56
3	Daytime (0700-2300)	47.5	43.5	--
	Night-time (2300-0700)	47.2	43.5	54.5
4	Daytime (0700-2300)	51.5	46.1	--
	Night-time (2300-0700)	49.4	42.3	56.4

Table 7.13 - Average Daytime and Night-time Noise Levels

5.13. Construction phase noise limits have been determined from the measured baseline noise levels, and in accordance with the ABC method in BS5228. The limits are shown in Table 7.14.

Receptor	Representative Monitoring Location	Average Measured Noise Levels	Ambient Noise Level Rounded to the Nearest 5dB(A) (dB LAeq)	Appropriate Category Value A, B or C in Accordance with BS5228-1	Noise Level above which Construction Activities May Cause a Significant Impact at the Receptor (dB LAeq)
ESR1	ML3	48	50	A	65
ESR2	ML3	48	50	A	65
ESR3	ML3	48	50	A	65
ESR4	ML4	52	50	A	65
ESR5	ML3	48	50	A	65

Table 7.14: Construction Phase Noise Limits at Existing Sensitive Receptors

Without Development

5.14. The evolution of the environment without the implementation of the development is likely to show that, the ambient noise at the Site will slowly and steadily increase as traffic flows on the M62 Motorway, and surrounding roads increase.

5.15. Noise from HS2 is also likely to increase noise at receptors to the north without the development.

6. Alternatives Considered

6.1. Through scheme evolution and consideration environmental impacts, the Facility Building (including Hotel) is located to the middle part of the Site, well away from the Motorway and ESRs. This is considered beneficial from a noise perspective.

7. Potential Environmental Effects

7.1. This section considers the potential impact from the construction and operation phase of the proposed scheme on existing and future receptors.

Construction Phase

Noise from Construction Phase Activities

7.2. The activities associated with the earthworks and construction phase of the Proposed Development have the potential to generate noise and create an impact on the surrounding area.

7.3. Construction noise can have effects on the surrounding neighbourhood. The effects are varied and are complicated further by the nature of the Site works, which will be characterised by mobile noise sources that will change location throughout the construction period. The duration of construction works is also an important consideration. Higher noise levels may be acceptable if it is known that the levels will occur for a limited period.

7.4. During the earthworks and construction phase, any work carried out at the Site is likely to generate noise that may propagate beyond the boundary of the Site.

7.5. As stated above in the limitations and assumptions section, detailed information regarding the nature and timescales of activities likely to take place during the earthworks and construction phase are not known. Activities on the Site, which could give rise to construction related noise impacts include (but are not limited to):

- Site preparation i.e. ground excavation, levelling of ground, trenching, trench filling, unloading and levelling of hardcore and compacting filling; and
- Construction of the Proposed Development including piling, construction of access roads, fabrication processes e.g. planing, sanding, routing, cutting, drilling and laying foundations.

7.6. The contractor undertaking the enabling and construction works has not yet been appointed. However, for the purposes of this assessment it is assumed that the enabling and construction works will be restricted to daytime hours, i.e. between 0700 and 1800 hours Monday to Friday

and 0700 to 1300 hours on a Saturday, with no work on Sunday and Bank Holidays. Based on the expected ambient noise levels during the daytime period, the appropriate category value has been determined for each of the sensitive receptors, as detailed in Table 7.10.

7.7. The earthworks and construction phase activities have the potential to generate short term increases in noise levels, above those recommended in BS5228-1. The levels of noise received at the receptors closest to the Proposed Development would depend on the sound power levels of the machines used, the distance to the properties, the presence of screening or reflecting surfaces and the ability of the intervening ground to absorb the propagating noise.

7.8. The nearest existing noise sensitive receptors to the Proposed Development, as detailed in Table 7.10, will vary depending on the phase of the Proposed Development under construction. Our previous experience of similar sites shows that, given the distances between the construction activities and residential dwellings, noise levels at the existing noise sensitive receptors may occasionally exceed the limits stated in Table 7.12.

7.9. Therefore, noise arising from the construction phase is likely to have a temporary minor impact on existing residential properties of **minor adverse significance** which is not significant, prior to the implementation of mitigation measures.

7.10. It is therefore recommended that mitigation measures be put in place to reduce the significance of effect. Details can be found in the mitigation section of this chapter.

Vibration from Construction Phase Activities

7.11. WA's archives contain field trial measurements of ground vibration associated with types of machinery likely to be used during the construction of the Proposed Development. The representative, measured levels, made by WA using a Vibrock B801 Digital Seismograph, are set out in Table 7.15.

Plant Type	Distance from Source		
	10m (mm/s)	20m (mm/s)	30m (mm/s)
25-30 tonne excavator	0.175	0.075	Background
25 tonne dumptruck (Volvo A25) Loaded Empty	 1.000 0.225	 0.150 0.050	 Background Background
Dozer	1.050	0.400	Background
Vibrating roller Drum Vibrator on Vibrator off	 4.470 0.500	 3.270 0.150	 2.350 0.050
Loading shovel	1.025	0.150	Background

Table 7.15: Measured Vibration Levels of Plant Under Normal Operating Conditions

7.12. The nearest sensitive properties to the proposed construction works, as detailed in Table 7.10 in this paper, will vary depending on the part of the Proposed Development under construction. The sensitive receptors could include noise sensitive premises which become occupied before the completion of the construction phase. As a worst-case scenario, earthworks and construction works may potentially take place at a distance of approximately 350m from existing residential properties.

7.13. In addition to the earthworks and construction works described, it is possible, but unlikely, that piling will be required. At this time, the type(s) of piling which would be used at various locations across the Site is not known and it is likely that the contractor responsible for undertaking construction works at the Site would decide the method of piling.

7.14. BS5228-2 recognises that the most common form of vibration associated with piling is the intermittent type derived from conventional driven piling. The intensity of vibration disturbance, which may be registered at a receptor, will be a function of many factors. These are set out in BS5228-2 and include:

- Energy per blow or cycle;
- Distance between source and receptor;
- Soil structure interaction i.e. nature of connection between soil and structure being monitored; and

- Construction of structure and location of measuring points e.g. soil surface, building foundation and internal structural element.

7.15. As the responsible contractor has not yet been appointed, detailed information regarding the above is not known. It is not therefore possible to assess the potential impacts of vibration generated by piling at this stage, If impact driven piling is required in the southern parts of the Site, there is the potential for an moderate adverse impact.

7.16. The receptors likely to be affected by piling will vary depending on the phase of the Proposed Development under construction. Once the precise building locations, ground conditions for each location and type(s) of piling are confirmed, vibration levels could be estimated and recommendations for control made as appropriate. The significance of effect is given in Table 7.16 below.

Nature of Impact	Receptor	Environmental Effect	Significance of Effect	Confidence Level
Construction Phase Noise	County	Minor Adverse	Minor Adverse	High
Construction Phase Vibration	County	Minor Adverse	Minor Adverse	High

Table 7.16: Significance of Effect - Construction Phase

7.17. Therefore, based on our previous experience and assumptions, vibration arising from the construction phase is likely to have a temporary minor impact on existing residential properties of **minor adverse significance** which is not significant, prior to the implementation of mitigation measures.

7.18. Mitigation measures are discussed within the mitigation section of this Chapter.

Operational Phase

Road Traffic Noise at Existing Sensitive Receptors

7.19. The development itself is not likely to generate significant levels of road traffic. Generally speaking, vehicles of any type visiting the MSA, will do so when undertaking existing journeys, and use the MSA as a stop-off and not a destination.

7.20. Staff vehicles, and occasional customers from the local area may cause a slight change in road traffic flows on the surrounding roads. Therefore, the current and future traffic noise levels at a number of sensitive receptors; both with and without the development in place, have been predicted using traffic flow information from the transport consultant together with the computer modelling software, SoundPLAN Version 8.1. The computer modelling methodology conforms to the calculation procedures set out in the Department of Transport's memorandum, "Calculation of Road Traffic Noise"[v], 1988

7.21. The procedures outlined in CRTN assume typical traffic and noise propagation conditions that are consistent with moderately adverse wind velocities and directions during specified periods. In CRTN, all noise levels can be expressed in terms of the index $L_{10(18\ hour)}$ dB(A).

7.22. In summary, CRTN has been used to determine the noise levels at each existing sensitive receptor, for a total of six scenarios:

- Scenario 1: 2018 Base year;
- Scenario 2: 2022 Baseline + Committed;
- Scenario 3: 2029 Baseline + Committed;
- Scenario 4: 2022 Baseline + Committed + Development; and,
- Scenario 5: 2029 Baseline + Committed + Development.

7.23. Scenarios 2-5 have been used to determine the effect of the proposed development at existing sensitive receptors. Scenarios 1 and 5 have been used to determine the inter-cumulative effect at existing sensitive receptors.

7.24. The results of the road traffic assessment at existing sensitive receptors, for each of the five scenarios, are shown for the façade which is likely to be impacted the most. The results of the assessment are detailed in Table 7.17 below and include the noise impact for each existing sensitive receptor in accordance with the significance criteria in detailed in this chapter. The results are shown graphically in Figures 7.4 to 7.10 in Appendix 7.3.

Existing Sensitive Receptor Number	Predicted $L_{10\ 18hour}$ dB(A) at the façade of the Receptor				2022 Change in Noise	2029 Change in Noise
	Scenario 2	Scenario 3	Scenario 4	Scenario 5		
ESR1	51.9	52.0	52.0	52.1	+0.1	+0.1
ESR2	51.9	52.0	52.0	52.1	+0.1	+0.1
ESR3	52.6	52.7	52.6	52.7	+0.0	+0.0
ESR4	61.7	61.9	61.9	62.1	+0.2	+0.2
ESR5	49.2	49.3	49.2	49.3	+0.0	+0.0

Table 7.17: SoundPLAN Predictions for the Short Term with and without Development Scenarios and Changes in Predicted Road Traffic Noise Levels (Figures in dB)

7.25. The results of the road traffic assessment at each ESR, for each of the four scenarios, are shown for the façade that is likely to be impacted by noise the most. The greatest increase will be +0.2dB(A) when comparing the With Development and Without Development scenario in 2022 and 2029.

7.26. The sensitivity of the ESR is county and the magnitude of change is negligible. Therefore, there is likely to be a direct, permanent, long-term residual effect on ESR of **Negligible (not significant)** at existing sensitive receptors.

Assessment of the Proposed Sources of Noise

7.27. As this is an outline application, no specific details regarding the types of equipment to be installed as part of the proposed MSA, has been determined. Therefore, some assumptions have been made based on previous experience of other motorway service areas. The proposed MSAs will operate 24 hours-a-day, and 365 days-a-year.

7.28. For the purposes of this assessment and for comparable assessment purposes only, it is proposed that; the Fuel Filling Station (FFS) will have A1 (Retail) use; the facilities building will have A1 (retail), and A3 (Restaurants and cafés) uses; and, the Hotel will have C1 (hotels) use. In reality, these uses are quasi uses and ancillary to the overall sui generis MSA use.

7.29. Operational activities associated with A1, A3, and C1 uses have the potential to generate noise at the proposed Hotel, and at existing receptors in the vicinity of the development. Activities that are likely to take place at the proposed development which would have the potential to generate noise include:

- Vehicle movements within the proposed car, coach & HGV parks;
- Ancillary noise sources associated with the proposed premises including external fixed plant; and
- Deliveries and/or collections of goods within the proposed premises, including movement of HGVs.

7.30. The proposed site plan shows the FFS to be located in the southern area of the Site, whilst the Facilities Building and Hotel will lie within the center of the Site. The proposed facility building is connected to the proposed Hotel, therefore noise from the facility building could impact directly upon the occupants of the Hotel bedrooms.

7.31. The following information regarding the proposed MSA has been provided, which is included into the noise model, and has been used to predict the noise emissions from the proposed MSA at existing sensitive receptors;

- Facilities Building with toilet facilities
- Fuel Filling Station (FFS) for cars and HGVs
- Hotel with up to 100 bedrooms
- 536 light vehicles
- 105 HGV spaces
- 1 abnormal load HGV space
- 16 coach spaces
- 15 car plus caravan / motorhome / vehicle plus trailer spaces
- 15 motorcycle spaces

7.32. We would anticipate that both the FFS and Facilities Building will require some externally mounted plant for equipment within the retail units and storage areas.

7.33. Noise from the proposed MSA, at each existing sensitive receptor, has been predicted using SoundPLAN Version 8.1. SoundPLAN contains a database of noise levels which can be used when the exact specification of the proposed equipment has not been determined.

7.34. The quantity predicted noise levels, and percentage on time corrections used in the model, from the database in SoundPLAN, are described in Table 7.18 below.

Details of Equipment	Quantity	Sound Power Level (dB(A))	% On-Time	Operational Hours
Fuel Pump	24	84.5	10	24hrs
Car Door Close	24	97.1	0.5	24hrs
Car Starting	24	98.4	1	24hrs
HGV Starting	4	100.0	1	24hrs
Miscellaneous Plant	1x Facility + 1 x FFS	65.0	100	24hrs
Water Pump	1	65.0	100	24hrs

Table 7.18 - Noise Levels Used in the Noise Model for Proposed Fixed Equipment

Identification of the Specific Noise

7.35. Noise modelling using SoundPLAN version 7.4 has been used to identify the level of noise from the proposed MSA at each receptor, using the details and assumptions as described above, at each of the sensitive receptor in the vicinity of the proposed MSA.

7.36. The predicted specific noise level for the daytime and night-time at each existing sensitive receptor (ESR) is presented in Table 7.19 below and shown on Figure 7.2 and 7.3 in Appendix 7.3.

Receptor	Predicted Noise Level at the Receptor (Leq, Figures in dB(A))	
	Daytime	Night-time
ESR1	41	39
ESR2	38	36
ESR3	36	34
ESR4	45	42
ESR5	37	35

Table 7.19 - Predicted Noise Level at Each Existing Sensitive Receptor

Application of Tonal Weighting

7.37. BS4142 includes guidance on the application of an additional weighting which should be applied should the industrial noise (e.g. condensers, coolers etc.) be considered to be either tonal, impulsive, or intermittent at the existing sensitive receptor.

7.38. Some processes in isolation may be considered to be tonal, impulsive or intermittent. However, when considering the noise from the proposed MSA as a whole, the overall noise is not considered to be tonal, impulsive or intermittent, therefore a weighting has not been applied.

Identification of the Background Noise Level

7.39. Section 8 of BS4142 provides guidance on the selection of the background sound to be used in the assessment. BS4142 states that the background sound levels used for the assessment should be representative of the period being assessed (i.e daytime or night-time periods), and that there is no "single" background sound level.

7.40. Therefore, some analysis of the measured noise levels is required to select the most appropriate and representative background sound levels for each ESR. An assessment has been carried out based upon the measured noise levels during the daytime and night-time.

7.41. The measured noise levels are shown in full in Appendix 7.2, therefore, a summary of the statistically analysed background noise levels is shown in Table 7.20 below.

Receptor	Time Period	Mean Average	Modal Average	Level to be Used in the Assessment
ESR1, ESR2, ESR3 & ESR5	Daytime (0700-2300)	44	46	44-45
	Night-time (2300-0700)	44	41	44-41
ESR4	Daytime (0700-2300)	46	45	45-46
	Night-time (2300-0700)	42	40	40-42

Table 7.20: Background L_{90} Noise Level – (Figures in dB(A))

7.42. A single background noise level is not clearly identifiable from the measured levels; therefore a range of levels will be used in the assessment.

BS4142:2014 Assessment for the Proposed MSA

7.43. In accordance with BS4142, the noise rating levels for the noise sources associated with the proposed MSA, as received at the existing sensitive receptors, have been compared with the corresponding measured background noise levels during the daytime and night-time, as shown in Table 7.21 and Table 7.22.

Description \ Receptor	ESR1	ESR2	ESR3	ESR4	ESR5
Specific Sound Level i.e. noise level of the operational activities (including distance and on-time correction), dB L_{Aeq}	41	38	36	45	37
Tonal Acoustic Feature Correction, dB	+0	+0	+0	+0	+0
Rating Level, dB	41	38	36	45	37
Background Noise level Range for Period	44-45			45-46	44-45
Highest Excess of rating over Background level	-3	-6	-8	+0	-7
Lowest Excess of rating over Background Level	-4	-7	-9	-1	-8

Table 7.21 - BS4142 Assessment of the Noise from the Proposed MSA at Existing Sensitive Receptors during the Daytime - (Figures in dB(A))

Description \ Receptor	ESR1	ESR2	ESR3	ESR4	ESR5
Specific Sound Level i.e. noise level of the operational activities (including distance and on-time correction), dB L_{Aeq}	39	36	34	42	35
Tonal Acoustic Feature Correction, dB	+0	+0	+0	+0	+0
Rating Level, dB	39	36	34	42	35
Background Noise level Range for Period	41-44			40-42	41-44
Highest Excess of rating over Background level	-2	-5	-7	+2	-6
Lowest Excess of rating over Background Level	-5	-8	-10	+0	-9

Table 7.22 - BS4142 Assessment of the Noise from the Proposed MSA at Existing Sensitive Receptors during the Night-time - (Figures in dB(A))

7.44. The noise impact of the operational phase pf the proposed MSA when assessed in accordance with the criteria determined in BS4142 is minor adverse to low at existing sensitive receptors. Indeed, it is likely that operational phase noise from the proposed MSA will not be audible at the receptors.

In EIA terms, noise arising from the operational phase is has an effect of between minor and negligible at existing sensitive receptors ESR1, ESR2, ESR3 and ESR5. Therefore, the effect is between minor adverse and negligible significance at ESR1, ESR2, ESR3 and ESR5 which is not significant. However, noise from the MSA may occasionally have a moderate effect at ESR4 which is moderate adverse that is significant. However, the effect will only have a short duration, and during the night-time. Therefore, results of the assessment indicate that the noise from the proposed MSA is **minor adverse to negligible significance** at existing sensitive receptors during the majority of the time, with occasional **moderate adverse significance** at ESR4 during the night-time.

BS8233 Guidelines Assessment of Noise Levels in Hotel Bedrooms

7.45. Noise prediction calculations have been carried out to determine the future levels of noise from road traffic, and the proposed MSA at the facades of the proposed Hotel, with the proposed MSA, committed development traffic and the proposed development traffic in place, using SoundPLAN. The results of the prediction calculations have been calculated into a 16 hour L_{Aeq} using the calculation methodology in TRL.

Daytime Noise

7.46. The highest predicted noise level at each façade of the proposed Hotel, together with the level of attenuation required to achieve 35dB L_{Aeq} in the Hotel bedrooms, are summarised in Table 7.23.

Properties	Noise Level at the Façade of the Property	Level of Attenuation Needed To Achieve BS8233 Noise Guideline Levels
Northern façade of the Hotel	53	18
Eastern façade of the Hotel	64	29
Southern façade of the Hotel	63	28
Western façade of the Hotel	53	18

Table 7.23 - Façade Noise Levels at the Hotel and Level of Attenuation Required to Achieve the Internal Daytime Noise Limit (Figures in dB (A))

Night-time Noise

7.47. The highest predicted noise level at each façade of the proposed Hotel, together with the level of attenuation required to achieve 30dB L_{Aeq} in the Hotel bedrooms, are summarised in Table 7.24.

Properties	Noise Level at the Façade of the Property	Level of Attenuation Needed To Achieve BS8233 Noise Guideline Levels
Northern façade of the Hotel	51	21
Eastern façade of the Hotel	61	31
Southern façade of the Hotel	59	29
Western façade of the Hotel	52	22

Table 7.24 - Façade Noise Levels at the Hotel and Level of Attenuation Required to Achieve the Internal Night-time Noise Limit (Figures in dB (A))

7.48. A summary of the noise impact of the operational phase of the development at existing sensitive receptors is presented in Table 7.25 below.

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level
Change in traffic noise on roads adjacent to receptors due to development traffic	County	Negligible	Negligible	High
Operational phase noise from the Proposed MSA	County	Moderate	Moderate Adverse	High

Table 7.25 – Summary of Operational Phase Impact Significance

7.49. Therefore, noise arising from the operational phase at the proposed hotel is likely to have a permanent moderate effect on proposed receptors of **moderate adverse significance** which is significant, prior to the implementation of mitigation measures. Mitigation measures and glazing recommendations are discussed in the Mitigation and Enhancement section of this chapter.

8. Proposed Mitigation

8.1. This section details the mitigation measures required to reduce or offset the noise and vibration impacts identified in this chapter.

Construction Phase

Noise from Earthworks and Construction

8.2. To reduce the potential impact of noise levels generated by the construction phase of the Proposed Development, at existing receptor locations in the immediate vicinity of the Site, mitigation measures will be required.

8.3. Best working practice will be implemented during each phase of the earthworks and construction works at the Site. The construction works will follow the guidelines in BS5228-1 and the guidance in BRE Controlling particles, vapour and noise pollution from construction sites, Parts 1 to 5, 2003.

8.4. The following measures will be put in place to minimise noise emissions:

- When works are taking place within close proximity to those sensitive receptors identified, screening of noise sources by temporary screens may be employed;
- All machinery should be regularly maintained to control noise emissions, with particular emphasis on lubrication of bearings and the integrity of silencers;
- Site staff should be aware that they are working adjacent to a sensitive area and avoid all unnecessary noise due to misuse of tools and equipment, unnecessary shouting and radios;
- As far as possible, the avoidance of two noisy operations occurring simultaneously in close proximity to the same sensitive receptor;
- Adherence to any time limits imposed on noisy works by the local authority;
- Implement set working hours during the week and at weekends;

- Ensure engines are turned off when possible; and

- Should earthworks and construction activities need to be carried out during night-time hours, the local authority could include a planning condition which requests advance notice and details of any night working to provided.

Vibration from Earthworks and Construction

8.5. BS5228-2 recognises that the most common form of vibration associated with piling is the intermittent type derived from conventional driven piling.

8.6. To minimise the potential for vibration to be generated by any necessary piling it is recommended that careful consideration is given to the type of piling to be used. However, it is recognised that the piling process will need to be selected on the basis of the strata to be encountered, the loads to be supported and the economics of the system.

8.7. The receptors likely to be affected by piling will vary depending of the phase of the Proposed Development under construction. Once the precise building locations, ground conditions for each location and type(s) of piling are confirmed, vibration levels could be estimated and recommendations for control made as appropriate.

8.8. To keep ground borne vibration to a minimum the following measures, as referred to in BS5228-2, should be put in place:

- Substitution: Where reasonably practicable, plant and or methods of work likely to cause significant levels of vibration at the receptors identified, should be replaced by less intrusive plant/methods of working;

- Isolation of plant at source: This may prove a viable option where the plant is stationary (e.g. a compressor, generator) and located close to a receptor; and,

- The implementation of a Construction and Environment Management Plan

8.9. There are a number of measures which can be implemented, depending upon the type of piling chosen. For example, continus flight auger (CFA) piling produces significantly less vibration than conventional vibration piling. Therefore, fewer mitigation measures would be required if CFA piling were chosen as the preferred method.

8.10. Additionally, the distance between the piling rig, and the receptors has a significant bearing upon the likely impact. Furthermore, the vibration produced by piling is generally transient, and only occurs in one location for a few days.

8.11. BS5228-2 indicates that mitigation might include: use of alternative methods, removal of obstructions, provision of cut-off trenches, reduction of energy input per blow, reduction of resistance to penetration.

8.12. As the construction programme and methodologies become more defined it is suggested that earthworks and construction vibration be reconsidered and that a detailed strategy for control be implemented.

8.13. The vibration impact of piling is therefore likely to vary depending upon the type, location, and duration of any piling undertaken.

Operational Phase

Sensitive Receptors

8.14. Mitigation measures are not required to reduce road traffic noise associated with the MSA at existing sensitive receptors.

Proposed Sources of Noise at the Proposed MSA

8.15. Noise from the MSA is only marginally above the background sound level at ESR4. Therefore, mitigation measures are not required to reduce noise from the proposed industrial noise sources at the proposed MSA.

Glazing Requirements - Daytime Hotel Bedrooms

8.16. When assessing daytime noise levels in noise sensitive rooms of the Hotel the noise attenuation provided by the overall building facade should be considered. To mitigate noise levels the composition of the building facade can be designed to provide the level of attenuation required. Glazing is generally the building element which attenuates noise the least, so the proportion of glazing in a building facade is an important consideration when assessing overall noise attenuation.

8.17. In the absence of design details for the Hotel facades, it has been assumed that the glazing to bedrooms would comprise about 25% of the facade area. To calculate the overall attenuation provided by this percentage of glazing in a brick or block facade, a non-uniform partition calculation can be used.

8.18. The calculation combines the different degrees of attenuation of the wall element and the window element. A facade element comprising solid brick or blockwork, will attenuate by 45dB (British Standard 8233: "Guidance on sound insulation and noise reduction for buildings" 2014) whereas standard double glazing will attenuate road traffic noise by 26-29dB(A) (BRE Digest 379 "Double glazing for heat and sound insulation"). The overall noise attenuation provided by this combination is, therefore, between 31.9dB(A) and 34.9dB(A).

8.19. A number of types of glazing would be able to achieve between 26-29 dB(A). For example, 6/12/6 Pilkington glazing would achieve 26 dB(A) attenuation and 10/12/4 glazing would achieve 29 dB(A) attenuation.

8.20. The noise attenuation requirements for bedrooms in the proposed Hotel are summarised in Table 7.21 and are less than or equal to the attenuation requirements during the night-time. Therefore, the attenuation requirements for the night-time stated in Table 7.21 should be used to determine the mitigation measures for Hotel bedrooms. *Glazing Requirements - Night Time Hotel Bedrooms*

8.21. The noise attenuation requirements for Hotel bedrooms are summarised in Table 7.21 and indicates that standard thermal double glazing would ensure that internal noise levels are met in proposed bedrooms.

8.22. However, with windows open the attenuation provided by the facade will fall to approximately 15dB(A). This would allow the recommended internal noise limits to be exceeded in Hotel bedrooms.

8.23. On occasions this may be acceptable to the occupant, but when quiet conditions are required, the occupant should be able to close the windows whilst maintaining adequate ventilation. Therefore, some form of acoustic ventilation may need to be installed in proposed Hotel bedrooms.

Acoustic Ventilation Requirements

8.24. It is recommended that the acoustic ventilation proposed at the Site should, as a minimum, comply with Building Regulations 2010 Approved Document F1 Means of Ventilation and British Standard BS5925 1991: "Code of Practice for Ventilation Principles and Designing for Natural Ventilation".

8.25. The implementation of the recommended glazing together with acoustic ventilation should ensure that the required internal daytime and night-time noise limits in bedrooms are met.

8.26. Glazing requirements can be confirmed at the detailed design stage.

9. Potential Residual Effects

9.1. The following section determines the noise and vibration impact following the implementation of the mitigation measures suggested in this chapter.

Potential Residual Effects – Construction Phase

9.2. The activities carried out during the earthworks and construction phase of the Proposed Development will have the potential to generate short term increases in noise levels above the recommended noise limits, set in accordance with current guidance, at existing and proposed sensitive receptors surrounding the Site. The use of heavy plant machinery associated with the earthworks and construction works also has the potential to give rise to ground borne vibration.

9.3. To minimise the potential impact of construction works, mitigation measures would be put in place. These will include restrictions on working hours, the implementation of temporary screening where possible, and best working practices as detailed in the mitigation section of this chapter.

9.4. In addition to earthworks and construction it is possible that piling will be required. At this stage detailed information regarding the type of piling has not been confirmed. To minimise the potential for vibration to be generated by piling it is recommended that careful consideration be given to the type of piling used.

9.5. The overall effect of the proposal in terms of construction phase noise and vibration issues during the construction phase is highlighted in the Table 7.26 below:

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation	Residual Significance of Effect
Construction Phase Noise	County	Minor	Minor adverse	High	Yes (Best working practices)	Negligible to minor adverse
Construction Phase Vibration	County	Minor	Minor adverse	High	Yes (Best working practices)	Negligible to minor adverse

Table 7.26: Residual Significance of Effect - Construction Phase

9.6. The overall effect of the proposal in terms of noise and vibration issues during the construction phase is negligible to minor adverse.

Potential Residual Effects – Operational Phase

9.7. The overall effect of the proposal in terms of noise and vibration issues during the operational phase is highlighted in the Table 7.27 below:

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation	Residual Significance of Effect
Change in traffic noise on roads adjacent to receptors due to development traffic	County	Negligible	Negligible	High	None	Negligible
Operational phase noise from the proposed MSA	County	Moderate to Negligible	Minor adverse to Negligible (Brief periods of moderate adverse)	High	None	Minor adverse to Negligible (Brief periods of moderate adverse)
Operational phase noise at the Hotel	County	Moderate	Moderate Adverse	High	Hotel glazing and ventilation	Negligible

Table 7.27: Residual Significance of Effect - Operation Phase

9.8. The overall effect of the proposal in terms of noise issues during the operational phase is negligible to minor adverse, with occasional brief periods of moderate adverse.

10. Additive Impacts (Cumulative Impacts and their Effects)

10.1. For the purposes of this ES we define the additive cumulative effects as:

> ***'Those that result from additive impacts (cumulative) caused by other existing and/or approved projects together with the project itself***

10.2. The developments that are likely to have a cumulative impact when considered with the proposed development have been scoped with the Local Authority and Key Consultees during the preparation of this ES (a full list is included within Section 9 of the ES Part One Report). The following table includes the agreed list of cumulative developments that have been assessed in respect of Nosie and Vibration. These are also shown geographically on the plan included at **Appendix 14** of the ES Part One Report, an shown in Table 7.28 below.

No.	Cumulative Development	Details	Status	Justification for Inclusion in Cumulative Assessment
1	The Quadrant, Cavendish Avenue, Birchwood Park, Warrington, WA3 6AE Application Ref: 2014/23358	Seven units for general industry and/or warehouse/distribution (Use Class B2 and/or B8) Area 7 of the 3.64ha site area 12,225m^2 of development Within area 7 of original outline permission g	Planning Permission Granted 12-08-2014	Yes, included within traffic data used in operational phase noise assessment

Table 7.28: Cumulative Development

10.3. Both Construction and Operational phases will be considered and the short, medium- and long-term impacts assessed.

10.4. Noise during the construction and operational phases of HS2 has been considered in Section 4 of this technical paper.

Short Term

10.5. Short term impacts are likely to occur during the construction phase of the development at existing sensitive receptors. However, construction works will be short term, and mitigation measures will be implemented to reduce any potential noise and vibration impact.

10.6. Furthermore, construction works are mobile and transient, therefore, any noise and vibration impacts will only be experienced where noisy construction works are taking place at the Site boundary closest to each receptor.

Medium Term

10.7. In the medium term, the major noise impacts are likely to be from the operational phase of the proposed MSA. The impact at the existing sensitive receptors in the medium term when assessed in accordance with BS4142 is minor adverse to low. This is equivalent to an effect that is minor adverse to negligible, with brief periods of moderate adverse significance. in EIA terms.

Long Term

10.8. The potential long term cumulative effects relate to the operational phase of the proposed development. The cumulative impact which may occur in the long term is the impact of road traffic noise from the proposed MSA, and the committed development, when considered on the future sensitive receptors.

10.9. For the cumulative assessment, the increase in road traffic noise between Scenario 1: 2015 baseline, and Scenario 3: Future year with the proposed MSA and all committed developments. The calculated noise levels are shown in Table 7.29 below and on Figure 7.6.

Existing Sensitive Receptor Number	Predicted L10 18hour dB(A) at the façade of the Receptor		Long Term Change in Noise
	Scenario 1	Scenario 5	
ESR1	51.7	52.1	+0.4
ESR2	51.8	52.1	+0.3
ESR3	52.5	52.7	+0.2
ESR4	61.5	62.1	+0.6
ESR5	49.1	49.3	+0.2

Table 7.29: SoundPLAN Predictions for the Long Term with and without Development Scenarios and Changes in Predicted Road Traffic Noise Levels (Figures in dB)

10.10. The highest change in noise is +0.6dB(A) (Shown rounded to whole numbers in the table). This cumulative impact is none when assessed in accordance with DMRB shown in Table 7.2. However, it is likely, that road traffic noise from many of the committed developments, with the exception of the proposed MSA, has already been considered at the future receptors. Therefore, the effect is negligible at receptors, which is **negligible significance**.

Summary

10.11. The cumulative effect of road traffic noise from the proposed MSA and committed developments has been considered at the future sensitive receptors identified. The effect at these receptors is negligible significance.

11. Conclusion

11.1. A noise and vibration assessment has been undertaken in support of the Proposed Development and has considered the construction and operational phases of the proposed development. The following potential impacts have been identified and assessed:

- Noise and vibration from the earthworks and construction phase of the development on existing, future and proposed sensitive receptors;
- Changes in road traffic noise on existing, and proposed sensitive receptors, due to development related traffic;
- Proposed noise sources on the existing sensitive receptors. These sources are likely to include vehicle movements at the MSA, and any fixed plant; and,
- The cumulative noise impact at existing sensitive receptors.

11.2. A noise survey was undertaken to establish the baseline ambient noise levels at the Site and at ESR locations. The activities carried out during the enabling works and construction phase of the development will have the potential to generate short-term increases in noise levels. The use of plant machinery associated with the enabling and construction works, including piling, has the potential to give rise to ground borne vibration. To minimise potential noise and vibration impacts, mitigation measures will be put in place. These mitigation measures will include best working practice. The temporary effect following mitigation is short term **Minor Adverse (Not Significant)** to **Negligible (Not Significant)** on sensitive receptors.

11.3. The current and future traffic noise levels at identified receptor locations, both with and without the development, have been predicted using the *Department of Transport's memorandum, Calculation of Road Traffic Noise 1998*[V]. The potential changes in noise levels were assessed against the significance criteria set out in the *Design Manual for Roads and Bridges*[VI] *Volume 11, 2008*. It is concluded that the potential increase in noise levels at existing receptor locations is considered to be **Negligible (Not Significant) effect**.

11.4. The results of the inter cumulative noise impact assessment of road traffic noise are detailed in Table 7.28 and include the noise impact for each ESR in accordance with the significance criteria in Appendix 3. The results indicate that there will be a **Negligible (Not Significant)**

effect at ESR when considering the potential cumulative effect within the locality of the Proposed Development.

11.5. Noise from future road traffic flows for the with development scenario in 2029 (Scenario 5) have been compared with the noise guideline levels specified in the *British Standard 8233:2014 Guidance on Sound Insulation & Noise Reduction for Buildings*[IX]. Appropriate glazing and ventilation will be included to reduce external noise to meet internal noise criteria for the Hotel. Mitigation measures will also be included to meet the required external noise level at proposed noise sensitive premises.

11.6. The results of the BS4142 assessment indicate mitigation measures may be required to ensure that the noise from the proposed MSA do not exceed the limits detailed in this assessment, which will be identified and agreed at the detailed design stage

12. Reference List

[I] National Planning Policy Framework, 2019

[II] Noise Policy Statement for England 2010

[III] National Planning Guidance - Noise, 2019

[IV] British Standard 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites- Parts 1 & 2: Noise and Vibration

[V] Department of Transport's technical memorandum Calculation of Road Traffic Noise 1988

[VI] Design Manual for Roads and Bridges – 2011

[VII] Traffic Research Laboratory Converting the UK traffic noise index LA10,18h to EU noise indices for noise mapping

[VIII] British Standard 4142:2014 Methods for rating and assessing industrial and commercial sound

[IX] British Standard 8233: 2014 Guidance on Sound Insulation and noise reduction for buildings

13. Appendices

Appendix 7.1 – Noise Monitoring Results

File	20190318_145531_000000_1.CMG				
Periods	15m				
Start	18/03/2019 15:00				
End	19/03/2019 15:30				
Location	ML1				
Period start	**LAeq**	**LAmin**	**LA(f)max**	**LA90**	**LA10**
18/03/2019 15:00	74.9	67.8	79.9	71.5	76.7
18/03/2019 15:15	75.2	69.1	79.7	72.5	76.8
18/03/2019 15:30	75.2	69.6	79.9	72.3	76.9
18/03/2019 15:45	75.4	69.2	79.5	73.0	76.9
18/03/2019 16:00	75.5	67.5	80.2	73.0	77.1
18/03/2019 16:15	75.6	68.9	78.9	72.8	77.3
18/03/2019 16:30	75.6	67.4	81.1	73.0	77.1
18/03/2019 16:45	75.6	66.1	79.8	73.3	77.1
18/03/2019 17:00	75.8	68.8	81.8	73.5	77.2
18/03/2019 17:15	76.8	71.3	81.7	74.3	78.3
18/03/2019 17:30	77.4	72.6	81.6	75.1	78.9
18/03/2019 17:45	77.1	71.5	80.4	75.1	78.4
18/03/2019 18:00	76.8	70.7	80.1	74.3	78.3
18/03/2019 18:15	77.1	72.2	82.5	74.8	78.6
18/03/2019 18:30	76.8	71.7	81.1	74.4	78.3
18/03/2019 18:45	76.0	70.1	80.4	73.3	77.7
18/03/2019 19:00	75.5	67.8	80.4	71.5	77.5
18/03/2019 19:15	75.3	66.8	81.0	71.5	77.3
18/03/2019 19:30	74.6	66.6	81.8	69.9	77.2
18/03/2019 19:45	74.6	66.3	80.4	70.1	77.1
18/03/2019 20:00	73.7	63.7	79.9	68.5	76.4
18/03/2019 20:15	73.1	62.2	79.8	68.3	75.8
18/03/2019 20:30	72.2	61.1	79.0	66.6	75.0
18/03/2019 20:45	71.8	63.1	79.2	67.1	74.8
18/03/2019 21:00	71.3	61.5	79.4	65.1	74.4
18/03/2019 21:15	71.2	62.3	79.5	65.1	74.1
18/03/2019 21:30	69.0	57.5	76.6	62.2	72.3
18/03/2019 21:45	67.5	50.3	76.1	58.7	70.9
18/03/2019 22:00	64.0	51.0	72.2	57.5	67.0
18/03/2019 22:15	63.0	48.2	71.2	53.6	66.0
18/03/2019 22:30	62.8	48.2	69.0	56.0	66.2
18/03/2019 22:45	61.5	49.7	69.3	54.1	64.7
18/03/2019 23:00	61.5	44.4	69.2	54.6	64.5
18/03/2019 23:15	60.4	46.9	68.0	53.4	63.3
18/03/2019 23:30	61.0	49.9	69.2	53.7	64.9
18/03/2019 23:45	61.3	49.6	68.3	54.1	64.4
19/03/2019 00:00	61.8	47.4	68.8	53.9	64.6
19/03/2019 00:15	60.5	47.4	68.5	52.9	63.8
19/03/2019 00:30	69.5	47.7	86.9	53.1	72.8
19/03/2019 00:45	74.5	42.2	90.2	47.6	77.7
19/03/2019 01:00	71.2	45.4	84.6	49.8	76.5
19/03/2019 01:15	64.3	40.7	73.2	49.9	68.8
19/03/2019 01:30	62.7	38.5	82.3	45.0	66.2
19/03/2019 01:45	55.1	36.6	68.4	39.4	59.6

19/03/2019 02:00	57.1	37.0	68.4	40.1	61.7
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19/03/2019 02:30	54.5	36.6	68.1	38.2	59.0
19/03/2019 02:45	75.8	41.8	95.4	44.8	63.0
19/03/2019 03:00	55.2	37.0	67.7	38.6	59.5
19/03/2019 03:15	57.8	37.5	69.5	40.4	62.1
19/03/2019 03:30	57.5	37.7	68.1	40.5	62.4
19/03/2019 03:45	56.5	35.3	68.3	40.4	60.8
19/03/2019 04:00	57.6	35.2	67.5	41.8	62.0
19/03/2019 04:15	58.5	36.5	71.2	41.7	63.0
19/03/2019 04:30	65.8	44.3	76.0	53.2	69.9
19/03/2019 04:45	68.3	51.4	77.9	60.3	71.9
19/03/2019 05:00	70.5	58.1	79.1	63.9	74.0
19/03/2019 05:15	72.5	60.6	79.3	66.7	75.5
19/03/2019 05:30	73.9	65.4	80.4	69.0	76.6
19/03/2019 05:45	74.5	67.2	79.6	70.9	76.6
19/03/2019 06:00	76.0	69.0	80.1	73.4	77.6
19/03/2019 06:15	76.6	72.2	80.5	75.2	77.7
19/03/2019 06:30	75.9	70.1	79.8	73.8	77.3
19/03/2019 06:45	72.4	66.7	77.6	69.5	74.4
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19/03/2019 07:30	69.9	64.1	74.8	67.1	71.5
19/03/2019 07:45	70.0	63.3	74.1	67.4	71.9
19/03/2019 08:00	74.8	67.8	79.5	69.5	77.4
19/03/2019 08:15	76.2	71.7	80.3	74.3	77.6
19/03/2019 08:30	75.5	69.0	79.7	73.6	77.0
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19/03/2019 09:30	75.2	66.3	79.6	72.6	76.8
19/03/2019 09:45	75.2	68.7	79.7	72.5	76.8
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19/03/2019 11:30	73.8	67.0	79.3	70.9	75.6
19/03/2019 11:45	74.6	69.3	79.2	72.0	76.4
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19/03/2019 12:30	74.1	67.3	79.7	70.8	76.1
19/03/2019 12:45	73.9	65.0	78.9	70.8	75.8
19/03/2019 13:00	74.2	67.8	79.4	71.4	76.1
19/03/2019 13:15	74.2	67.2	79.1	71.5	76.0
19/03/2019 13:30	73.7	67.0	77.9	70.4	75.5
19/03/2019 13:45	73.3	66.8	78.6	70.1	75.2
19/03/2019 14:00	73.8	67.2	77.9	70.8	75.9
19/03/2019 14:15	73.7	66.1	79.8	70.9	75.5

19/03/2019 14:30	73.7	67.0	79.1	70.9	75.4
19/03/2019 14:45	74.0	65.1	78.7	70.7	76.1
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End	19/03/2019 14:30				
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18/03/2019 15:30	52.9	50.4	58.0	51.4	54.0
18/03/2019 15:45	52.9	49.8	56.7	51.2	54.0
18/03/2019 16:00	52.1	49.3	55.1	50.9	53.1
18/03/2019 16:15	52.6	48.6	58.9	51.2	53.6
18/03/2019 16:30	52.5	49.9	57.6	51.2	53.4
18/03/2019 16:45	52.0	49.1	57.6	50.7	52.9
18/03/2019 17:00	52.3	49.8	58.9	50.9	53.2
18/03/2019 17:15	51.8	49.6	59.5	50.3	53.1
18/03/2019 17:30	53.7	51.9	56.0	52.7	54.4
18/03/2019 17:45	54.2	51.5	59.2	52.7	55.8
18/03/2019 18:00	55.0	53.0	58.2	53.8	55.9
18/03/2019 18:15	54.8	53.3	58.2	53.9	55.4
18/03/2019 18:30	55.7	53.7	58.1	54.4	56.4
18/03/2019 18:45	55.9	53.4	60.0	54.5	56.7
18/03/2019 19:00	55.0	52.8	57.2	53.8	55.9
18/03/2019 19:15	54.1	51.4	57.2	53.0	55.1
18/03/2019 19:30	53.0	50.5	57.5	51.6	54.1
18/03/2019 19:45	53.2	50.6	57.4	51.8	54.1
18/03/2019 20:00	52.1	50.1	54.5	50.8	53.0
18/03/2019 20:15	51.6	48.4	60.9	49.7	52.3
18/03/2019 20:30	51.1	48.7	54.5	49.8	52.1
18/03/2019 20:45	52.0	49.2	56.9	50.6	53.1
18/03/2019 21:00	51.0	48.6	55.2	49.7	52.1
18/03/2019 21:15	50.4	48.2	57.0	48.9	51.3
18/03/2019 21:30	49.9	47.1	55.1	48.3	50.9
18/03/2019 21:45	49.6	44.1	53.1	47.7	50.9
18/03/2019 22:00	49.1	45.1	54.3	47.1	50.5
18/03/2019 22:15	48.6	43.7	53.3	45.6	50.6
18/03/2019 22:30	48.1	43.2	53.6	45.6	50.0
18/03/2019 22:45	46.8	42.0	51.1	44.0	48.6
18/03/2019 23:00	46.1	41.0	51.2	43.5	47.7
18/03/2019 23:15	45.1	42.5	49.4	43.5	46.5
18/03/2019 23:30	45.1	41.8	50.2	43.5	46.2
18/03/2019 23:45	47.6	39.8	57.2	41.4	50.1
19/03/2019 00:00	41.9	38.5	46.8	40.0	43.2
19/03/2019 00:15	42.2	39.0	45.3	40.3	43.5
19/03/2019 00:30	46.8	34.9	56.8	38.0	51.7
19/03/2019 00:45	44.4	34.8	54.2	37.0	48.4
19/03/2019 01:00	48.1	38.0	55.3	41.1	52.0
19/03/2019 01:15	43.4	33.0	57.4	38.3	47.6
19/03/2019 01:30	40.6	33.5	48.4	35.3	43.4
19/03/2019 01:45	38.6	34.5	44.7	35.7	41.1
19/03/2019 02:00	38.0	33.7	41.9	34.8	40.0

19/03/2019 02:15	40.1	35.1	46.8	37.5	42.4
19/03/2019 02:30	41.5	33.3	56.7	35.4	44.4
19/03/2019 02:45	48.3	33.7	63.7	35.1	48.1
19/03/2019 03:00	39.2	33.2	48.0	35.0	42.1
19/03/2019 03:15	42.0	35.8	47.7	37.6	44.6
19/03/2019 03:30	40.6	34.1	47.9	36.2	43.2
19/03/2019 03:45	40.3	33.2	48.9	35.7	43.1
19/03/2019 04:00	39.0	31.2	55.3	34.5	41.3
19/03/2019 04:15	42.2	30.8	56.5	34.7	44.6
19/03/2019 04:30	44.7	38.7	49.7	41.8	46.5
19/03/2019 04:45	47.2	41.8	51.6	44.5	48.9
19/03/2019 05:00	49.6	46.2	52.2	47.8	50.7
19/03/2019 05:15	50.7	47.8	56.2	48.7	52.3
19/03/2019 05:30	54.3	48.3	66.3	50.4	56.9
19/03/2019 05:45	55.9	51.7	65.4	52.8	58.7
19/03/2019 06:00	55.0	52.3	61.5	53.2	56.2
19/03/2019 06:15	55.7	53.5	67.6	54.6	56.1
19/03/2019 06:30	55.3	53.8	57.8	54.5	56.0
19/03/2019 06:45	55.0	53.2	59.4	54.0	55.7
19/03/2019 07:00	54.4	52.7	60.7	53.6	54.9
19/03/2019 07:15	54.0	52.1	59.3	52.9	54.8
19/03/2019 07:30	53.7	51.9	60.2	52.6	54.5
19/03/2019 07:45	54.0	52.2	61.1	52.8	55.1
19/03/2019 08:00	54.4	51.7	59.9	52.5	55.9
19/03/2019 08:15	56.0	53.6	60.6	54.7	56.9
19/03/2019 08:30	54.8	52.1	58.9	53.4	55.7
19/03/2019 08:45	55.5	53.4	60.6	54.2	56.3
19/03/2019 09:00	55.0	52.8	63.1	53.8	55.9
19/03/2019 09:15	56.0	53.2	61.0	54.5	57.2
19/03/2019 09:30	55.6	51.9	58.8	53.7	56.7
19/03/2019 09:45	55.1	53.2	59.2	54.0	56.0
19/03/2019 10:00	54.0	50.5	59.4	51.6	55.3
19/03/2019 10:15	53.4	50.8	61.5	51.8	54.4
19/03/2019 10:30	51.5	48.1	57.0	49.1	52.8
19/03/2019 10:45	54.0	50.2	63.7	51.4	55.4
19/03/2019 11:00	54.6	51.2	59.6	52.9	55.9
19/03/2019 11:15	54.3	48.3	59.8	52.1	55.7
19/03/2019 11:30	53.7	45.7	73.3	47.6	53.3
19/03/2019 11:45	54.3	51.7	59.5	52.8	55.3
19/03/2019 12:00	55.2	52.5	60.0	53.9	56.3
19/03/2019 12:15	54.8	50.8	59.6	52.6	56.3
19/03/2019 12:30	55.4	52.3	63.0	53.7	56.5
19/03/2019 12:45	54.5	51.7	64.0	52.8	55.8
19/03/2019 13:00	54.6	51.5	64.0	53.1	55.5
19/03/2019 13:15	54.7	51.5	57.8	53.1	55.7
19/03/2019 13:30	55.6	52.8	63.8	53.6	56.8
19/03/2019 13:45	55.0	51.2	61.4	52.9	56.4
19/03/2019 14:00	56.1	52.6	61.1	54.4	57.1
19/03/2019 14:15	55.5	51.3	69.3	53.1	56.5

File	20190319_150150_000000_1.CMG				
Periods	15m				
Start	19/03/2019 15:00				
End	20/03/2019 16:15				
Location	ML1				
Period start	**LAeq**	**LAmin**	**LA(f)max**	**LA90**	**LA10**
19/03/2019 15:00	50.9	46.5	66.9	47.9	51.9
19/03/2019 15:15	50.7	45.5	66.3	47.6	50.1
19/03/2019 15:30	49.7	46.5	53.5	48.1	50.8
19/03/2019 15:45	50.7	48.1	58.9	48.8	51.9
19/03/2019 16:00	50.4	47.9	56.5	49.2	51.2
19/03/2019 16:15	50.5	47.7	59.6	49.0	51.3
19/03/2019 16:30	50.3	45.9	64.8	47.2	51.1
19/03/2019 16:45	48.2	46.1	52.2	47.0	49.1
19/03/2019 17:00	49.8	46.5	55.7	47.8	51.1
19/03/2019 17:15	49.7	46.9	54.9	48.3	50.7
19/03/2019 17:30	47.5	44.4	51.0	45.7	48.8
19/03/2019 17:45	47.8	44.8	54.3	45.7	49.1
19/03/2019 18:00	48.6	44.9	65.2	45.9	48.8
19/03/2019 18:15	47.2	44.9	52.7	46.1	48.0
19/03/2019 18:30	45.3	42.7	52.1	43.4	46.9
19/03/2019 18:45	45.8	43.1	55.0	44.0	46.5
19/03/2019 19:00	46.5	44.1	56.3	45.0	47.5
19/03/2019 19:15	47.6	45.4	50.0	46.6	48.5
19/03/2019 19:30	47.6	45.4	51.8	46.5	48.3
19/03/2019 19:45	46.9	44.7	49.1	45.9	47.4
19/03/2019 20:00	48.1	45.2	55.9	46.5	48.7
19/03/2019 20:15	49.5	47.3	58.5	48.1	50.5
19/03/2019 20:30	48.0	44.8	55.4	46.8	48.9
19/03/2019 20:45	47.5	44.7	55.0	46.2	48.4
19/03/2019 21:00	47.4	44.3	56.8	45.5	48.3
19/03/2019 21:15	47.5	45.5	51.5	46.5	48.4
19/03/2019 21:30	48.2	45.3	53.4	46.4	49.5
19/03/2019 21:45	48.0	44.2	56.7	45.8	49.3
19/03/2019 22:00	46.5	42.9	53.5	44.2	47.7
19/03/2019 22:15	46.3	43.2	53.7	44.4	47.6
19/03/2019 22:30	45.8	42.1	55.2	43.9	47.2
19/03/2019 22:45	45.7	42.9	49.6	44.3	46.9
19/03/2019 23:00	44.9	41.8	50.7	43.0	46.3
19/03/2019 23:15	44.1	41.2	50.6	42.2	45.5
19/03/2019 23:30	43.6	41.2	48.0	42.0	44.9
19/03/2019 23:45	42.4	39.4	46.6	40.8	43.5
20/03/2019 00:00	43.0	39.6	48.2	41.1	44.7
20/03/2019 00:15	43.9	40.9	49.2	42.3	45.0
20/03/2019 00:30	44.5	41.0	51.5	42.2	46.2
20/03/2019 00:45	44.8	39.8	50.9	42.1	46.7
20/03/2019 01:00	44.1	40.9	50.3	42.2	45.3
20/03/2019 01:15	44.1	41.5	50.8	42.3	45.6
20/03/2019 01:30	43.3	38.7	49.8	40.5	44.9
20/03/2019 01:45	42.3	38.5	47.7	40.1	44.0

20/03/2019 02:00	40.7	36.4	46.4	38.1	42.3
20/03/2019 02:15	42.1	37.6	53.7	39.5	43.3
20/03/2019 02:30	42.9	39.8	51.0	40.9	44.6
20/03/2019 02:45	42.7	39.6	50.0	40.6	44.1
20/03/2019 03:00	43.3	39.8	50.0	41.2	45.0
20/03/2019 03:15	42.2	38.9	47.5	40.5	43.3
20/03/2019 03:30	42.3	38.3	46.4	40.0	43.8
20/03/2019 03:45	44.1	39.5	51.6	41.2	46.3
20/03/2019 04:00	43.3	39.9	55.1	41.2	44.8
20/03/2019 04:15	45.1	40.0	54.6	41.4	48.0
20/03/2019 04:30	46.9	44.2	60.7	45.4	48.0
20/03/2019 04:45	46.9	43.0	50.8	45.0	48.4
20/03/2019 05:00	49.8	46.2	54.2	48.0	51.2
20/03/2019 05:15	49.2	46.4	56.8	47.5	50.1
20/03/2019 05:30	50.8	47.6	57.4	48.9	51.8
20/03/2019 05:45	51.1	47.0	68.9	48.8	51.4
20/03/2019 06:00	51.9	49.3	57.4	50.6	52.9
20/03/2019 06:15	52.6	50.7	57.1	51.3	53.6
20/03/2019 06:30	52.2	50.2	59.4	51.0	53.2
20/03/2019 06:45	52.5	49.4	57.5	51.3	53.6
20/03/2019 07:00	51.1	47.8	59.0	48.6	52.5
20/03/2019 07:15	49.6	47.4	64.0	47.9	50.3
20/03/2019 07:30	48.0	45.5	55.3	46.7	49.1
20/03/2019 07:45	47.9	45.7	56.4	46.5	49.3
20/03/2019 08:00	48.3	43.1	55.8	44.7	50.0
20/03/2019 08:15	44.9	43.2	53.6	43.8	45.7
20/03/2019 08:30	45.8	43.4	55.3	44.0	47.5
20/03/2019 08:45	46.5	43.1	54.3	44.2	47.6
20/03/2019 09:00	48.2	44.4	60.1	45.6	49.5
20/03/2019 09:15	48.3	45.2	54.7	46.2	49.7
20/03/2019 09:30	48.9	45.5	57.3	47.5	50.0
20/03/2019 09:45	49.4	45.1	59.8	46.3	51.0
20/03/2019 10:00	45.9	43.5	50.6	44.4	47.0
20/03/2019 10:15	46.6	42.9	58.8	44.2	47.7
20/03/2019 10:30	45.0	41.1	52.1	42.5	46.7
20/03/2019 10:45	43.8	41.7	49.4	42.3	45.1
20/03/2019 11:00	43.2	40.6	49.4	41.7	44.2
20/03/2019 11:15	45.8	39.9	62.3	41.3	47.6
20/03/2019 11:30	47.2	39.6	60.3	40.5	50.5
20/03/2019 11:45	45.5	40.6	57.3	41.8	47.3
20/03/2019 12:00	45.1	40.0	59.5	40.8	47.4
20/03/2019 12:15	43.1	38.9	53.6	39.7	45.8
20/03/2019 12:30	42.0	39.3	50.1	40.2	43.3
20/03/2019 12:45	41.4	37.9	51.8	38.9	43.2
20/03/2019 13:00	44.7	37.8	60.8	39.1	44.1
20/03/2019 13:15	45.4	37.5	56.2	38.9	48.9
20/03/2019 13:30	43.2	39.7	48.2	41.3	44.7
20/03/2019 13:45	42.9	37.4	56.9	38.7	43.4
20/03/2019 14:00	52.6	37.6	74.5	38.8	49.1
20/03/2019 14:15	42.8	37.3	48.7	38.8	44.8

20/03/2019 14:30	41.0	37.3	45.7	38.5	43.1
20/03/2019 14:45	41.8	36.1	56.1	37.3	43.7
20/03/2019 15:00	46.7	37.9	63.9	39.8	45.4
20/03/2019 15:15	39.7	35.6	47.2	36.7	41.2
20/03/2019 15:30	39.5	35.6	48.6	36.9	41.6
20/03/2019 15:45	41.0	37.1	48.9	38.4	42.8
20/03/2019 16:00	47.2	37.5	69.6	39.1	46.6

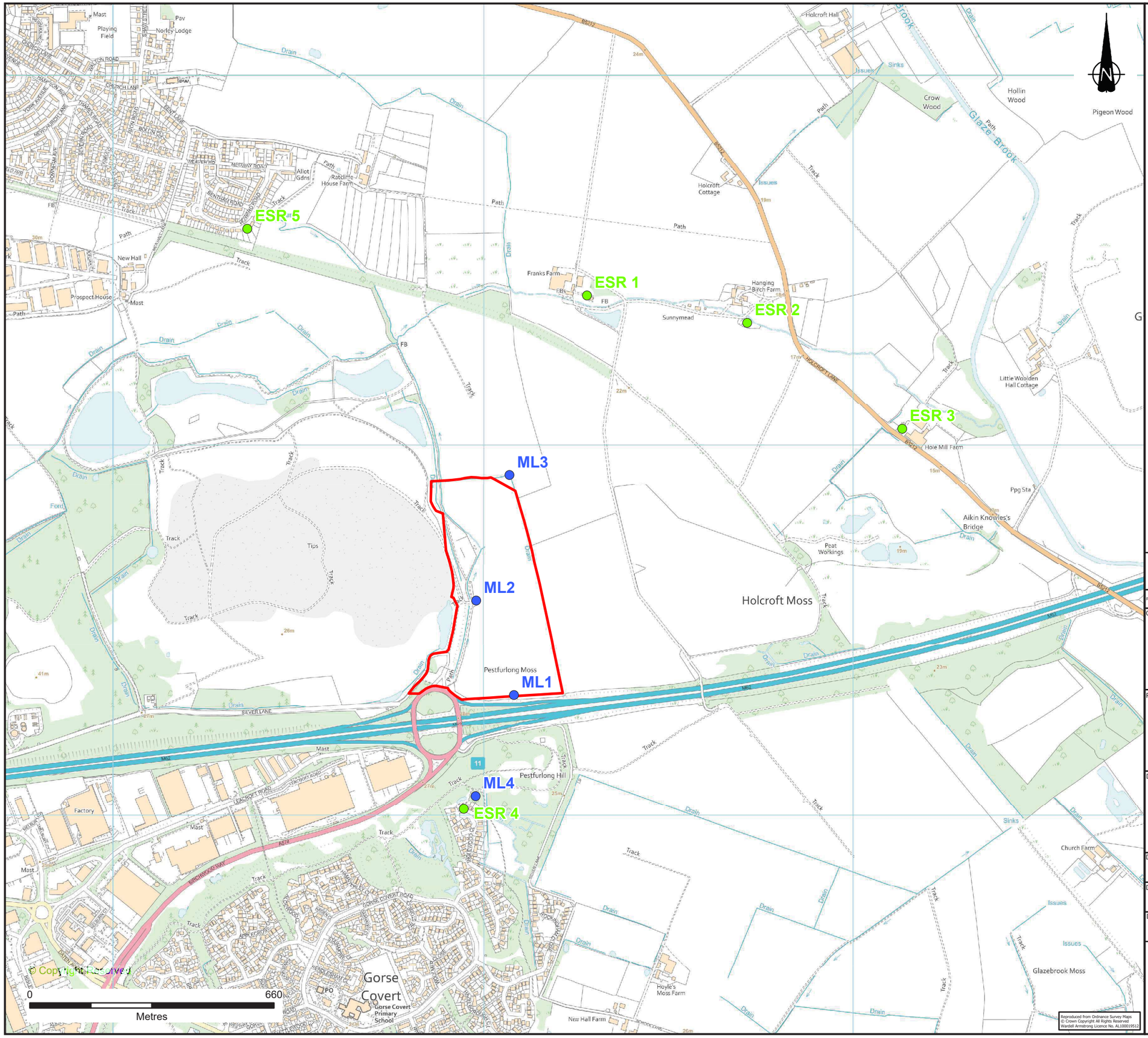
File	20190319_153940_000000_1.CMG				
Periods	15Min				
Start	19/03/2019 15:30				
End	20/03/2019 13:30				
Location	ML4				
Period start	**LAeq**	**LAmin**	**LA(f)max**	**LA90**	**LA10**
19/03/2019 15:30	53.6	49.5	66.9	50.8	54.8
19/03/2019 15:45	54.0	50.8	69.4	51.6	55.2
19/03/2019 16:00	53.2	49.4	65.9	50.1	54.2
19/03/2019 16:15	53.1	49.0	64.4	50.1	54.8
19/03/2019 16:30	51.8	48.1	59.1	49.3	54.0
19/03/2019 16:45	51.2	48.5	68.7	49.1	51.5
19/03/2019 17:00	52.7	48.2	67.9	49.3	55.0
19/03/2019 17:15	52.4	48.9	60.0	50.1	54.4
19/03/2019 17:30	53.5	49.1	68.4	50.6	55.8
19/03/2019 17:45	55.1	47.8	70.9	50.4	57.0
19/03/2019 18:00	53.2	49.1	64.0	50.4	55.1
19/03/2019 18:15	51.9	49.1	62.0	49.8	53.5
19/03/2019 18:30	51.9	47.0	68.2	48.3	53.2
19/03/2019 18:45	51.9	46.3	62.8	47.8	55.3
19/03/2019 19:00	48.7	45.8	54.9	46.9	49.9
19/03/2019 19:15	48.5	46.3	50.5	47.2	49.3
19/03/2019 19:30	48.7	47.3	52.4	47.9	49.4
19/03/2019 19:45	47.4	45.0	50.7	46.2	48.2
19/03/2019 20:00	47.2	45.0	57.0	45.7	47.3
19/03/2019 20:15	47.8	44.6	55.9	46.3	49.0
19/03/2019 20:30	49.0	46.7	54.7	47.7	49.8
19/03/2019 20:45	49.3	46.4	59.5	47.6	50.0
19/03/2019 21:00	49.6	46.4	58.0	47.7	50.9
19/03/2019 21:15	49.3	46.7	52.2	47.9	50.2
19/03/2019 21:30	48.9	45.1	53.0	46.5	50.3
19/03/2019 21:45	45.9	41.2	54.3	42.4	47.7
19/03/2019 22:00	45.5	41.4	53.8	43.2	46.3
19/03/2019 22:15	45.1	40.5	56.5	42.4	45.8
19/03/2019 22:30	42.7	39.9	48.1	40.9	44.1
19/03/2019 22:45	42.6	40.1	49.2	41.3	43.5
19/03/2019 23:00	41.9	39.1	45.9	40.3	43.0
19/03/2019 23:15	42.6	39.1	56.6	40.4	44.1
19/03/2019 23:30	42.1	39.7	46.8	40.7	43.2
19/03/2019 23:45	41.2	38.1	45.3	39.7	42.4
20/03/2019 00:00	41.9	39.2	45.9	40.4	43.1
20/03/2019 00:15	41.8	39.2	46.8	40.4	43.0
20/03/2019 00:30	42.2	39.6	47.8	40.7	43.5
20/03/2019 00:45	42.2	39.5	45.6	40.8	43.2
20/03/2019 01:00	41.8	39.2	45.4	40.2	43.2
20/03/2019 01:15	41.3	38.3	45.5	39.7	42.5
20/03/2019 01:30	41.9	39.1	46.2	40.1	43.4
20/03/2019 01:45	41.2	39.0	44.0	40.1	42.0
20/03/2019 02:00	41.1	37.4	45.0	38.6	42.8
20/03/2019 02:15	41.1	38.2	47.7	39.5	42.2

20/03/2019 02:30	41.7	39.5	45.9	40.2	43.0
20/03/2019 02:45	41.0	38.6	44.7	39.5	42.3
20/03/2019 03:00	41.2	39.0	46.1	39.9	42.2
20/03/2019 03:15	40.8	37.3	49.5	39.3	41.9
20/03/2019 03:30	41.5	37.8	45.4	39.7	42.9
20/03/2019 03:45	41.6	38.6	45.7	40.3	42.5
20/03/2019 04:00	42.1	37.7	56.5	39.2	42.7
20/03/2019 04:15	46.3	38.8	57.1	40.8	50.8
20/03/2019 04:30	47.4	40.2	58.8	41.9	51.7
20/03/2019 04:45	48.4	41.5	59.8	42.9	52.5
20/03/2019 05:00	51.8	42.5	62.4	44.9	55.4
20/03/2019 05:15	53.8	44.5	61.6	48.1	56.8
20/03/2019 05:30	56.9	47.8	71.1	50.8	59.1
20/03/2019 05:45	58.0	47.2	73.8	49.0	62.2
20/03/2019 06:00	51.0	46.5	59.5	48.8	52.8
20/03/2019 06:15	55.8	47.9	69.4	48.9	57.2
20/03/2019 06:30	51.5	47.7	66.8	48.8	54.1
20/03/2019 06:45	52.1	47.8	60.8	48.8	54.5
20/03/2019 07:00	53.0	46.9	61.3	49.5	55.5
20/03/2019 07:15	52.1	49.2	60.5	50.5	53.0
20/03/2019 07:30	50.3	46.4	60.4	47.9	51.7
20/03/2019 07:45	49.8	45.6	62.9	46.9	52.0
20/03/2019 08:00	50.0	45.5	60.7	47.2	51.8
20/03/2019 08:15	48.8	45.0	57.9	46.5	50.3
20/03/2019 08:30	48.8	43.5	64.8	45.1	50.4
20/03/2019 08:45	52.5	43.1	71.4	44.8	55.7
20/03/2019 09:00	55.7	44.4	69.4	47.3	59.2
20/03/2019 09:15	60.4	43.7	80.8	45.1	57.4
20/03/2019 09:30	48.9	44.1	58.9	45.7	51.0
20/03/2019 09:45	50.1	45.1	61.0	47.4	52.2
20/03/2019 10:00	51.0	45.3	58.9	47.2	53.9
20/03/2019 10:15	54.0	43.0	70.1	44.4	54.3
20/03/2019 10:30	49.6	42.9	62.3	45.8	52.1
20/03/2019 10:45	50.1	43.6	62.0	45.4	52.9
20/03/2019 11:00	50.9	41.5	68.6	43.8	54.1
20/03/2019 11:15	50.0	42.1	61.4	44.7	52.5
20/03/2019 11:30	50.9	42.1	61.8	46.7	53.9
20/03/2019 11:45	52.3	45.5	61.9	47.9	55.0
20/03/2019 12:00	52.7	43.3	69.3	44.8	56.9
20/03/2019 12:15	51.6	43.1	66.9	44.4	56.3
20/03/2019 12:30	52.2	43.0	71.1	44.7	53.1
20/03/2019 12:45	48.9	43.9	65.2	45.3	48.4
20/03/2019 13:00	52.8	43.2	72.7	44.8	54.9

Appendix 7.2 – Traffic Flows Used in the Road Traffic Noise Assessment

Warrington - 24hr AADT and 18hr AAWT flows issued 22.03.19

	2018 Base			2022 Base + Committed			2029 Base + Committed			2022 Base + Committed + Development			2029 Base + Committed + Development		
Link	**Vehicles**	**%HDVs**	**HDVs**	**Vehicles**	**HDVs**	**%HDV**	**Vehicles**	**HDVs**	**%HDV**	**Vehicles**	**HDVs**	**%HDV**	**Vehicles**	**HDVs**	**%HDV**
M62 EB On-Slip	7157	7%	494	7513	506	7%	7513	506	7%	10865	884	8%	10865	884	8%
M62 WB Off-Slip	6614	7%	430	6974	443	6%	6974	443	6%	10468	818	8%	10468	818	8%
Birchwood Way	25509	7%	1773	27895	1856	7%	27895	1856	7%	27895	1856	7%	27895	1856	7%
M62 WB On-Slip	7193	7%	468	8024	495	6%	8024	495	6%	11518	870	8%	11518	870	8%
M62 EB Off-Slip	4545	8%	382	5385	412	8%	5385	412	8%	8737	791	9%	8737	791	9%
Site Access	0	0%	0	5385	0	0%	0	0	0%	7998	1607	20%	7998	1607	20%
Eastern Circulatory	4545	8%	382	5385	412	8%	5385	412	8%	9524	815	9%	9524	815	9%
Western Circulatory	7157	7%	494	7513	506	7%	7513	506	7%	11652	908	8%	11652	908	8%
M62 Mainline East of J11	117621	16%	18290	118337	18315	15%	118337	18315	15%	118337	18315	15%	118337	18315	15%
M62 Mainline Within J11	102485	16%	16346	108730	17342	16%	116787	18627	16%	101884	16590	16%	109940	17875	16%
M62 MainlineWest of J11	114442	15%	17510	116112	17568	15%	116112	17568	15%	116112	17568	15%	116112	17568	0



KEY

- Site Boundary
- Noise Monitoring Locations
- Existing Sensitive Receptors

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
-	-	-	-	-	-

CLIENT

EXTRA MSA GROUP

PROJECT

WARRINGTON MSA

DRAWING TITLE

NOISE MONITORING AND EXISTING SENSITIVE RECEPTORS LOCATION PLAN

DRG No.		REV
SH11739-FIGURE 7.1		P01
DRG SIZE	SCALE	DATE
A3	1:10,000	26/04/2019
DRAWN BY	CHECKED BY	APPROVED BY
EF		

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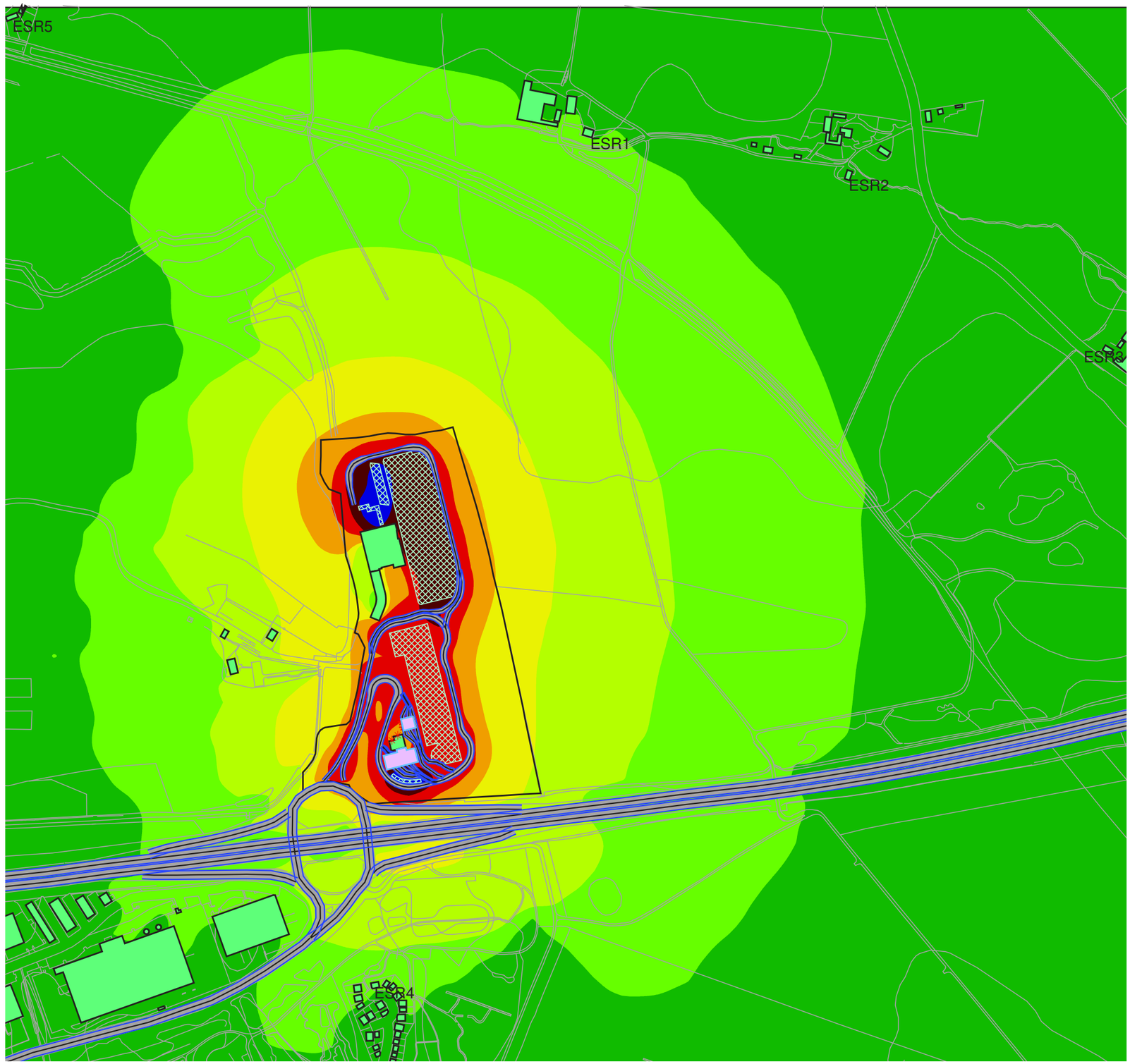

Warrington MSA

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Figure 7.2 - Daytime

Operational Phase Noise from the MSA

Drawn By: R Calvert

Checked By: R Calvert

Approved By: Mark Dawson

26/07/2019

Signs and symbols

- Buildings
- Roads
- Parking lot
- Point source
- Roof area

Noise levels
in $L_{eq\ 16\ hour}$ dB(A)

<	40
40 -	45
45 -	50
50 -	55
55 -	60
60 -	65
65 -	70
>=	70

N

Length scale 1:7000

0 70 140 210 m

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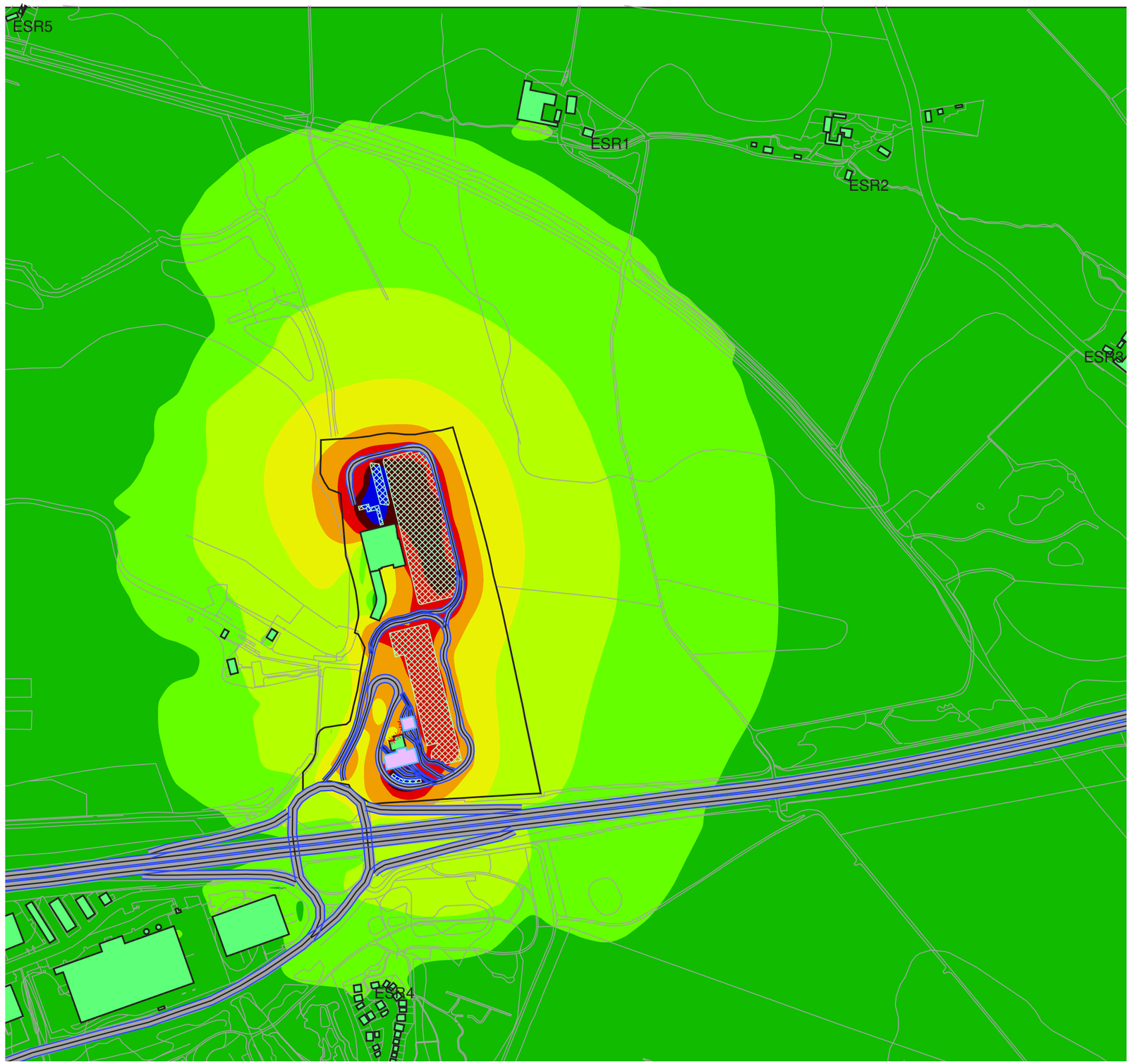

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Figure 7.3 - Night-time

Operational Phase Noise from the MSA

Drawn By: R Calvert

Checked By: R Calvert

Approved By: Mark Dawson

26/07/2019

Signs and symbols

- Buildings
- Roads
- Parking lot
- Point source
- Roof area

Noise levels

in $L_{eq\ 16\ hour}$ dB(A)

<	40
40 -	45
45 -	50
50 -	55
55 -	60
60 -	65
65 -	70
>=	70

N

Length scale 1:7000

0 70 140 210 m

wardell armstrong

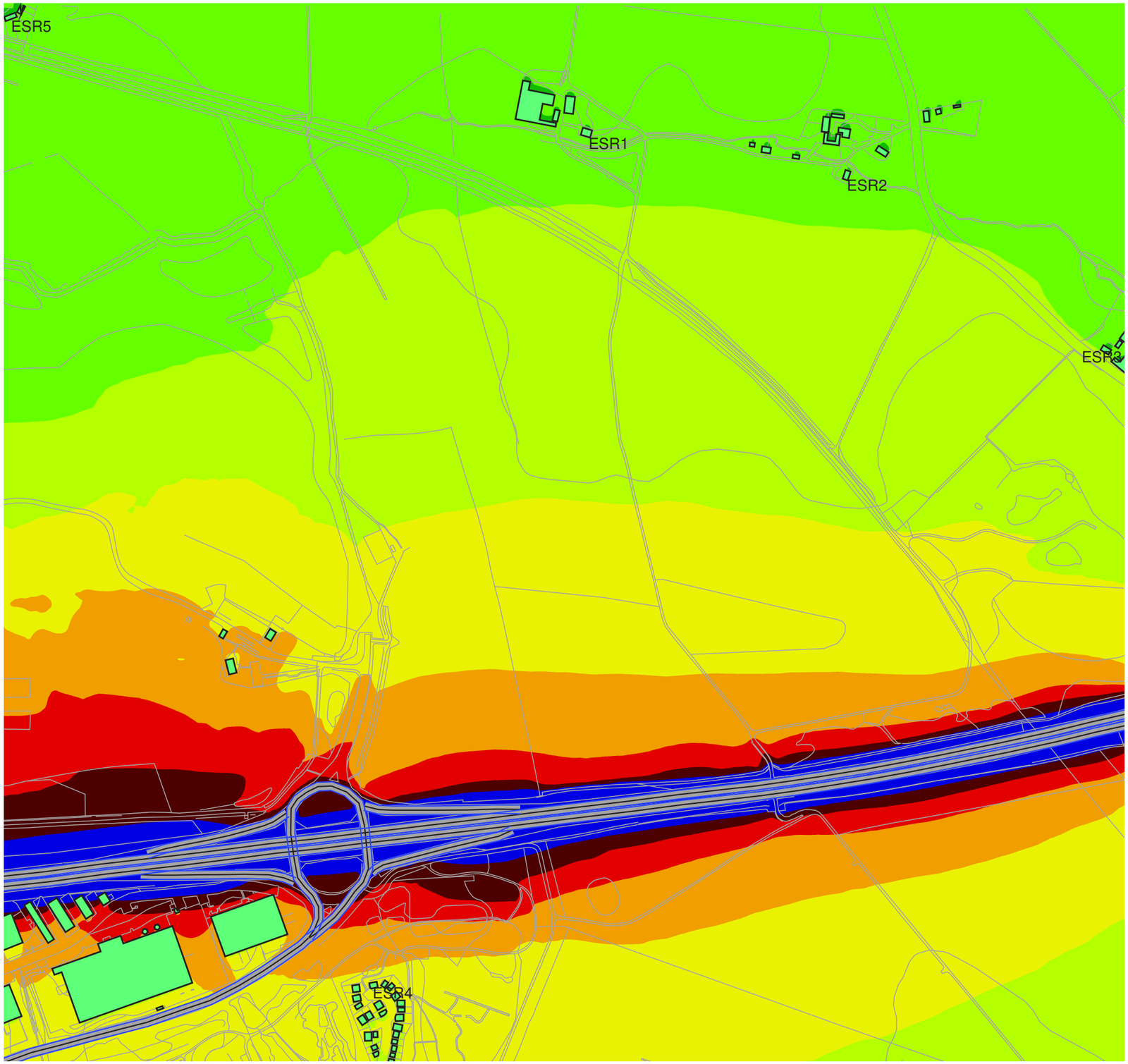

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Figure 7.4 - 2018 Baseline

Noise Contour Plot

Drawn By: R Calvert

Checked By: R Calvert

Approved By: Mark Dawson

26/07/2019

Signs and symbols

- Buildings
- Roads

Noise levels

in $L_{10\ 18\ hour}$ dB(A)

<	45
45 -	50
50 -	55
55 -	60
60 -	65
65 -	70
70 -	75
>=	75

N

Length scale 1:7000

0 70 140 210 m

wardell armstrong

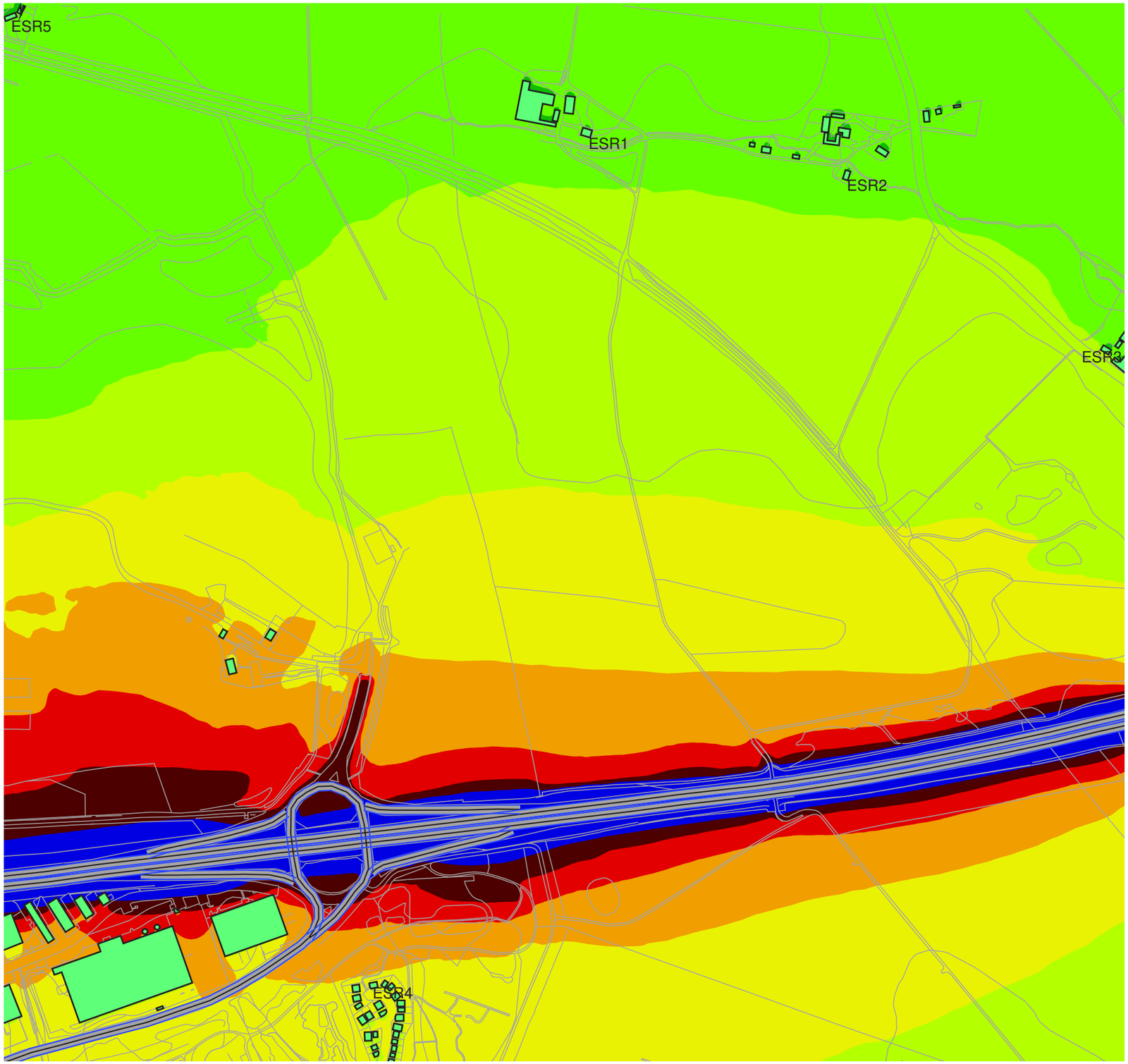

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Figure 7.5 - 2022 Baseline

Noise Contour Plot

Drawn By: R Calvert

Checked By: R Calvert

Approved By: Mark Dawson

26/07/2019

Signs and symbols

- Buildings
- Roads

Noise levels

in $L_{10\ 18\ hour}$ dB(A)

<	45
45 -	50
50 -	55
55 -	60
60 -	65
65 -	70
70 -	75
>=	75

N

Length scale 1:7000

0 70 140 210 m

wardell armstrong

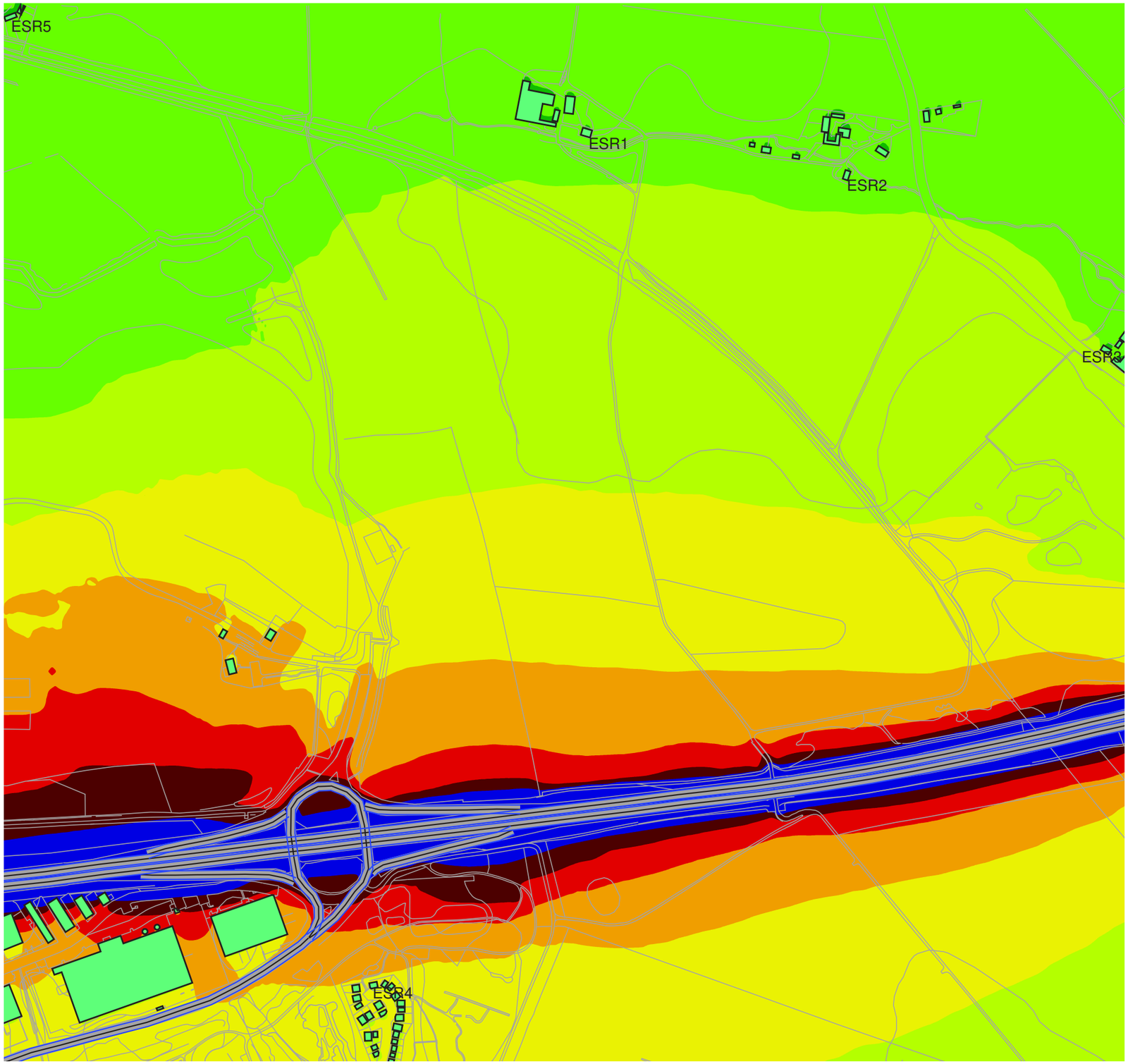

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Figure 7.6 - 2029 Baseline

Noise Contour Plot

Drawn By: R Calvert

Checked By: R Calvert

Approved By: Mark Dawson

26/07/2019

Signs and symbols

- Buildings
- Roads

Noise levels

in $L_{10\ 18\ hour}$ dB(A)

<	45
45 -	50
50 -	55
55 -	60
60 -	65
65 -	70
70 -	75
>=	75

N

Length scale 1:7000

0 70 140 210 m

wardell armstrong

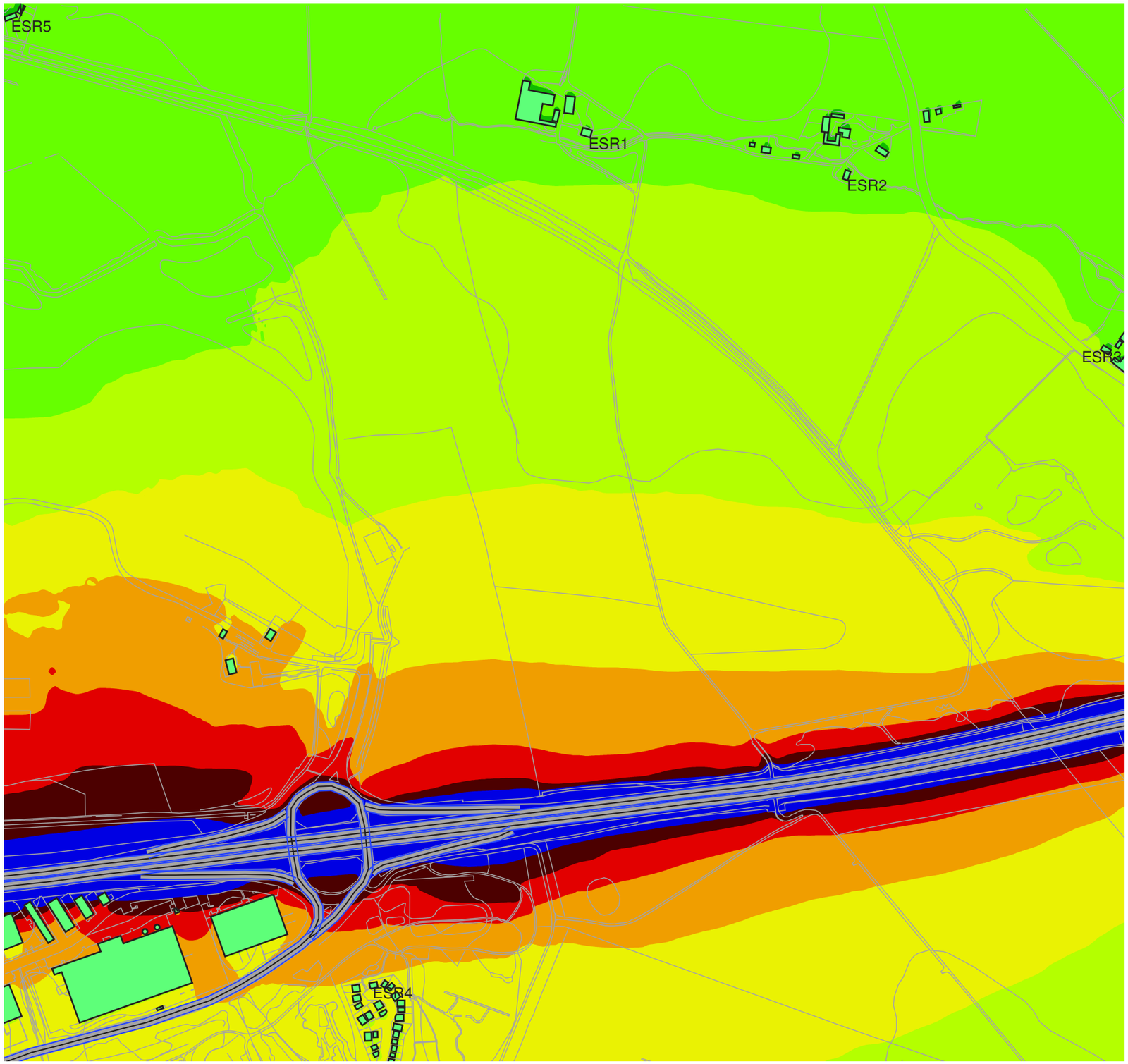

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Figure 7.7 - 2022 - Baseline with Development

Noise Contour Plot

Drawn By: R Calvert

Checked By: R Calvert

Approved By: Mark Dawson

26/07/2019

Signs and symbols

- Buildings
- Roads

Noise levels
in $L_{10\ 18\ hour}$ dB(A)

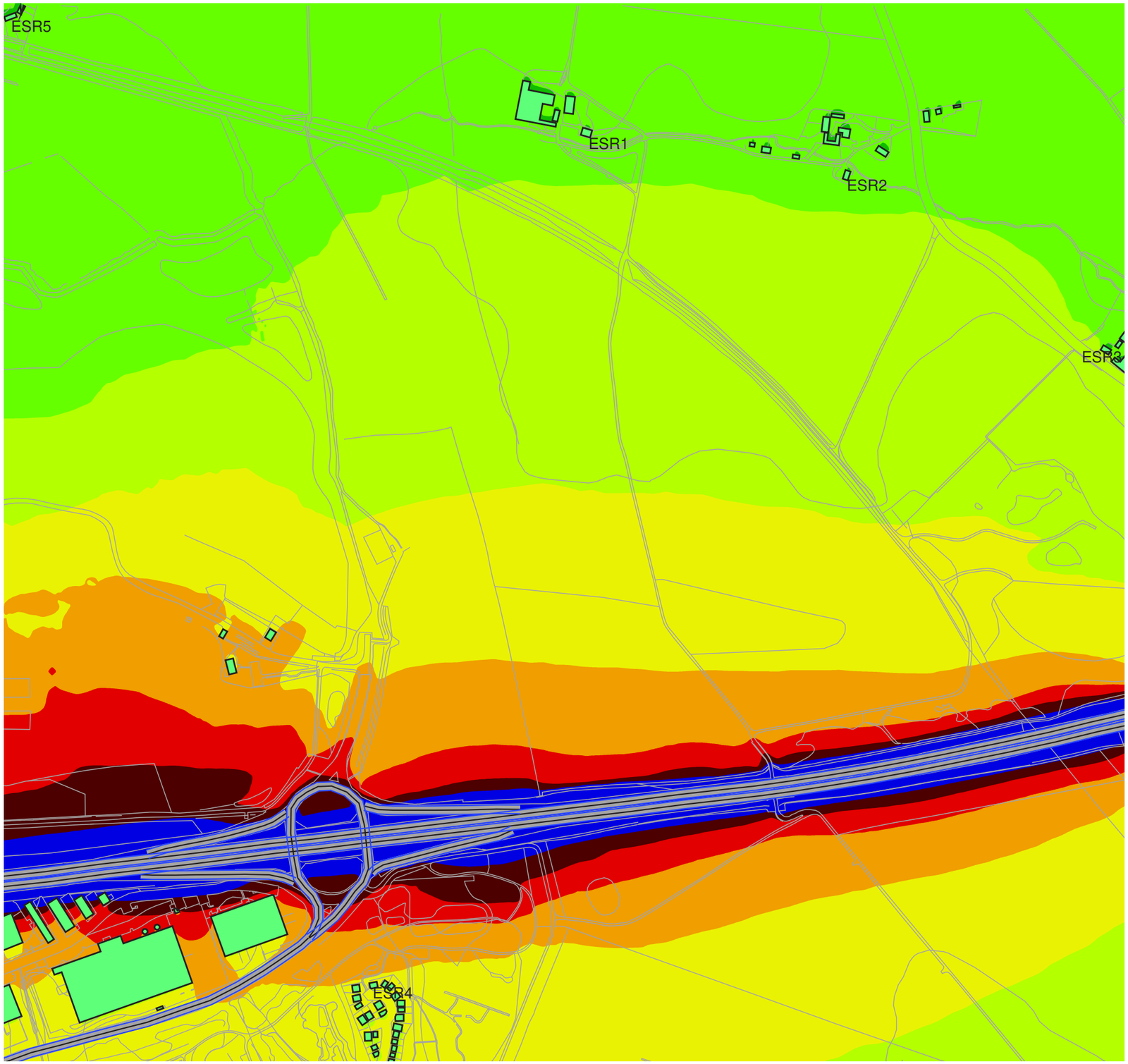
<	45
45 -	50
50 -	55
55 -	60
60 -	65
65 -	70
70 -	75
>=	75

N

Length scale 1:7000

0 70 140 210 m

wardell armstrong



Warrington MSA

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Figure 7.7 - 2022 - Baseline with Development

Noise Contour Plot

Drawn By: R Calvert

Checked By: R Calvert

Approved By: Mark Dawson

26/07/2019

Signs and symbols

- Buildings
- Roads

Noise levels
in $L_{10\ 18\ hour}$ dB(A)

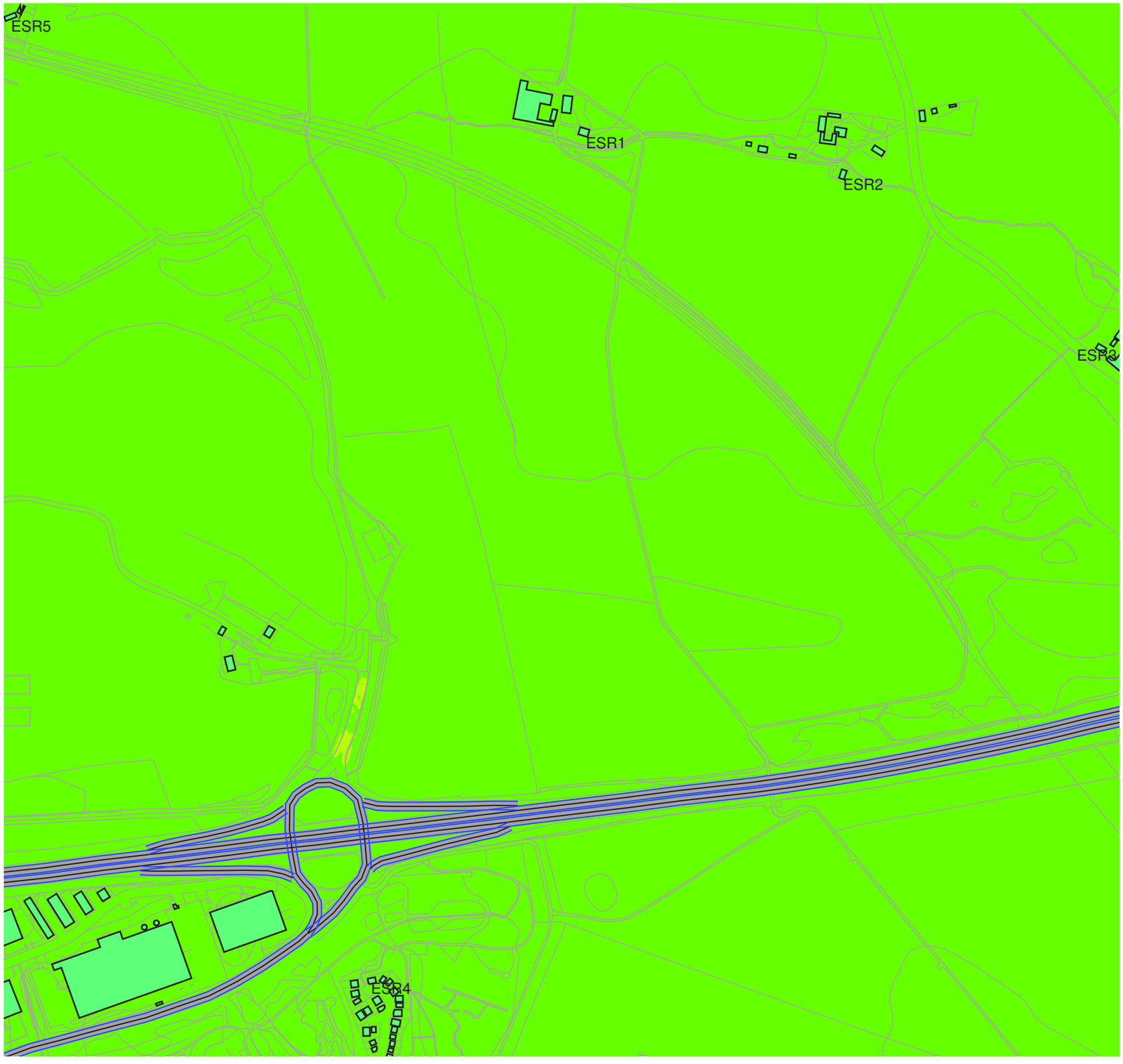
<	45
45 -	50
50 -	55
55 -	60
60 -	65
65 -	70
70 -	75
>=	75

N

Length scale 1:7000

0 70 140 210 m

wardell armstrong



Warrington MSA

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Figure 7.9 - 2022 - Change

Noise Contour Plot

Drawn By: R Calvert

Checked By: R Calvert

Approved By: Mark Dawson

26/07/2019

Signs and symbols

- Buildings
- Roads

Noise levels
in $L_{10\ 18\ hour}$ dB(A)

- < 1.5
- 1.5 - 3.0
- 3.0 - 4.5
- >= 4.5

N

Length scale 1:7000

0 70 140 210 m

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Figure 7.10 - 2029 - Change

Noise Contour Plot

Drawn By: R Calvert

Checked By: R Calvert

Approved By: Mark Dawson

26/07/2019

Signs and symbols

- Buildings
- Roads

Noise levels
in $L_{10\ 18\ hour}$ dB(A)

- < 1.5
- 1.5 - 3.0
- 3.0 - 4.5
- >= 4.5

N

Length scale 1:7000

0 70 140 210 m

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Figure 7.11 - Long Term Change

Noise Contour Plot

Drawn By: R Calvert

Checked By: R Calvert

Approved By: Mark Dawson

26/07/2019

Signs and symbols

- Buildings
- Roads

Noise levels
in $L_{10\ 18\ hour}$ dB(A)

- < 1.5
- 1.5 - 3.0
- 3.0 - 4.5
- >= 4.5

N

Length scale 1:7000

0 70 140 210 m

wardell armstrong