

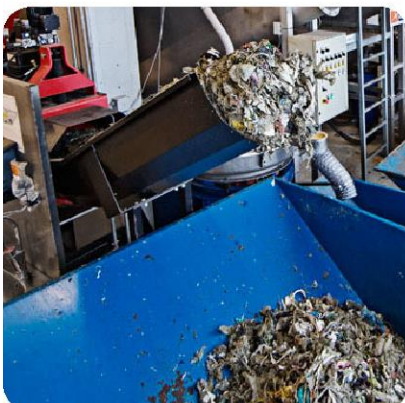
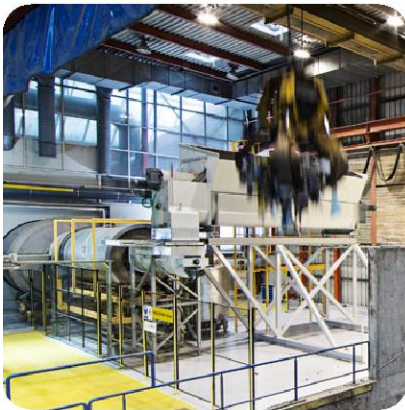


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## REnescience Northwich

# Appendix E: Noise and Vibration Assessment

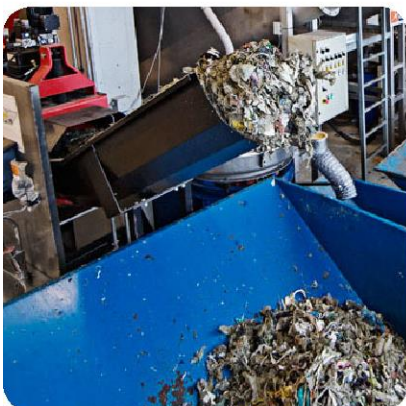
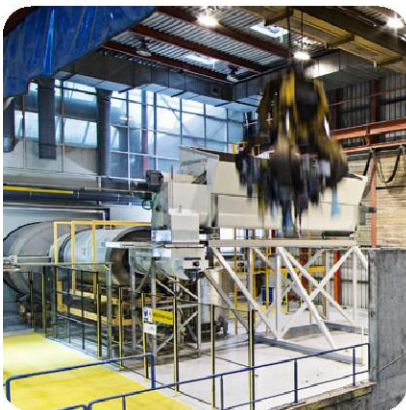


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## Chapter 11: Noise and Vibration

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## Quality Management

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## Executive Summary

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A noise and vibration assessment has been completed as part of the formal Environmental Impact Assessment (EIA) required for the planning application for the proposed REnescence Northwich development, which is located off the A530 Griffiths Road, near Northwich and Lostock Gralam, Cheshire.

Mitigation for noise and vibration from construction activities is provided within the Construction Environmental Management Plan (Appendix 2.C) for the site. Construction works will follow Best Practicable Means to minimise noise and vibration effects. A qualitative assessment of construction noise and vibration effects has been carried out with reference to national Planning Practice Guidance for Noise (PPGN). The assessment indicates that, with suitable mitigation measures, there is likely to be a direct, temporary, medium-term noise effect on noise-sensitive receptors of minor adverse significance. There will be no change due to vibration and the significance of effects will therefore be neutral. With reference to the PPGN, construction noise effects might be above the Lowest Observed Adverse Effect Level (LOAEL) but will be below the Significant Observed Adverse Effect Level (SOAEL) and vibration effects will be below the No Observed Effect Level (NOEL).

In order to comply with the Environmental Permitting Regulations (EPR), the development will incorporate Best Available Techniques (BAT) to minimise noise emissions during operation. The gas engines will be located within containers which provide significant sound attenuation. The gas engines' stack will be fitted with a silencer. The drive gear of the bioreactors, the ballistic separator and other plant associated with waste sorting will be located in buildings. Other external plant, including pumps, dewatering plant etc will be located within enclosures. HGVs will follow the approved access routes to and from site.

An assessment of the operational noise effects, with the above measures in place has been carried out in accordance with the PPGN and BS 4142:2014. The assessment indicates that at the majority of locations the rating level does not exceed the background sound level, which is an indication of the specific sound source having a low impact, depending on the context. With consideration for the context, it is possible that noise from site activities will be noticeable on occasions at the closest noise-sensitive to the site but it will not cause any changes in behaviour or attitude or a perceived change in quality of life. Therefore, with respect to national planning guidance in the PPGN, the level of noise will be at or below the LOAEL. With respect to EIA, the impact of noise from activities on site is expected to be low. The sensitivity of receptors is medium so there will be a direct, minor adverse effect due to noise from the operation of the facility.

The effects of change in noise levels due to road traffic on the local road network have also been considered. The assessment indicates that the significance of effects due to operational road traffic noise is negligible.

Cumulative operational noise effects with other consented developments that have the potential to generate cumulative operational noise effects at receptors within the vicinity of the site. Although there is

potential for cumulative effects to occur, these are likely to be negligible to minor, and there is also potential that other developments will reduce the noise effects from that facility. On this basis, the significance of cumulative effects would be, in the worst case, of minor adverse significance.

Cumulative effects of change in noise levels due to road traffic on the local road network have also been considered. The assessment indicates that the significance of effects due to operational road traffic noise from the development is negligible. The significance of cumulative effects due to road traffic noise with the development and other consented developments is in the worst-case minor to moderate adverse. However, where minor to moderate adverse effects occur due to noise from road traffic these are not attributable to this development, but rather to the contribution from other developments.

In summary, there is the potential for effects of minor adverse significance to occur due to noise during the construction of the development and during the operation of the development. Construction noise will be controlled using best practicable means and operational noise will be controlled using best available technology. The effects due to construction vibration and road traffic noise are negligible.

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# 1 Introduction

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- 1.1 This chapter provides an assessment of the airborne noise and ground-borne vibration effects (on people, buildings and areas used by people) that may arise from the construction and operation of the proposed REnescience Northwich development, that will recover recyclable materials from waste and generate renewable electricity. This chapter of the ES is supported by Figures 11.A to 11.D and Appendices 11.A to 11.D.

## Scope of Study

- 1.2 This chapter sets out the approach to the assessment; provides a description of the baseline noise environment; identifies those aspects of the proposed development that may cause significant noise and/or vibration effects; provides predictions of noise and/or vibration immissions at the nearest noise and vibration sensitive receptors (NSRs); and provides an assessment of the significance of potential residual noise and/or vibration effects. Mitigation measures are identified where necessary. Cumulative noise and/or vibration effects with other proposed developments that may also affect the same NSRs as the project are also considered, as are the limitations of the assessment.
- 1.3 Significant noise exposure can cause annoyance and sleep disturbance, both of which can impact on the quality of life. Significant ground-borne vibration can reduce the quality of life and working efficiency of building occupants and, for very high levels, has the potential to cause cosmetic or structural damage to buildings and structures.

## Study Area

- 1.4 The study area for this assessment includes the nearest existing and consented noise sensitive receptors (NSRs) to each boundary of the site that are within 1 km of the site boundary. The following are the sensitive receptors/areas which have been identified and considered in this assessment:
- existing and consented residential properties on Manchester Road – approximately 200 to 600 m to the north-east and 250 to 450 m to the north-west of the site;
  - consented residential properties on James Street between 320 and 620 m to the south-west of the site (planning application ref: 4/08/0020/OUM/CCC - Demolition of existing structures and redevelopment of land for the residential use for up to 306 dwellings, associated infrastructure and open space - Phase 1. Land at Hargreaves Road Northwich Cheshire);
  - consented residential properties at Farm Road between 430 and 570 m to the south-east of the site (planning application ref: 12/03653/OUT - Residential development of 48 dwellings including means of access (outline). Land At End Of Farm Road Rudheath Northwich Cheshire);



- consented residential properties at Cottage Close between 580 and 650 m to the south-east of the site (planning application ref: 12/03652/OUT - Residential development of 13 dwellings including means of access (outline). Land Adjacent to Cottage Close Rudheath Northwich Cheshire);
- existing residential properties on James Street, Birkenhead Street, Liverpool Street, Edward Street, Stanley Street and Verdin Street – between 600 m and 760 m to the south-west of the site; and
- existing residential properties on St John's Close, Farm Road, Cottage Close and Wentworth Close – between 580 m and 900 m to the south-east of the site.

1.5 For the assessment of effects from road traffic noise, the study area comprises roads included in the transport assessment provided in Chapter 6: Traffic and Transport of this ES.

## 2 Legislation and Policy Context

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- 2.1 A detailed review of the development plan documents and planning context in relation to the proposed development proposals is provided in the Planning Statement accompanying the planning submission. This section summarises those policies that are directly relevant to noise and vibration.

### National Policy and Legislation

#### National Planning Policy Framework

- 2.2 The National Planning Policy Framework (NPPF)<sup>[1]</sup>, published in March 2012, sets out the government's planning policies for England.
- 2.3 The document does not contain any specific noise policy or noise limits, but it provides a framework for local people and local authorities to produce their own local and neighbourhood plans, which reflect the needs and priorities of their communities.
- 2.4 In Section 11, 'Conserving and enhancing the natural environment', paragraph 123 relates to noise and states:

*'123. Planning policies and decisions should aim to:*

- *avoid noise from giving rise to significant adverse impacts<sup>27</sup> on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impact<sup>28</sup> on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established;<sup>28</sup> and*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.'*

27 See Explanatory Note to the Noise Policy Statement for England (Department for the Environment, Food and Rural Affairs).

28 Subject to the provisions of the Environmental Protection Act 1990 and other relevant law.'

- 2.5 In addition to the NPPF and the Noise Policy Statement for England (NPSE) described below, the Department for Communities & Local Government released Planning Practice Guidance (PPG) on noise in March 2014. The PPG provides guidance on determining the significance of noise effects to support the requirements of the NPPF.

## Noise Policy Statement for England

2.6 The Noise Policy Statement for England (NPSE) <sup>[2]</sup>, published in March 2010 by Defra, aims to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion.

2.7 Paragraph 1.6 of the NPSE sets out the long-term vision and aims of government noise policy:

### “Noise Policy Vision

*Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.”*

### “Noise Policy Aims

*Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.”*

2.8 The aims require that all reasonable steps should be taken to avoid, mitigate and minimise adverse effects on health and quality of life whilst also taking into account the guiding principles of sustainable development, which include social, economic, environmental and health considerations.

2.9 With regard to the terms ‘significant adverse’ and ‘adverse’ included in the ‘Noise Policy Aims’, these are explained further in the ‘Explanatory Note’ as relating to established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation which are:

### ‘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 human health and quality of life due to noise.*

### ‘LOAEL – Lowest Observed Adverse Effect Level’

*This is the level above which adverse effects on health and quality of life can be detected.’*

Defra has then extended these concepts for the purpose of the NPSE to introduce the concept of:

### ‘SOAEL – Significant Observed Adverse Effect Level’

2.10 This is the level above which significant adverse effects on health and quality of life occur. The accompanying explanation states:

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

- 2.11 With regard to 'further evidence', Defra has commissioned research to try and identify the levels at which the above effects occur but this is not yet in the public domain. However, early indications are that this research has been largely inconclusive. On this basis, and until further guidance becomes available, and given that there is no specific guidance in the NPPF on noise, there is no justification to vary assessment methods and criteria from those previously adopted from British Standards etc.

### **Planning Practice Guidance for Noise (PPGN)**

- 2.12 The government has published Planning Practice Guidance on a range of subjects including noise (paragraph Reference ID: 30-001-20140306) <sup>[3]</sup>. The guidance provides advice on how to deliver its policies. The PPG reiterates general guidance on noise policy and assessment methods provided in the NPPF, NPSE and British Standards (BSs) and contains examples of acoustic environments commensurate with various effect levels.
- 2.13 The PPGN describes noise that is not noticeable to be at levels below the NOEL. It describes a range of noise exposure that is noticeable but not to the extent there is a perceived change in quality of life. Noise exposures in this range are below the LOAEL and need no mitigation. On this basis, the audibility of noise from a development is not, in itself, a criterion to judge noise effects that is commensurate with national planning policy.
- 2.14 The PPGN suggests that noise exposures above the LOAEL cause small changes in behaviour. An example of noise exposures above the LOAEL provided in the PPG is having to turn up the volume on the television; needing to speak more loudly to be heard; or, where there is no alternative ventilation, closing windows for some of the time because of the noise. In line with the NPPF and NPSE, the PPGN states that consideration needs to be given to mitigating and minimising effects above the LOAEL but taking account of the economic and social benefits being derived from the activity causing the noise.
- 2.15 The PPG suggests that noise exposures above the SOAEL cause material changes in behaviour. An example of noise exposures above the SOAEL provided in the PPGN are, where there is no alternative ventilation, keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. In line with the NPPF and NPSE, the PPGN states that effects above the SOAEL should be avoided and that whilst the economic and social benefits being derived from the activity causing the noise must be taken into account, such exposures are undesirable.

## Local Policy

- 2.16 Strategic Policy ENV 7 'Alternative Energy Supplies' of CWCC's Local Plan<sup>[4]</sup> states that:

*'The Local Plan will support renewable and low carbon energy proposals where there are no unacceptable impacts on: ...'*

and then lists several areas including 'noise'.

- 2.17 CWCC's Replacement Waste Local Plan (RWLP) <sup>[5]</sup> provides policies saved after 29<sup>th</sup> January 2015. Chapter 4 'Site Search, Assessment and Selection' of the RWLP, indicates how sites for waste management will be selected. Paragraph 4.8 of Chapter 4 states the following:

*'The assessment process considered the following site specific issues to identify the site's suitability for a range of potential uses:'*

and

*'B Residential and General Amenity Issues*

*Consideration was given to whether the site is close to residential properties or other sensitive uses which could be adversely affected by the proposals (i.e. through noise, dust, odour, gulls/vermin, visual impact or heavy vehicles). The impact of the proposals on the general character of the area was assessed, for example through increasing the volume of HGV traffic or noise levels in an otherwise quiet rural area.'*

- 2.18 Policy 12 'Impact of Development Proposals' of the RWLP expands on the above:

*'An application to develop a waste management facility, or to alter or amend an existing facility, must be accompanied by an evaluation of the proposed development and its likely direct, indirect and cumulative impacts. Where unacceptable impacts are identified the measures proposed to avoid, reduce or remedy these should be provided at the application stage. The planning application should also set out, where appropriate, the arrangements for the management and monitoring of the waste management facility.*

*For evaluation and mitigation purposes the application should address any relevant environmental issues, including: ...*

and then lists several areas including 'noise levels'.

- 2.19 It concludes with:

*'When issuing planning permissions the Waste Planning Authority will, where appropriate, use planning conditions and/or planning obligations to secure implementation and compliance in respect of the above matters.'*

### 3 Assessment Methodology

#### Consultation

- 3.1 Prior to undertaking any work in connection with the noise and vibration assessment, RPS initially consulted with the Environmental Protection Team (EPT) at CWCC by e-mail on 11<sup>th</sup> June 2015 and then in subsequent telephone conversations between 16<sup>th</sup> June 2015 and 3<sup>rd</sup> July 2015. In these discussions, agreements were made between RPS and CWCC's EPT regarding the NSRs to be considered within the assessment; the baseline monitoring locations, and the assessment methodology.

#### Methodology

##### Baseline Characterisation

###### Desk Study

- 3.2 Existing noise sources for consideration within and around the site are: road traffic on the A559 Manchester Road, the A530 Griffiths Road and other local roads; trains on the railway line to the north of the site; noise from other existing industrial uses in the area including the Solvay facility immediately to the east of the site, industrial units on the opposite side of the railway line to the north and other commercial/industrial developments beyond the A530 Griffiths Road; and aircraft noise overhead.
- 3.3 Significant levels of vibration within the vicinity of the site are unlikely; the only potential source being freight trains running on the railway line to the north which, from RPS' experience, will produce very low vibration emissions. On this basis, vibration has been scoped out of the baseline study.

###### Site Visit / Other Assessment

- 3.4 The baseline sound climate has been determined at the locations of existing and potential future NSRs in the vicinity through baseline sound monitoring carried out by RPS at five locations in July 2015. Table 3.1 contains a summary of the baseline noise monitoring locations and the NSRs that they represent.

**Table 3.1: Baseline Noise Monitoring Locations**

Ref	Location	NSRs
L1	273 Manchester Road	Existing and consented residential properties on Manchester Road to the north-east of the site.
L2	38 James Street	Existing residential properties on James Street, Birkenhead Street, Liverpool Street, Edward Street, Stanley Street and Verdin Street.
L3	Manchester Road opposite Brickfield Business Centre	Existing residential properties on Manchester Road to the north-west of the site.

Ref	Location	NSRs
L4	On footpath north of Farm Road	Existing and consented residential properties on St John's Close, Farm Road, Cottage Close and Wentworth Close.
L5	North of James Street	Consented residential properties on James Street.

- 3.5 Long-term sound monitors were installed by RPS at two of the locations, L1 and L2, on the 9<sup>th</sup> July 2015 and collected on the 16<sup>th</sup> July 2015. Data were logged of the Fast, A-weighted sound pressure level in 100 ms periods for the entire period of the surveys.
- 3.6 At the remaining three locations, L3, L4 and L5, short-term measurements were undertaken by RPS. In each location, two or three 15-minute surveys were undertaken during daytime hours (07:00 – 23:00 hrs) and two 15-minute surveys were undertaken in night-time hours (23:00 – 07:00 hrs).
- 3.7 The sound monitoring locations are identified on Figure 11.A of this chapter. Specific details of survey locations and principal sound sources are provided under Section 4 of this chapter 'Baseline Conditions'.
- 3.8 Measurements at L1 and L2 were carried out using Rion NL 52 Sound Level Meter (SLM) and measurements at L3, L4 and L5 were carried out using a B&K 2250 SLM. Both types of SLM used are Type 1 with high performance environmental windshields. BS 7445-2:1991 recommends that sound level meters used for the acquisition of data pertinent to land use be preferably Type 1.
- 3.9 All instrumentation was checked for calibration prior to and following the measurements using a Rion NC 74 calibrator and there was no significant drift within the survey period. All equipment was within the two year BS 4142:2014 advisory calibration period at the time of the measurements. Calibration certificates are available on request.
- 3.10 Wind conditions during the survey period were recorded using a local meteorological recording station. Checks were made of the monitored data to see if wind speed, direction and rainfall had any considerable influence on the recorded sound levels.

### **Assessment of Construction Effects**

- 3.11 A qualitative assessment of noise and vibration effects has been undertaken based on the typical construction equipment and plant that would be required for this type of development. The significance of effects have been determined on the basis of professional judgement, baseline sound levels determined from surveys and the semantic scale described in Table 3.2, which refers to guidance contained within the PPGN. Table 3.2 provides the corresponding effect levels in the terminology of the PPGN for the significance of effects for residential NSRs.

**Table 3.2: Methodology for Determining Significance of Effect for Construction (and Industrial) Noise and Vibration at Residential NSRs**

Magnitude of Impact	Threshold Effect Level for Residential NSRs (PPGN)	Criteria for Assessing Effect Significance
High	UAEL <sup>1</sup>	The noise/vibration causes a material change in behaviour and/or attitude. 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.
Medium	SOAEL	Noise/vibration can be heard/felt and causes small changes in behaviour and/or attitude. Affects the acoustic character of the area such that there is a perceived change in the quality of life.
Low	LOAEL	A minor shift away from baseline conditions. Noise/vibration can be heard/felt, 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.
Negligible	NOEL	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

Note 1: The PPGN indicates that an unacceptable adverse effect (level) occurs above SOAEL; the term UAEL (Upper Adverse Effect Level) has therefore been used to describe effects at this level although it is not a term referred to in the NPSE or elsewhere in the PPGN except in the table of effects.

## Assessment of Operational Effects

### Operation of the Proposed Facility

3.12 Noise effects due to the operation of the proposed facility have been assessed according to the guidance in BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' [6] and the PPGN as presented in Table 3.2 above. The foreword to BS 4142:2014 provides the following introduction for the assessment of human response to sound:

*"Response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact, for example, can depend on such factors as the margin by which a sound exceeds the background sound level, its absolute level, time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood."*

3.13 BS 4142:2014 primarily provides a numerical method by which to determine the significance of sound of an industrial nature (i.e. the 'specific sound' from the proposed development) at residential NSRs. The specific sound level may then be corrected for the character of the sound (e.g. perceptibility of tones and/or impulses), if appropriate, and it is then termed the 'rating level', whether or not a rating penalty is applied. The 'residual sound' is defined as the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.

3.14 The specific sound levels have been determined separately in terms of the  $L_{Aeq,T}$  index over a period of  $T = 1$ -hour during the daytime and  $T = 15$ -minutes during the night-time. For the



purposes of the Standard, daytime is typically between 07:00 and 23:00 hours and night-time is typically between 23:00 and 07:00 hours.

- 3.15 From Chapter 2 'Site Context and Project Description', the standard operating hours for the site will be 07:00 to 19:30 Monday to Friday and 08:00 to 13:00 on Saturday. Deliveries and exports will only take place during these hours, and waste sorting activities will normally only take place within these hours. For the purposes of this assessment in accordance with BS 4142:2014, it has been assumed that full site operations will take place during the daytime assessment period, i.e. 1-hour assessment period between 07:00 and 23:00 hrs, and that the gas engines and stack will be fully operational during the night-time assessment period, i.e. 15-minute assessment period between 23:00 and 07:00 hours.
- 3.16 Specific sound immissions from the site have been predicted at the NSRs in paragraph 1.4 using SoundPLAN Version 7.2 sound modelling software utilising the propagation method contained in ISO 9613-2:1996 'Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation' <sup>[7]</sup>. Source data for the gas engines has been supplied by the technology providers for the site. For other key plant and processes within the facility, source data have been derived from measurements undertaken by RPS of similar operations on other sites. Details of the source data used for the assessment are provided in Appendix 11.A and a plan indicating the location of the plant is provided in Figure 11.B. Specifications for the sound insulation of the facades of building has also been determined based upon the construction information provided by the project architects. These are also provided in Appendix 11.A.
- 3.17 For the sound model, standard meteorological conditions and a ground factor of 0.5 (mixed ground) have been used in the model. For each group of NSRs, a single location has been modelled, which is representative of the closest NSRs to the site within that group. Predictions have been made at ground and first floor level, and the maximum predicted sound level for each NSR has been used to determine the specific sound level at that NSR.
- 3.18 At each NSR, the rating level has been determined from the predicted specific sound level. Where RPS has considered it to be appropriate, a rating penalty has been applied for tonality, impulsivity and/or intermittent specific sounds as described in the commentary to paragraph 9.2 of BS 4142:2014. This has been applied with consideration for the main sound sources from site that contribute to the level of specific sound at the NSR location.
- 3.19 BS 4142:2014 requires that the background sound levels adopted for the assessment be representative for the period being assessed. The Standard recommends that the background sound level should be derived from continuous measurements of normally not less than 15-minute intervals, which can be contiguous or disaggregated. However, the Standard states that there is no 'single' background sound level that can be derived from such measurements. It is particularly difficult to determine what is 'representative' of the night-time period is because it can be subject to a wide variation in background sound level between the shoulder night periods. The accompanying note to paragraph 8.1.4 states that:

*“A representative level ought to account for the range of background sounds levels and ought not automatically to be assumed to be either the minimum or modal value.”*

- 3.20 The approach that has been adopted for this project is based on a combination of long-term and attended short-term surveys to obtain values of the background ( $L_{A90}$ ) and residual ( $L_{Aeq}$ ) sound levels at five locations. For the long-term surveys, background and residual sound levels for the daytime and night-time periods have been determined for each full period (i.e. 07:00 to 23:00 hrs and 23:00 to 07:00 hrs) and an average of the levels determined has been used for the assessment. For the short-term measurements, the lowest of the monitored levels has been used for the assessment. This is a more conservative approach, accounting for the limitations of the use of short-term data. Further information regarding the determination of background sound levels is provided within Section 4 ‘Baseline Conditions’.
- 3.21 An initial estimate of the impact of the specific sound has been obtained by subtracting the measured background sound level from the rating level of the specific sound. In the context of the Standard, adverse impacts include, but are not limited to, annoyance and sleep disturbance. Typically, the greater this difference, the greater is the magnitude of the impact:
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
  - A difference of around +5 dB 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.
- 3.22 Whilst there is a relationship between the significance of impacts determined by the method contained within BS 4142:2014 and the significance of effects described in the PPGN, there is not a direct link. It is not appropriate to ascribe numerical rating / background level differences to LOAEL and SOAEL because this fails to consider the context of the sound, which is a key requirement of the Standard.
- 3.23 The significance of the effect of the noise in question (i.e. whether above or below SOAEL and LOAEL) should be determined on the basis of the initial estimate of impact significance from the BS 4142:2014 assessment with reference to the examples of outcomes described within the PPGN and after having considered the context of the sound. It is necessary to consider all pertinent factors, including:
- the absolute level of the 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.

3.24 In addition to the above the quanta of affected NSRs is considered within the overall significance of effects due to the proposed development.

#### **Off-Site Road Traffic Noise**

3.25 The assessment of changes in road traffic noise levels on local roads as a result of the operation of the proposed development is based on the methods contained within Calculation of Road Traffic Noise (CRTN)<sup>[8]</sup> and the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 7: Noise and Vibration<sup>[9]</sup>, which is a method designed for the assessment of new construction, improvements and maintenance of trunk roads. Therefore, the method described in DMRB is considered as informative but not definitive for the assessment of the traffic effects of the proposed development.

3.26 The calculations are based on traffic flow data contained with Chapter 6 'Traffic and Transport', and consider the difference in flows, comparing 'with' and 'without' the proposed development, expected for the initial year of operation (2017). Both scenarios 'with' and 'without' the proposals include measured 2015 baseline flows, anticipated traffic growth to 2017 and anticipated traffic due to other consented developments. In order to assess cumulative effects, a comparison has also been made between the scenario 'with' the proposals and a scenario 'without' the proposals and 'without' other consented developments. Traffic data have been provided for 7 links, of which Links 1 and Links 3 to 7 have been included in this assessment. There are no NSRs adjacent to Link 2 'Site Access,' and data are sufficiently low that noise from road traffic on this link would not contribute to the noise climate at NSRs further afield.

3.27 Paragraph 3.5 of DMRB HD 213/11 states that:

*'The threshold criteria used for traffic noise assessment during the day is a permanent change in magnitude of 1 dB  $L_{A10,18h}$  in the short term (i.e. on opening) or a 3 dB  $L_{A10,18h}$  change in the long term (typically 15 years after project opening). For night time noise impacts, the threshold criterion of a 3 dB  $L_{night,outside}$  noise change in the long term should also apply but only where the  $L_{night,outside}$  is predicted to be greater than 55 dB for any scenario.'*

3.28 Furthermore, (paragraph 3.37):

*'A change in road traffic noise of 1 dB  $L_{A10,18h}$  in the short term (e.g. when a project is opened) is the smallest that is considered perceptible. In the long term (typically 15 years after project opening), a 3 dB  $L_{A10,18h}$  change is considered perceptible.'*

3.29 On the basis of the above, changes in road traffic sound emissions will only have the potential to cause or contribute to some harmful or otherwise unwanted effect, like annoyance or sleep disturbance, (i.e. for the change to be an impact) if they are 1 dB  $L_{A10,18h}$  or more. Changes in

road traffic sound emissions that are less than 1 dB  $L_{A10,18h}$  do not give rise to an impact. Consequently, no adverse effect, significant or otherwise, can occur from such changes.

- 3.30 Where impacts are predicted (i.e. where changes in road traffic sound emissions are predicted to be 1 dB  $L_{A10,18h}$  or more), the magnitude of the impact is classified using the semantic scale provided in the table below, which is adapted from the scale contained within DMRB HD 213/11.

**Table 3.3: Magnitude of Impact for Road Traffic Noise**

Magnitude of Impact	Change in Traffic Sound Emission $L_{A10,18hr}$ dB
High	5.0 to 9.9
Medium	3.0 to 4.9
Low	1.0 to 2.9
Negligible	0.1 to 0.9
No Change	<0.1

- 3.31 Impacts may not give rise to adverse effects if road traffic sound immissions at NSRs are low such they do not have the potential to cause or contribute to some harmful or otherwise unwanted effect, like annoyance or sleep disturbance. Consequently, where an impact is predicted to occur, the absolute levels of road traffic sound immission are considered in terms of guidance contained within BS 8233:2014<sup>[10]</sup>, NIR<sup>[11]</sup> and DMRB HD 213/11. This provides quantitative information that is combined with qualitative information such as the type of NSR (e.g. home, school, hospital etc.) and the acoustic character of the immission in the context of the baseline soundscape to assign a level of 'receptor sensitivity'.
- 3.32 BS 8233:2014 provides guideline values for desirable internal ambient noise levels in rooms used for resting, dining and sleeping when they are unoccupied. Impacts are increasingly likely to give rise to adverse effects the greater the road traffic noise immission exceeds the guideline levels contained within BS 8233:2014.
- 3.33 On this basis, the guideline internal noise levels contained within BS 8233:2014 have been converted to equivalent external noise levels on the basis that windows are sufficiently open (partially) to provide background ventilation. An external to internal sound level difference of 15 dB has been adopted based on the guidance contained within the Defra Report NANR 116 'Open/Closed Window Research – Sound Insulation through Ventilated Domestic open Windows'<sup>[12]</sup>. These levels are commensurate with the requirements for schools contained within BB93.
- 3.34 The NIR provides  $L_{A10,18h}$  levels above which insulation would be offered, assuming other factors are satisfied. As quoted above, paragraph 3.5 of DMRB HD 213/11 provides a threshold  $L_{night,outside}$  criterion below which impacts are not considered. Impacts are increasingly likely to give rise to significant adverse effects the greater the road traffic noise immission exceeds the threshold levels contained within NIR and DMRB HD 213/11.

3.35 The methodology described above does not transpose readily to a four-point scale of receptor sensitivity that has been adopted for the EIA. Nevertheless, the methodology has been summarised in Table 3.4 below so that this assessment is consistent with the rest of the EIA. However, the table is not used prescriptively; the ultimate determination of receptor sensitivity is based on professional judgment with consideration for the context of the site and NSRs being assessed albeit informed by quantitative assessment.

**Table 3.4: Quantitative Indicators of Receptor Sensitivity**

Sensitivity	Typical Descriptors (Residential NSRs)
Medium or High	External road traffic noise immissions exceed 68 dB $L_{A10,18h}$ 06:00 to 24:00 hours (nominally daytime) or 55 dB $L_{night,outside}$ during the night-time
Low or Medium	External road traffic noise immissions exceed 50 dB $L_{Aeq,16h}$ 07:00 to 23:00 hours (which is approximately equivalent to 52 dB $L_{A10,18h}$ for trunk roads) during the daytime or 45 dB $L_{Aeq,8h}$ during the night-time
Negligible	External road traffic noise immissions are less than 50 dB $L_{Aeq,16h}$ 07:00 to 23:00 hours (which is approximately equivalent to 52 dB $L_{A10,18h}$ for trunk roads) during the daytime or 45 dB $L_{Aeq,8h}$ during the night-time

3.36 On the basis of the above:

- significant adverse effects are increasingly likely to occur at NSRs where external road traffic noise immissions exceed 68 dB  $L_{A10,18h}$  06:00 to 24:00 hours (nominally daytime) or 55 dB  $L_{night,outside}$  during the night-time, depending on the impact magnitude (typically a noise change of +1 dB or more) and the context of the immissions;
- adverse effects are increasingly likely to occur at NSRs where external road traffic noise immissions exceed 50 dB  $L_{Aeq,16h}$  07:00 to 23:00 hours (which is approximately equivalent to 52 dB  $L_{A10,18h}$  for trunk roads) during the daytime or 45 dB  $L_{Aeq,8h}$  during the night-time, depending on the impact magnitude (typically a noise change of +3 dB or more) and the context of the immissions; and
- changes in road traffic sound emission that are less than 1 dB  $L_{A10,18h}$  or  $L_{night,outside}$  do not give rise to an adverse effect at any absolute level of immission.

### Limitations of the Assessment

3.37 In all assessments, it is good practice to consider uncertainty, which can arise from a number of different aspects of an assessment. There is a degree of uncertainty associated with: the instrumentation itself; the use of instrumentation, i.e. the measurements; the source terms used; the sound propagation model; and the subjective response of residents to the sound sources.

3.38 With regard to subjective response, the acoustics standards and guidance adopted for the assessments within this chapter are based on the subjective response of the majority of the population. This is considered to be the best that can be achieved in a population of varying subjective responses, which are dependent upon a wide range of factors.

- 3.39 On the basis of the above, whilst the magnitude of uncertainty has not been quantitatively defined, measures have been taken to minimise this aspect in accordance with best practice.

#### **Baseline Characterisation**

- 3.40 Uncertainty due to instrumentation error has been significantly reduced with the introduction of modern instrumentation and is reduced further by ensuring that all instrumentation is calibrated before and after each measurement period and is within accepted calibration intervals.
- 3.41 Uncertainty in the baseline data has been reduced significantly by carrying out baseline sound monitoring over a period of seven days in some locations, allowing analysis of how representative the baseline data is given the naturally varying sound level at NSRs within the vicinity of the site.

#### **Operation of the Proposed Facility**

- 3.42 Operational sound emissions for the gas engines have been determined from sound power data provided by the technology providers. Other operational noise emissions have been obtained from data within the RPS Source Term Library of similar plant and facilities. Therefore, these data are estimates of realistically achievable sound levels although, with the exception of the gas engines, the final plant servicing the facility may vary from that which has been modelled. However, any plant included in the facility will need to comply with the Environmental Permitting Regulations<sup>[13]</sup> (EPR), and therefore demonstrate that the techniques used represent Best Available Techniques (BAT), which will include minimising noise immissions at NSRs, among other requirements.
- 3.43 Sound immissions at NSRs have been calculated using the prediction methodology in ISO 9613-2:1996. For source heights up to 30 m and prediction distances between 100 and 1000 m, ISO 9613-2:1996 claims accuracy of +/-3 dB. ISO 9613-2 is widely used for the prediction of industrial noise and is recommended in paragraph 1.5.3.2 of EA's Horizontal Guidance - H3 Part 2 Noise Assessment and Control and referred to in BS 4142:2014.
- 3.44 On the basis of the above, it is considered that limitations to the assessment have been minimised and that the results provide a robust estimate of the likely noise effects of the development.

#### **Road Traffic Noise Assessment**

- 3.45 The assessment of noise from road traffic is limited to the traffic data provided. Further details of the assumptions used in deriving the traffic data are provided in Chapter 6: 'Traffic and Transport'.
- 3.46 The CRTN prediction method is based on free-flowing traffic on main roads and typical noise levels from cars and HGVs within 1988. Vehicles have changed since the time that the guidance was drafted and typically it is expected that HGVs in particular will be quieter. Therefore the predictions of absolute noise levels produced by road traffic have potential to be higher than road traffic noise levels will be in practice. Predictions of changes in noise levels are likely to be fairly robust.

## 4 Baseline Conditions

4.1 Summaries of the locations of the baseline sound surveys and principal sound sources are provided in Table 4.1, and a summary of typical sound levels is provided in Table 4.2. Full tabulated baseline survey data and graphical plots of data at the locations of long-term surveys (L1 and L2) is provided in Appendix 11.B. The graphical plots in Appendix 11.B for locations L1 and L2 provide an indication of the weather conditions during the monitoring. There was no significant correlation between unfavourable weather and monitored sound levels; therefore, data have not been removed from the dataset due to unfavourable weather.

**Table 4.1: Baseline Sound Monitoring Locations and Details**

Ref	Location	Position	Principal Sound Sources
L1	273 Manchester Road	The microphone was installed at a facade <sup>1</sup> location in the front garden of the property mounted on a pole approximately 1.5 m above local ground level, at approximately 5 m from the edge of Manchester Road.  The ground surface between the monitoring location and the site was a mixture of hard and soft ground.	Road traffic on Manchester Road. Undefined industrial activity. Aircraft.
L2	38 James Street	The microphone was installed in a free-field <sup>2</sup> location in the rear garden of the property mounted on a pole approximately 1.5 m above local ground level.  The ground surface between the monitoring location and the site was soft.	Distant road traffic. Aircraft. Railway trains. Undefined industrial / construction activity. Wind in trees.
L3	Manchester Road opposite Brickfield Business Centre	The microphone was installed in a free-field <sup>2</sup> location on the pavement approx. 2 m north of Manchester Road and 1 m south of a hedgerow, mounted on a tripod approximately 1.5 m above local ground level.  The ground surface between the monitoring location and the site was a mixture of hard and soft ground.	Road traffic on Manchester Road and other local roads (continuous during daytime, intermittent during night-time). Aircraft. Pedestrians passing by on pavement (daytime only). Low level plant sound (night-time only).
L4	On footpath north of Farm Road	The microphone was installed in a free-field <sup>2</sup> location on the footpath approx. 170 m north of Farm Road and 230 m west of A530 Griffith's Road, mounted on a tripod approximately 1.5 m above local ground level.  The ground surface between the monitoring location and the site was soft.	Industrial sound from chemical works to north and unidentified site to the south-east including impulsive sounds from materials moving and alarms, and steady continuous sounds. Distant road traffic. Dog barking (daytime only).
L5	North of James Street	The microphone was installed in a free-field <sup>2</sup> location at the north end of James Street approx. 220 m from the railway line and 330 m from the	Wind in trees. Birdsong. Aircraft.

Ref	Location	Position	Principal Sound Sources
		<p>application site, mounted on a tripod approximately 1.5 m above local ground level.</p> <p>The ground surface between the monitoring location and the site was mainly soft, with hard ground in the immediate vicinity of the monitoring location.</p>	<p>Distant road traffic.</p> <p>Railway trains.</p> <p>Insects.</p> <p>Distant industrial sound.</p> <p>Pedestrians passing by (daytime only).</p>

1 A facade location is 1 m from the wall of the building

2 A free-field location is at least 3.5 m from any reflecting surfaces, excluding the ground

**Table 4.2: Summary of Typical Baseline Sound Levels**

Ref	Period	Typical Baseline Sound Levels dB		
		L <sub>Aeq</sub>	L <sub>A10</sub>	L <sub>A90</sub>
L1	Daytime (07:00 – 23:00)	69 <sup>1</sup>	72 <sup>1</sup>	51 <sup>1</sup>
	Night-time (23:00 – 07:00)	61 <sup>1</sup>	61 <sup>1</sup>	45 <sup>1</sup>
L2	Daytime (07:00 – 23:00)	46	47	36
	Night-time (23:00 – 07:00)	41	42	30
L3	Daytime (07:00 – 23:00)	73	78	56
	Night-time (23:00 – 07:00)	62	57	40
L4	Daytime (07:00 – 23:00)	44	46	40
	Night-time (23:00 – 07:00)	42	44	39
L5	Daytime (07:00 – 23:00)	47	49	40
	Night-time (23:00 – 07:00)	39	40	37

1 Corrected to free-field sound level by applying -3 dB

4.2 From Table 4.2, sound levels at L1 and L3 are significantly higher during the daytime than at other locations. This is due to the influence of high levels of road traffic on the A559 Manchester Road. During the night-time, levels monitored at L1 were slightly higher than those monitored at the short-term locations but levels at L3 were similar to those monitored at other short-term locations. Higher levels at L1 during the night-time may be attributed to the proximity of the chemical works. Therefore, for the assessment of operational noise from the facility, baseline sound levels at L1 have been considered representative of all locations on Manchester Road during the daytime and the specific siting of L1 and L3 have been considered for the night-time assessment.

4.3 Levels monitored at L2 were significantly lower than at other locations, including L5 which was located at the top of James Street. This is likely to be due to the increased distance from significant sources of traffic sound on the A559 Manchester Road and the railway line. This may also have been due to the situation of the sound monitor within the garden of a residential property, where screening afforded by fences and other buildings within the vicinity reduces the level of sound experienced. The sound levels at L2 are likely a worst-case estimate of sound levels at existing properties on James Street, as the assessment includes predictions at first floor



level, where screening effects will be lower and existing sound levels are therefore likely to be greater.

- 4.4 Baseline measurements at L5 have been taken as representative of those at the closest part of the consented residential development on James Street. In practice, with the consented residential development in place, baseline sound levels could be lower due to screening effects afforded by buildings.
- 4.5 The measured sound levels at L4 were affected by sound from industrial activities, which likely accounts for the similarity in background sound levels that occurred in the daytime and night-time periods.

## 5 Embedded Mitigation and Enhancement

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### Construction Phase

5.1 Construction works would follow Best Practicable Means (BPM) outlined in Section 72 of the Control of Pollution Act 1974 (as amended) (HMSO 1974) to minimise noise and vibration effects. Such details are to be required by the Construction Environmental management Plan (CEMP, see Appendix 2.C) to be submitted to and agreed in writing with CWCC prior to commencement of construction activities and following the appointment of a contractor. The following mitigation measures for noise and vibration are provided within the CEMP. These are based upon the guidance contained in BS 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'<sup>[14]</sup> and 'Part 2: Vibration'<sup>[15]</sup>.

- **Communication:** A Local Liaison Committee will be established, and occupiers of residential and business properties that are likely to be affected by the works will be notified in advance of the works. A named individual will be appointed to take primary responsibility for the day-to-day implementation of the CEMP during the construction phase and to act as the first point of contact on environmental matters for CWCC, other external bodies and the general public. Information regarding the nature and duration of the works, and named contact details for key members of staff will be displayed on a noticeboard near to the site.
- **Standard construction hours:** From Chapter 2 Project Description, core working hours would be 07:00 to 19:00 hours Monday to Friday, 07:00 to 13:00 hours on Saturday and at no time on Sundays or on public or bank holidays, with some non-intrusive and internal activities such as fit out and commissioning to be undertaken outside these hours. During the summer construction, hours may be extended up to 21:00 hours on Monday to Friday. However, significant noise generating works will normally be restricted to 08:00 to 18:00 Monday to Friday and would be strictly managed on Saturdays. In the event that noise generating works are required outside of core working hours, this would be agreed with CWCC prior to commencement of the activity. In such instances the contractor would apply to CWCC for written consent prior to work commencing by submitting either a Section 61 consent application or an agreed method statement in line with the Control of Pollution Act.
- **Access routes:** The sole access point to the site would be from the existing private road through Lostock Works off Griffiths Road. Construction traffic routes on the public highway will be controlled through the Construction Traffic Management Plan, which is at Annex 2.C.2.
- **Equipment:** Quieter alternative methods, plant and equipment will be used, where reasonably practicable, as required by the CEMP.
- **Worksite:** Plant, equipment, site offices, storage areas and worksites will be positioned away from existing NSRs, where reasonably practicable.

- **Screening:** Portable acoustic enclosures/screens will be used, as required.
- **Maintenance:** All vehicles, plant and equipment will be maintained and operated in an appropriate manner, to ensure that extraneous noise from mechanical vibration, creaking and squeaking is kept to a minimum.

## Operational Phase

- 5.2 As discussed in paragraph 3.42 of this chapter, in order to comply with EPR, the site will need to use BAT, which will include limiting noise generation by the plant where practicable. Of the plant within the facility, due to their 24-hour operation, the gas engines and stack are likely to result in the most significant effects at NSRs. The gas engines will be located within containers which provide a significant reduction in sound. The gas stack will be fitted with a silencer of a similar specification to that provided within the model input data in Appendix 11.A.
- 5.3 Although the bioreactors are external, the main noise generating elements including the engines will be located internally. The ballistic separator and other plant associated with waste sorting will also be located within buildings.
- 5.4 HGVs will follow the approved access routes to and from site, which will be detailed in a Delivery and Servicing Management Plan.
- 5.5 Other external plant, including pumps, dewatering plant etc will be located within enclosures.

## 6 Identification and Evaluation of Key Impacts

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### Construction Effects

#### Noise and Vibration from On-site Construction Activities

- 6.1 Details of the construction of the site are provided in Chapter 2: Project Description.
- 6.2 Noise emissions are likely to be highest at the early stages of works i.e. during site preparation and civil works, and decrease during the plant erection and fit-out stages. Noise emissions during the fit-out as buildings are completed would be very low as work is undertaken mostly with hand-tools within the completed structures.
- 6.3 For the majority of the construction period, plant on-site would comprise various diesel mechanised construction plant including excavators (with various tool attachments depending upon the task being undertaken), dump trucks, fork-lift trucks, concrete wagons and pumps, mobile cranes and delivery lorries.
- 6.4 It is anticipated that vibro-stone column ground improvement or driven precast concrete piling will be required where building foundation loadings are likely to be very high, and/or the depth of ground fill is excessive. In general, other methods of piling are likely to produce the same level of noise or lower, so the above methods would produce the worst case piling noise emissions from the site. As building foundation loadings are not high for the majority of the development, the need for driven piling is expected to be limited and alternative methods will be employed where possible.
- 6.5 As construction works are likely to begin shortly following a successful planning application, only existing NSRs need to be considered within the construction assessment. With reference to paragraph 1.4 of this chapter, the closest existing NSRs to the site are residential properties on Manchester Road to the north of the site. From Section 4 of this chapter, NSRs on Manchester Road are already subject to high levels of noise from road traffic. Therefore, noise from construction activities may be noticeable at times, but is unlikely to be above existing ambient sound levels and thus would not be intrusive at NSRs on Manchester Road.
- 6.6 Existing NSRs to the south, south-east and south-west are at further propagation distances, the closest being at 580 m from the site, but are subject to lower levels of ambient sound. In these locations it is likely that noise from on-site construction activities would exceed existing ambient sound levels at times and is likely to be noticeable. However noise immissions would be below levels that are likely to result in a change in behaviour or attitude of the recipients.
- 6.7 Driven precast concrete piling has the potential to cause vibration that would be noticeable on-site. However, the propagation of ground-borne vibration is subject to significant losses due to the distances between the site and NSRs and the varying densities of the subsurface geology.

Therefore vibration effects are unlikely to be noticeable at the closest NSRs, which are 200 m from the site construction activity.

- 6.8 In summary, it is unlikely that construction works will generate noise levels at NSRs that are disturbing or that affect activities commonly occurring in residential areas. Noise levels may be noticeable for limited and short durations when significant works such as piling are being undertaken. Vibration is likely to be imperceptible at the closest NSRs to the site. Construction activities will take place to a predetermined schedule following the BPM measures stated within Section 5 above. There would be very little change to the evening, night-time and weekend baseline noise conditions as most construction activities will be outside of these more sensitive periods.
- 6.9 With reference to Table 3.2 the magnitude of noise impacts, prior to mitigation, is negligible to low and the sensitivity of receptor is medium. Therefore there is likely to be a direct, temporary, medium-term noise effect on NSRs of minor adverse significance prior to the implementation of mitigation measures. There will be no change due to vibration and the significance of effects will therefore be neutral. With reference to the PPGN, construction noise effects might be above the LOAEL but will be below the SOAEL and vibration effects will be below the NOEL.

#### **Off-site Construction Traffic Noise**

- 6.10 It is anticipated that construction-phase HGV traffic will be similar to the operational-phase traffic, which is assessed below, and the magnitude of impact would be negligible. With respect to noise from off-site traffic movements on the local road network, the quanta of vehicles is not sufficient to warrant a full assessment.

#### **Associated Development**

- 6.11 Associated works may also be undertaken by the applicant or third parties to improve the existing shared private access road through Lostock Works, within the planning application boundary. This may involve widening at certain points to ease passing and turning of HGVs. This widening would be limited (anticipated to be <3 m) as the access road is constrained by the industrial facilities through which it runs. Re-surfacing some sections may also be undertaken if necessary. Any works undertaken would be in agreement with the land owner and other road users.
- 6.12 Noise and vibration from these works would be minor, not closer to high-sensitivity receptors than the construction activity on the main site, and would not give rise to any significant impacts or effects.

#### **Additional Mitigation**

- 6.13 Reasonable mitigation for noise and vibration from construction activities has been provided by applying BPM as outlined within Section 5 of this chapter 'Embedded Mitigation and Enhancement'. With this mitigation in place, construction noise and vibration effects are expected

to be minor adverse at worst, and of a temporary nature. On this basis, in our opinion, it is not expected that there will be a need for further mitigation measures to be employed.

### **Residual Effects**

- 6.14 The sensitivity of NSRs is medium and the magnitude of change, following mitigation, is low. Therefore, there is likely to be a direct, temporary residual effect on NSRs of minor adverse significance due to noise from on-site construction activities following the implementation of mitigation measures. Vibration effects will be neutral.

### **Operational Effects**

#### **Operation of the Proposed Facility**

- 6.15 The predicted specific sound levels from the facility are provided in Appendix 11.C and Table 6.1 below. Noise contour plots for the daytime and night-time periods are provided in Figures 11.C and 11.D for a height of 4 m above datum, equivalent to first floor level of any dwellings or other receptors.
- 6.16 An assessment has been carried out at the closest NSRs to the site for both the daytime (07:00 to 23:00 hrs) and night-time (23:00 to 07:00 hrs) periods. The results of the BS 4142:2014 assessment for the daytime and night-time periods are provided in Table 6.1 and Table 6.2 below.
- 6.17 During the daytime period, the main contributions to predicted specific sound levels at L1 Manchester Road are loading shovels operating in the storage area. At Ann Street (off Manchester Road), Cottage Close, St John's Close and the consented residential developments at Cottage Close and Farm Road, loading shovels operating in the storage area are still the main sound source, although other activities on site also contribute to the specific sound level. At 38 James Street, and the consented residential development on James Street, the gas engines and stack are the main contributors to the specific sound level. During the night-time period, when external sources such as loading shovels and HGVs are not working, gas engines and the stack are the main contributors to the specific sound level at all locations.
- 6.18 BS 4142:2014 states that acoustic features including tonality, impulsivity, intermittency and features that are otherwise readily distinctive can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. For planning purposes, a subjective assessment of the prominence of the character of a specific sound at the noise sensitive locations should be applied based on the expected characteristics of a similar source.
- 6.19 In the experience of RPS, noise emissions from modern well designed plant used in industrial facilities are generally broadband and not dissimilar in character to the sound from a domestic central heating system. Therefore, noise emissions from the proposed facility will generally not be tonal or impulsive by design. It is widely acknowledged that tonal and/or impulsive acoustic

features can increase the likelihood of complaint. It is considered commensurate with BAT that these features will therefore be controlled. However, there are some exceptions to this, where processes are difficult to control and may, at times, produce sound that contains impulsive or other specific features. Movements of materials using front-end loading shovels would be included within these types of processes.

- 6.20 Front-end loading shovels will only operate during the daytime and only contribute significantly to sound levels above other sources on site at 217 Manchester Road. From Table 6.1 below, it is estimated that, at 217 Manchester Road, the specific sound level from all sources on site will be 2 dB below the background sound level during the daytime. It is therefore unlikely that the sound of front-end loading shovels in isolation will be sufficiently prominent to be perceptible above other sound sources audible at 217 Manchester Road.
- 6.21 On the basis of the subjective analysis above no character correction has been applied to derive the rating level for either the daytime or night-time period at any of the NSRs considered within this assessment.

**Table 6.1: BS 4142 Assessment Daytime (07:00 – 23:00 hrs)**

Location	Predicted Specific Sound Level $L_s$ dB	Character Correction (dB)	Rating Level $L_{Ar,Tr}$ dB	Background Sound Level $L_{A90}$ dB	Residual Sound Level $L_{Aeq}$ dB	Difference between Rating and Background Sound Level dB	Total Sound Level Specific Plus Residual $L_{Aeq,T}$ dB
38 James Street	31	0	31	36	46	-5	46
217 Manchester Road	46	0	46	48	69	-2	69
Ann Street (Off Manchester Road)	42	0	42	48	69	-6	69
Consented Residential Cottage Close	36	0	36	42	44	-6	45
Consented Residential Farm Road	36	0	36	42	44	-6	45
Consented Residential James Street	35	0	35	44	47	-9	47
Cottage Close	36	0	36	42	44	-6	45
St John's Close	34	0	34	42	44	-8	45

**Table 6.2: BS 4142 Assessment Night-time (23:00 – 07:00 hrs)**

Location	Predicted Specific Sound Level $L_S$ dB	Character Correction (dB)	Rating Level $L_{Ar,Tr}$ dB	Background Sound Level $L_{A90}$ dB	Residual Sound Level $L_{Aeq}$ dB	Difference between Rating and Background Sound Level dB	Total Sound Level Specific Plus Residual $L_{Aeq,T}$ dB
38 James Street	30	0	30	30	41	0	41
217 Manchester Road	40	0	40	44	61	-4	61
Ann Street (Off Manchester Road)	38	0	38	40	62	-2	62
Consented Residential Cottage Close	34	0	34	39	42	-5	43
Consented Residential Farm Road	33	0	33	39	42	-6	42
Consented Residential James Street	34	0	34	37	39	-3	40
Cottage Close	33	0	33	37	42	-4	42
St John's Close	31	0	31	37	42	-6	42

6.22 From Table 6.1, during the daytime period the difference between the rating and the background sound level ranges between -9 dB and -2 dB, with the highest level difference occurring at 217 Manchester Road. From Table 6.2, during the night-time period, the difference between the rating and background sound level ranges between -6 dB and 0 dB, with the highest level difference occurring at 38 James Street. At all locations for both the daytime and night-time periods, the rating level does not exceed the background sound level which, from BS 4142:2014, is an indication of the specific sound source having a low impact, depending on the context.

6.23 Paragraph 3.3 of this chapter states the factors that BS 4142:2014 requires to be taken into consideration when assessing the context of the sound, including the absolute level of sound. Table 4 of BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' contains guidance values for indoor ambient noise levels within dwellings for resting during the daytime and sleeping during the night-time. The guidance levels are 35 dB  $L_{Aeq,16hr}$  for daytime resting and 30 dB  $L_{Aeq,8hr}$  for night-time sleeping. BS 8233:2014 also recommends that *'for traditional areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB  $L_{Aeq,T}$  with an upper guideline value of 55 dB  $L_{Aeq,T}$  which would be acceptable in noisier environments'*.

6.24 The combined predicted specific sound level from the facility and the existing level of residual sound during the daytime are 69 dB  $L_{Aeq,T}$  at 217 Manchester Road and Ann Street (off Manchester Road) and range between 44 dB  $L_{Aeq,T}$  and 47 dB  $L_{Aeq,T}$  at other locations. The



predicted total sound levels combined from the specific sound level from the facility and existing level of residual sound during the night-time are 61 dB  $L_{Aeq,T}$  and 62 dB  $L_{Aeq,T}$  at 217 Manchester Road and Ann Street (off Manchester Road) respectively, and range between 37 dB  $L_{Aeq,T}$  and 44 dB  $L_{Aeq,T}$  at other locations.

- 6.25 Based on the guidance contained within the Napier University Report NANR 116 [16], a standard residential partially open window will provide a sound attenuation of around 15 dB. Therefore, at all locations with the exception of 217 Manchester Road and Ann Street (off Manchester Road), the resultant sound levels would be within internal guidance levels for resting during the daytime and sleeping during the night-time. Similarly, at all locations with the exception of 217 Manchester Road and Ann Street (off Manchester Road), total sound levels would be within the guidance levels for quiet enjoyment of gardens during the daytime.
- 6.26 Existing levels of residual sound at 217 Manchester Road and Ann Street (off Manchester Road) are 69 dB  $L_{Aeq}$  during the daytime and 61 to 62 dB  $L_{Aeq}$  during the night-time (i.e. 20 to 30 dB higher than the specific sound from the facility), and are mainly attributed to sound from road traffic on Manchester Road. Therefore, sound from the facility does not serve to increase the high levels of sound already experienced at 217 Manchester Road and Ann Street (off Manchester Road). Furthermore, it is unlikely that sound from the facility will significantly contribute to the sound environment to an extent that it would be intrusive to residents of Manchester Road and Ann Street.
- 6.27 The above assessment indicates that with the development, at the closest NSRs, there will be very little change from baseline conditions. In the event that noise from the site is audible, it will not cause any changes in behaviour or attitude or a perceived change in quality of life. Therefore, with respect to national planning guidance in the NPPF, NPSE and PPGN (Table 3.2), it is likely that the level of noise will be within the NOEL, and it would in the very worst case not exceed the LOAEL.
- 6.28 Therefore, with consideration for the context, the impact of noise from activities on site is expected to be negligible or low. The sensitivity of receptors is medium so there will be a direct, permanent negligible or minor adverse effect due to noise from the operation of the facility.

### **Additional Mitigation**

- 6.29 Reasonable mitigation for noise from the operation of the facility has been provided as outlined within Section 5 of this chapter 'Embedded Mitigation and Enhancement'. With this mitigation in place, noise effects from the operation of the facility are expected to be minor adverse at worst. On this basis, it is not expected that there will be a need for further mitigation measures to be employed.

### **Residual Effects**

- 6.30 The sensitivity of NSRs is medium and the magnitude of change, following mitigation, is negligible or low. Therefore, there is likely to be a direct, permanent residual effect on some

NSRs of negligible or minor adverse significance due to noise from the operation of the facility following the implementation of mitigation measures.

### Off-Site Operational Traffic Noise

6.31 The magnitude of impacts during the daytime is determined from the predicted change in road traffic sound immissions at NSRs comparing the flows for the year 2017 'with' and 'without' the development using the methodology described in Section 3 of this chapter. The traffic data provided indicated that there would be seven, two-way vehicle trips on and off site on per night, none of which would be HGVs. On this basis, the magnitude of impacts during the night-time would be negligible and do not warrant numerical assessment. The magnitude of impacts during the daytime are summarised in Table 6.3, below. Full traffic calculations are provided in Appendix 11.D.

**Table 6.3: Magnitude of Road Traffic Sound Impacts – Daytime**

NSR	Road Traffic Sound Immission, L <sub>A10,18h</sub> (dB)		Change in Road Traffic Sound Immission L <sub>A10,18h</sub> (dB)	Magnitude of Impact
	Opening year Without Development (plus Committed Development)	Opening Year With Development (Plus Committed Development)		
Link 1: A530 Griffiths Road North (Site 1)	68.2	68.2	0.0	Negligible
Link 3: A530 Griffiths Road South (Site 3)	70.4	70.6	0.2	Negligible
Link 4: A530 North of A556 (Site 4)	70.5	70.6	0.1	Negligible
Link 5: A556 East (Sites 5 + 6)	75.4	75.5	0.1	Negligible
Link 6: A530 South of A556 (sites 7 + 8)	72.4	72.4	0.0	Negligible
Link 7: A556 West (Sites 9 + 10)	74.7	74.7	0.0	Negligible

6.32 From Table 6.3, the change in traffic sound immission is less than 1 dB and therefore the magnitude of impact is negligible. Therefore, with reference to paragraph 3.36, the significance of effects due to operational road traffic noise is negligible.

### Additional Mitigation

6.33 As noise effects from road traffic are negligible, additional mitigation measures will not need to be employed.

### Residual Effects

6.34 Residual effects on NSRs will be of negligible significance due to noise from road traffic associated with the facility following the implementation of mitigation measures.

## 7 Cumulative Effects

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### Cumulative Operational Noise Effects

- 7.1 There are five other consented developments to the south of the site that have the potential to generate cumulative operational noise effects at NSRs within the vicinity of the site. The assessment of the cumulative effects has been undertaken on the basis of the specific sound levels permitted by their respective planning conditions, noting that the majority of these facilities have not been constructed and are not operational.

### Sustainable Energy Plant (SEP)

- 7.2 The project is an energy from waste-fuelled generating station at land formerly occupied by the Lostock Power Station at Griffiths Road, Lostock (Ref: 10/00691/DECC), adjacent to the west of the site. The planning consent does not impose specific numerical noise limits. Condition 28 requires the maximum permissible specific sound levels to be agreed with the Council prior to the commissioning of the SEP. Therefore, specific sound levels have been adopted relative to the background sound levels contained within this ES that are approximately commensurate with the LOAEL; i.e. 5 dB above the background sound level at the nearest NSRs.

### Bio Energy Plant (BEP)

- 7.3 The project is a bio energy plant at Lostock Works, Griffiths Road (Ref: 08/0034/FZ5), to the south-east of the site. Planning condition 19 requires that the night-time rating level not exceed 42 dB  $L_{Ar,Tr}$  at Anne Street and 40 dB  $L_{Ar,Tr}$  at Bowden Drive or St Johns Close. These limits are 2 to 10 dB above the background sound levels; 1 to 2 dB below the residual sound levels at NSRs to the south of Manchester Road; and 20 dB below the residual sound levels at NSRs to the north of Manchester Road; relative to the baseline survey data adopted in this ES. The noise report that accompanied the planning application <sup>[17]</sup> provides no discussion on the likely acoustic character of the specific sound.
- 7.4 For the purposes of this assessment, a rating penalty of 0 and 3 dB has been adopted for NSRs to the north and south of Manchester Road, respectively. This corresponds to a specific sound that either contains perceptible tones or does not contain tones but is otherwise readily distinctive against the residual sound at NSRs to the south of Manchester Road; and a specific sound that is not readily distinctive against the residual sound at NSRs to the north of Manchester Road

### Waste Recycling Centre and Waste Transfer Building (WRC/WTB)

- 7.5 The project includes use of the site as a non-hazardous household, commercial and industrial waste recycling centre with the erection of a mixed waste transfer building and ancillary works on Land To The South West Of Lostock Works, Griffiths Road, Lostock Gralam (Ref: 09/10799/CPO), to the south-east of the site. Planning condition 9 limits the hours of operation to

between 07.30 and 18.00 hours Monday to Friday and between 07.30 and 13.00 hours on Saturday. Planning condition 14 requires that the rating level does not exceed the background sound level at the nearest residential NSRs. For the purposes of this assessment, the nearest residential NSRs have been taken as the consented residential development at Farm Road and a rating penalty of 3 dB has been applied, which corresponds to a specific sound that either contains perceptible tones or impulses; or does not contain tones or impulses but is otherwise readily distinctive against the residual sound.

### **Peaking Power Plant (PPP)**

- 7.6 The project is a gas-fired peaking power plant using containerised generators, total 48.4 MWth, 20.9 MWe on Land To The South West Of Lostock Works, Griffiths Road, Lostock Gralam (Ref: 15/00935/FUL), to the south-east of the site. The planning consent does not impose any noise limits on the project. The Design and Access Statement for the project <sup>[18]</sup> refers to housing the plant within purpose built sound attenuation enclosures; surrounding the compound with 3 m high acoustics fences; and states that the '*noise impact of the plant when generating is very low*'. On this basis, the assessment has assumed that the specific sound from the peaking plant does not materially affect the baseline residual and background sound levels at NSRs.

### **Metal Recovery Plant and Fertiliser Manufacturer (MRP)**

- 7.7 The project comprises precious and semi-precious metal recovery plants with fertiliser manufacturer at Eco House Griffiths Road, Lostock Gralam, Northwich (Ref: 07-3384-FZ5 & 14/05128/S73), to the south of the site. The planning consent does not impose specific numerical noise limits. Condition 11 requires a noise assessment to be carried out prior to the commencement of the development. Therefore, specific sound levels have been adopted relative to the background sound levels contained within this ES that are approximately commensurate with the LOAEL; i.e. 5 dB above the background sound level at the nearest NSRs.

### **Assessment**

- 7.8 The above-listed sites all occupy land that is between the proposed facility and the nearest NSRs to the south, south-east and south-west so it is likely that the already consented sites will have greater constraints upon them with respect to sound immissions at NSRs than the proposed development. There is also the potential that the structures contained therein will provide additional screening to sound from the proposed facility at the nearest NSRs to the south, south-east and south-west. However, no adjustments have been made to account for screening of sound from buildings and structures provided by other developments. On this basis, the levels of cumulative specific sound may be over-estimated, thereby providing a robust assessment of cumulative effects.
- 7.9 The commentary to clause 8.1 of BS 4142:2014 states:

*“Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.”*

- 7.10 In the context of this cumulative assessment, the specific sound that is under consideration is the specific sound from the proposed development and the specific sound levels from the consented developments contribute to the future residual and background sound levels against which this is compared. The increases in total specific sound level (consented plus proposed developments) and in total ambient sound level (consented plus proposed developments plus baseline residual sound level) are relevant to the consideration of the context of the initial estimate of impacts, determined in accordance with BS 4142:2014; and of the likely change in the acoustic character of the area, in accordance with the PPGN.
- 7.11 The sound emissions from the consented developments are nominally continuous sound sources. Therefore, the specific sound levels permitted by their respective planning consents has been added to the baseline background sound level to determine the future background sound levels at NSRs that has been consented. The results of the cumulative operational noise assessment in accordance with BS 4142:2104 are provided in Appendix 11.E.
- 7.12 The specific sound levels from the proposed development are predicted to be approximately 6 to 17 dB below the future background sound levels; and 13 to 27 dB below the future residual sound levels; at NSRs during the daytime and night-time.

### **Cumulative Traffic Noise**

- 7.13 The magnitude of impacts during the daytime is determined from the predicted change in road traffic sound immissions at NSRs comparing the flows for the year 2017 ‘with’ and ‘without’ the proposals and other committed development using the methodology described in Section 3 of this chapter. As for the assessment of operational traffic noise, a specific assessment of night-time effects has not been carried out. The magnitude of impacts during the daytime is summarised in Table 7.1.

**Table 7.1: Magnitude of Cumulative Road Traffic Sound Impacts – Daytime**

NSR	Road Traffic Sound Immission, $L_{A10,18h}$ (dB)		Change in Road Traffic Sound Immission $L_{A10,18h}$ (dB)	Magnitude of Impact
	Opening year Without Development (plus Committed Development)	Opening Year With Development (Plus Committed Development)		
Link 1: A530 Griffiths Road North (Site 1)	67.8	68.2	0.4	Negligible
Link 3: A530 Griffiths Road South (Site 3)	69.1	70.6	1.5	Low
Link 4: A530 North of A556 (Site 4)	69.3	70.6	1.3	Low
Link 5: A556 East (Sites 5 + 6)	75.2	75.5	0.3	Negligible
Link 6: A530 South of A556 (sites 7 + 8)	72.1	72.4	0.3	Negligible
Link 7: A556 West (Sites 9 + 10 )	74.5	74.7	0.2	Negligible

7.14 From Table 7.1, on Links 3 and 4, the change in road traffic sound immissions are 1.5 dB and 1.3 dB; therefore the magnitude of impact is low. On all other links, the change in road traffic sound immissions is below 1 dB; therefore the magnitude of impact is negligible. The predicted level of sound immissions from road traffic is 70.5 dB  $L_{A10,18hr}$  on both Links 3 and 4. With reference to Table 3.3 and paragraph 3.36, the sensitivity of receptors on Links 3 and 4 is medium to high. Therefore the overall significance of cumulative effects due to road traffic is minor to moderate adverse. However, with reference to Table 6.3, the majority of this increase in traffic noise levels is not attributable to this development.

## 8 Summary and Conclusions

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- 8.1 A noise and vibration assessment has been completed as part of the formal Environmental Impact Assessment (EIA) required for the planning application for the proposed REnescience Northwich development, which is located off the A530 Griffiths Road, near Northwich and Lostock Gralam, Cheshire.
- 8.2 Mitigation for noise and vibration from construction activities is provided within the Construction Environmental Management Plan (CEMP, see Appendix 2.C) for the site based upon the guidance in BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014. Construction works will follow Best Practicable Means (BPM) outlined in Section 72 of the Control of Pollution Act 1974 (as amended) (HMSO 1974) to minimise noise and vibration effects.
- 8.3 A qualitative assessment of construction noise and vibration effects has been carried out with reference to national Planning Practice Guidance for Noise (PPGN). The assessment indicates that, with suitable mitigation measures, there is likely to be a direct, temporary, medium-term noise effect on noise-sensitive receptors (NSRs) of minor adverse significance. There will be no change due to vibration and the significance of effects will therefore be neutral. With reference to the PPGN, construction noise effects might be above the Lowest Observed Adverse Effect Level (LOAEL) but will be below the Significant Observed Adverse Effect Level (SOAEL) and vibration effects will be below the No Observed Effect Level (NOEL).
- 8.4 In order to comply with the Environmental Permitting Regulations (EPR), the development will incorporate Best Available Techniques (BAT) to minimise noise emissions. The gas engines will be located within containers which provide significant sound attenuation. The gas engines' stack will be fitted with a silencer. The drive gear of the bioreactors, the ballistic separator and other plant associated with waste sorting will be located in buildings. Other external plant, including pumps, dewatering plant etc will be located within enclosures. HGVs will follow the approved access routes to and from site.
- 8.5 An assessment of the operational noise effects, with the above measures in place has been carried out in accordance with the PPGN and BS 4142:2014. The assessment indicates that at the majority of locations the rating level does not exceed the background sound level which, from BS 4142:2014, is an indication of the specific sound source having a low impact, depending on the context. With consideration for the context, it is possible that noise from site activities will be noticeable on occasions at the closest NSRs to the site but it will not cause any changes in behaviour or attitude or a perceived change in quality of life. Therefore, with respect to national planning guidance in the PPGN, the level of noise will be at or below the LOAEL. With respect to EIA, the impact of noise from activities on site is expected to be low. The sensitivity of receptors is medium so there will be a direct, minor adverse effect due to noise from the operation of the facility.

- 8.6 The effects of change in noise levels due to road traffic on the local road network have also been considered with reference to the guidance in Volume 11, Section 3, Part 7: Noise and Vibration of the Design Manual for Roads and Bridges (DMRB). The assessment indicates that the significance of effects due to operational road traffic noise is negligible.
- 8.7 Cumulative operational noise effects with other consented developments that have the potential to generate cumulative operational noise effects at receptors within the vicinity of the site. Although there is potential for cumulative effects to occur, these are likely to be negligible to minor, and there is also potential that other developments will reduce the noise effects from that facility. On this basis, the significance of cumulative effects would be, in the worst case, of minor adverse significance.
- 8.8 Cumulative effects of change in noise levels due to road traffic on the local road network have also been considered with reference to the guidance on noise contained in the DMRB. The assessment indicates that the significance of effects due to operational road traffic noise from the development is negligible. The significance of cumulative effects due to road traffic noise with the development and other consented developments is in the worst-case minor to moderate adverse. However, where minor to moderate adverse effects occur due to noise from road traffic these are not attributable to this development, but to the contribution from other developments.
- 8.9 In summary, there is the potential for effects of minor adverse significance to occur due to noise during the construction of the development and during the operation of the development. Construction noise will be controlled using best practicable means and operational noise will be controlled using best available technology. The effects due to construction vibration and road traffic noise are negligible.



## References

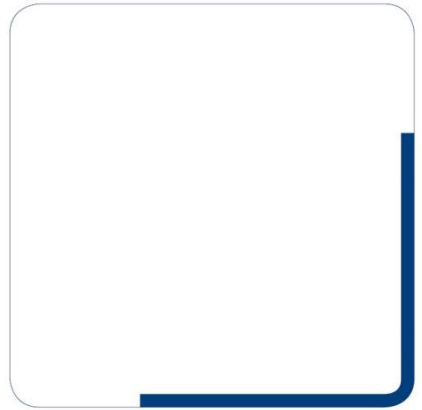
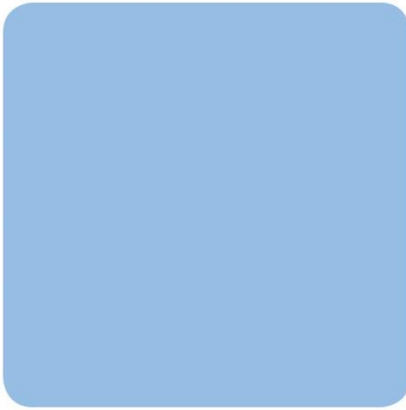
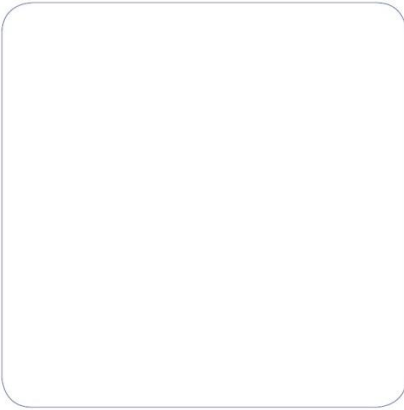
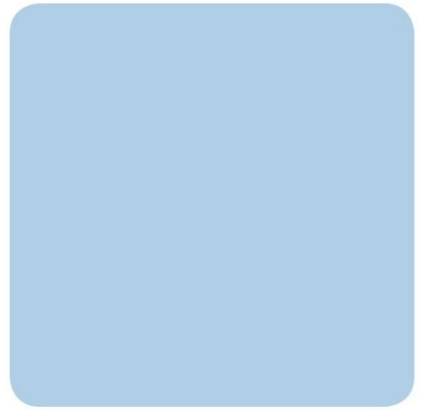
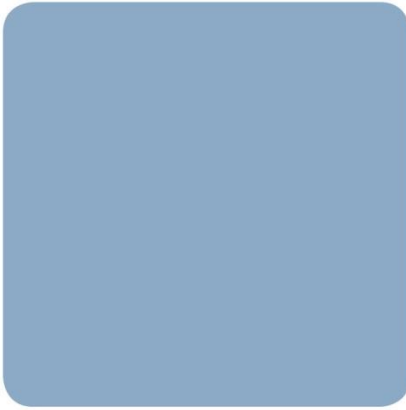
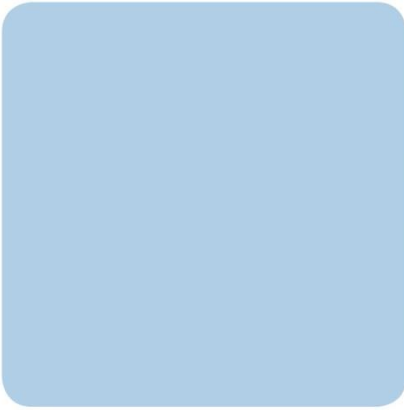
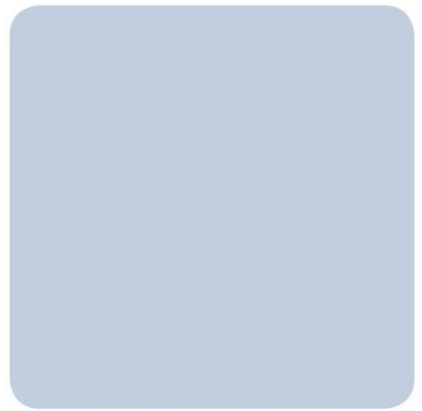
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## Appendix 11.A: Noise Model Source Data

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### External Plant Data

Plant	Quantity	Type	on time	Period	Height (m)	Sound Power Level $L_{WA}$ dB	Spectral Shape dB(A)							
							63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
CHP (Gas Engines)	5	Point	100%	24 hour	2.0	98	60	72	73	80	86	91	84	79
Gas Engine Stack	1	Point	100%	24 hour	33.0	89	88	78	70	66	64	70	71	69
Front-end Loader	2	Line	100%	Daytime (07:00 - 19:00)	1.0	104	80	75	83	83	103	99	85	77
HGV	4	Line	na	Daytime (07:00 - 19:00)	1.0	98	81	84	86	92	93	92	88	80
Flare	1	Point	3%	24 hour	10.0	93	88	78	70	66	64	70	71	69

### Internal Reverberant Sound Level in Buildings

	Sound Power Level $L_{WA}$ dB	Spectral Shape dB(A)							
		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Internal Reverberant Sound Level $L_{Ap,in}$	80	53	63	69	73	76	73	69	61

### Cladding Specification

Façade	Construction	Sound Reduction Index (SRI)									
		Rw	63	125	250	500	1000	2000	4000	8000	
Walls	0.5 mm corrugated steel	19	7	9	13	17	18	21	24	27	
Roof	Insulated panel (KS 1000 RW or similar)	25	20	18	20	24	20	29	39	47	

**Stack Silencer Reduction Calculations**

	LWA	Spectral shape							
		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
JMC 41	121	111.0	116.0	105.0	102.0	96.0	108.0	107.0	104.0
JMC 42	123	117.0	115.0	113.0	108.0	105.0	108.0	109.0	107.0
	128.1	121.0	121.5	116.6	112.0	108.5	114.0	114.1	111.8
<b>IMS Reactive Exhaust Gas Silencer MA51</b>		33.0	44.0	47.0	46.0	45.0	44.0	43.0	43.0
	88.6	88.0	77.5	69.6	66.0	63.5	70.0	71.1	68.8

**SoundPlan Stack Directivity Input**

Degrees		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Sound Plan Stack Directi vity Input	0	0.6	2.4	4.2	6.1	7.9	9.7	11.6	13.4
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	30	0.8	1.5	2.1	2.8	3.9	3.6	3.1	2.3
	40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	50	1.2	1.1	0.9	0.6	-0.1	-1.3	-3.2	-5.7
	60	-0.2	-0.5	-1.0	-2.0	-3.8	-6.7	-9.8	-12.5
	70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	90	1.3	-1.8	-4.9	-8.0	-11.1	-14.3	-17.4	-20.5
	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	110	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	120	0.7	-3.8	-8.4	-13.0	-17.6	-22.2	-26.7	-31.3
	130	0.7	-3.8	-8.4	-13.0	-17.6	-22.2	-26.7	-31.3
	140	0.7	-3.8	-8.4	-13.0	-17.6	-22.2	-26.7	-31.3
	150	0.7	-3.8	-8.4	-13.0	-17.6	-22.2	-26.7	-31.3
160	0.7	-3.8	-8.4	-13.0	-17.6	-22.2	-26.7	-31.3	
170	0.7	-3.8	-8.4	-13.0	-17.6	-22.2	-26.7	-31.3	
180	0.7	-3.8	-8.4	-13.0	-17.6	-22.2	-26.7	-31.3	


# Appendix 11.B: Baseline Noise Monitoring Data

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**Sound Level Survey Record (Unattended Baseline Survey)**

Location		L1 273 Manchester Road											
Purpose of Monitoring		Baseline											
Relevant Guidance / Standard		BS 7445-1:2003 / BS 7445-2:1991 / BS 4142:2014 / BS 8233:2014											
<b>Sound Measurement System</b>													
RPS ID	Manufacturer / Model		Serial Number	Last Lab Verification	Filename	Memory Card ID							
Hire	Rion NL-52		320636	-	0001	-							
Microphone Height	Measurement Interval	Dynamic Range	Time Weighting	Frequency Weighting	Façade / Freefield	Photo?							
1.5 m	100 ms	20 - 130 dB	F	A	Façade	✓							
<b>START</b>				<b>END</b>									
Personnel		PGH			-								
Date / time		09/07/2015 12:05			-								
<b>Calibrator</b>	RPS ID		14		-								
	Manufacturer / Model		RION NC-74		#N/A								
	Serial Number		110118		#N/A								
	Date last verification		10/02/2014		#N/A								
	Reference level		94.0		-								
	Meter reading		94.0		-								
<b>Weather</b>	Wind speed (m/s) & dir'n 1		0.8	SW	-	-							
	Wind speed (m/s) & dir'n 2		1.8	SW	-	-							
	Wind speed (m/s) & dir'n 3		1	SW	-	-							
	Wind speed (m/s) & dir'n Av.		1.2	SW	-	-							
	Cloud cover (100%= 8 oktas)		3- oktas		-								
	Temperature (degrees Celsius)		~21 °C		-								
	Relative Humidity (%)		~ 50 %		-								
	Likely temp. inversion / Precipitation / Fog / Wet ground / Frozen ground / Snow cover? (tick boxes)		TI	P	F	W	Fr	Sn	TI	P	F	W	Fr
		x											
Subjective description / additional details		Clear. Dry ground.			Clear. Dry ground.								
Photographs of Measurement Location													
													
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))													
~1m from façade in front of house.													
Description of sound environment at start of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)													
Road noise, Sound of steel roof erection across street, aeroplane flying over.													
Description of sound environment at end of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)													
Road noise													


**Sound Level Survey Record** (Unattended Baseline Survey)

Location		L2 38 James Street											
Purpose of Monitoring		Baseline											
Relevant Guidance / Standard		BS 7445-1:2003 / BS 7445-2:1991 / BS 4142:2014 / BS 8233:2014											
<b>Sound Measurement System</b>													
RPS ID	Manufacturer / Model		Serial Number	Last Lab Verification	Filename	Memory Card ID							
Hire	Rion NL-52		932323	-	0002	-							
Microphone Height	Measurement Interval	Dynamic Range	Time Weighting	Frequency Weighting	Façade / Freefield	Photo?							
1.5 m	100 ms	20 - 130 dB	F	A	Freefield	✓							
<b>START</b>						<b>END</b>							
Personnel			PGH			PB							
Date / time			09/07/2015 11:00			-							
<b>Calibrator</b>	RPS ID		14			14							
	Manufacturer / Model		RION NC-74			RION NC-74							
	Serial Number		110118			110118							
	Date last verification		10/02/2014			10/02/2014							
	Reference level		94.0			94.0							
	Meter reading		94.0			94.0							
<b>Weather</b>	Wind speed (m/s) & dir'n 1		1.1	SW		-	-						
	Wind speed (m/s) & dir'n 2		0.5	SW		-	-						
	Wind speed (m/s) & dir'n 3		0.8	SW		-	-						
	Wind speed (m/s) & dir'n Av.		0.8	SW		-	-						
	Cloud cover (100%= 8 oktas)		3- oktas			5- oktas							
	Temperature (degrees Celsius)		~21 °C			~20 °C							
	Relative Humidity (%)		~ 45 %			~ 50 %							
	Likely temp. inversion / Precipitation / Fog / Wet ground / Frozen ground / Snow cover? (tick boxes)		TI	P	F	W	Fr	Sn	TI	P	F	W	Fr
		x											
Subjective description / additional details		Clear. Dry ground.					Clear. Dry ground.						
<b>Photographs of Measurement Location</b>													
													
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))													
Near middle of back garden in close proximity to small tree. Soft ground to source. Fence 4 m away.													
Description of sound environment at start of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)													
Distant road traffic, birds, impulsive sound from west, distant dog barking, train and train horn. Building working expected between 3pm-5pm Tuesday and Wednesday													
Description of sound environment at end of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)													
Distant road traffic, wind rustle, aircraft noise, people talking next door													


**Sound Level Survey Record (Attended Baseline Survey)**

Location		L4 On footpath north of Farm Road											
Purpose of Monitoring		Baseline											
Relevant Guidance / Standard		BS 7445-1:2003 / BS 7445-2:1991 / BS 4142:2014 / BS 8233:2014											
<b>Sound Measurement System</b>													
RPS ID	Manufacturer / Model		Serial Number	Last Lab Verification	Filename	Memory Card ID							
32	B&K 2250		2579764	30/06/2014	003, 006	-							
Microphone Height	Measurement Interval	Dynamic Range	Time Weighting	Frequency Weighting	Façade / Freefield	Photo?							
1.5 m	15 min	20 - 140 dB	F	A	Freefield	✓							
<b>003</b>						<b>006</b>							
Personnel			PGH			PGH							
Date / time			09/07/2015 18:00			09/07/2015 19:54							
<b>Calibrator</b>	RPS ID		35			35							
	Manufacturer / Model		B&K 4231			B&K 4231							
	Serial Number		2665087			2665087							
	Date last verification		20/02/2015			20/02/2015							
	Reference level		94.0			94.0							
	Meter reading		94.0			94.0							
<b>Weather</b>	Wind speed (m/s) & dir'n 1		1.6	NE	1	NE							
	Wind speed (m/s) & dir'n 2		1.1	NE	1.8	NE							
	Wind speed (m/s) & dir'n 3		1.1	NE	0.7	NE							
	Wind speed (m/s) & dir'n Av.		1.3	NE	1.2	NE							
	Cloud cover (100%= 8 oktas)		2- oktas			1- oktas							
	Temperature (degrees Celsius)		~20 °C			~17 °C							
	Relative Humidity (%)		~ 50 %			~ 55 %							
	Likely temp. inversion / Precipitation / Fog / Wet ground / Frozen ground / Snow cover? (tick boxes)		TI	P	F	W	Fr	Sn	TI	P	F	W	Fr
Subjective description / additional details		Clear. Dry ground.					Clear. Dry ground.						
<b>Photographs of Measurement Location</b>													
													
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))													
Industrial Sources to NW over a grassy hill. Position elevated above nearby houses.													
Description of sound environment during 003 survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)													
Industrial sound from N/NW - continuous sound of aggregate falling off conveyor/raspy turbine - (loading train). Aeroplanes, dog barking, leaf blower ~150 m in garden to E. Distant traffic.													
Description of sound environment during 006 survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)													
Low level hum and impulses, aeroplanes, birds, process/movement alarm, instant voices from playing field, dog barking, dog walker passing													


**Sound Level Survey Record (Attended Baseline Survey)**

Location		L4 On footpath north of Farm Road												
Purpose of Monitoring		Baseline												
Relevant Guidance / Standard		BS 7445-1:2003 / BS 7445-2:1991 / BS 4142:2014 / BS 8233:2014												
<b>Sound Measurement System</b>														
RPS ID	Manufacturer / Model		Serial Number	Last Lab Verification	Filename	Memory Card ID								
32	B&K 2250		2579764	30/06/2014	009_0112	-								
Microphone Height	Measurement Interval	Dynamic Range	Time Weighting	Frequency Weighting	Façade / Freefield	Photo?								
1.5 m	15 min	20 - 140 dB	F	A	Freefield	✓								
<b>009</b>						<b>012</b>								
Personnel			PGH			PGH								
Date / time			10/07/2015 01:21			10/07/2015 02:44								
<b>Calibrator</b>	RPS ID		35			35								
	Manufacturer / Model		B&K 4231			B&K 4231								
	Serial Number		2665087			2665087								
	Date last verification		20/02/2015			20/02/2015								
	Reference level		94.0			94.0								
	Meter reading		94.0			94.0								
<b>Weather</b>	Wind speed (m/s) & dir'n 1		0.2	?	Still	?								
	Wind speed (m/s) & dir'n 2		0	?	Still	?								
	Wind speed (m/s) & dir'n 3		0	?	Still	?								
	Wind speed (m/s) & dir'n Av.		0.1	?	-	?								
	Cloud cover (100%= 8 oktas)		7- oktas			7- oktas								
	Temperature (degrees Celsius)		~15 °C			~15 °C								
	Relative Humidity (%)		~ 65 %			~ 65 %								
	Likely temp. inversion / Precipitation / Fog / Wet ground / Frozen ground / Snow cover? (tick boxes)		TI	P	F	W	Fr	Sn	TI	P	F	W	Fr	Sn
	Subjective description / additional details		Clear. Dew on ground.			Clear. Dew on ground.								
<b>Photographs of Measurement Location</b>														
														
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))														
Industrial Sources to NW over a grassy hill. Position elevated above nearby houses.														
Description of sound environment during 009 survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)														
Industrial sound/distant motorway (dominant). Industrial site to north audible. Distant birds, distant cars.														
Description of sound environment during 012 survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)														
Same as above with more traffic														


**Sound Level Survey Record (Attended Baseline Survey)**

Location		L5 North of James Stree											
Purpose of Monitoring		Baseline											
Relevant Guidance / Standard		BS 7445-1:2003 / BS 7445-2:1991 / BS 4142:2014 / BS 8233:2014											
Sound Measurement System													
RPS ID	Manufacturer / Model		Serial Number	Last Lab Verification	Filename	Memory Card ID							
32	B&K 2250		2579764	30/06/2014	001, 004	-							
Microphone Height	Measurement Interval	Dynamic Range	Time Weighting	Frequency Weighting	Façade / Freefield	Photo?							
1.5 m	15 min	20 - 140 dB	F	A	Freefield	✓							
						<b>001</b>	<b>004</b>						
Personnel		PGH					PGH						
Date / time		09/07/2015 15:30					09/07/2015 18:34						
Calibrator	RPS ID		35			35							
	Manufacturer / Model		B&K 4231			B&K 4231							
	Serial Number		2665087			2665087							
	Date last verification		20/02/2015			20/02/2015							
	Reference level		94.0			94.0							
	Meter reading		94.0			94.0							
Weather	Wind speed (m/s) & dir'n 1		1.1	NE		0.6	NE						
	Wind speed (m/s) & dir'n 2		1.7	NE		2.0	NE						
	Wind speed (m/s) & dir'n 3		0.8	NE		1.0	NE						
	Wind speed (m/s) & dir'n Av.		1.2	NE		1.2	NE						
	Cloud cover (100%= 8 oktas)		1- oktas			1- oktas							
	Temperature (degrees Celsius)		~21 °C			~21 °C							
	Relative Humidity (%)		~ 45 %			~ 45 %							
	Likely temp. inversion / Precipitation / Fog / Wet ground / Frozen ground / Snow cover? (tick boxes)		TI	P	F	W	Fr	Sn	TI	P	F	W	Fr
Subjective description / additional details		Clear. Dry ground.					Clear. Dry ground.						
Photographs of Measurement Location													
													
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))													
On hard ground next o gate at end of track. Soft and uneven ground to nearby road.													
Description of sound environment during 001 survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)													
Birds, foliage in wind, aeroplanes, distant traffic. Incects, train, distant car alarm, distant car horns.													
Description of sound environment during 004 survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)													
Industrial sound, train, aeroplanes, distant traffic, jogger/dogwalkers passing, birds.													

**Sound Level Survey Record (Attended Baseline Survey)**


Location		L3 Manchester Road opposite Brickfield Business Centre												
Purpose of Monitoring		Baseline												
Relevant Guidance / Standard		BS 7445-1:2003 / BS 7445-2:1991 / BS 4142:2014 / BS 8233:2014												
<b>Sound Measurement System</b>														
RPS ID	Manufacturer / Model		Serial Number	Last Lab Verification	Filename	Memory Card ID								
32	B&K 2250		2579764	30/06/2014	002, 005	-								
Microphone Height	Measurement Interval	Dynamic Range	Time Weighting	Frequency Weighting	Façade / Freefield	Photo?								
1.5 m	15 min	20 - 140 dB	F	A	Freefield	✓								
<b>002</b>				<b>005</b>										
Personnel		PGH		PGH										
Date / time		09/07/2015 16:15		09/07/2015 19:25										
<b>Calibrator</b>	RPS ID		35		35									
	Manufacturer / Model		B&K 4231		B&K 4231									
	Serial Number		2665087		2665087									
	Date last verification		20/02/2015		20/02/2015									
	Reference level		94.0		94.0									
	Meter reading		94.0		94.0									
<b>Weather</b>	Wind speed (m/s) & dir'n 1		0.4	NE	0.7	NE								
	Wind speed (m/s) & dir'n 2		0.8	NE	0.6	NE								
	Wind speed (m/s) & dir'n 3		0.8	NE	0.5	NE								
	Wind speed (m/s) & dir'n Av.		0.7	NE	0.6	NE								
	Cloud cover (100%= 8 oktas)		1- oktas		1- oktas									
	Temperature (degrees Celsius)		~20 °C		~19 °C									
	Relative Humidity (%)		~ 45 %		~ 50 %									
	Likely temp. inversion / Precipitation / Fog / Wet ground / Frozen ground / Snow cover? (tick boxes)		TI	P	F	W	Fr	Sn	TI	P	F	W	Fr	Sn
	Subjective description / additional details		Clear. Dry ground.				Clear. Dry ground.							
<b>Photographs of Measurement Location</b>														
														
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))														
~2 m from carriage way edge														
Description of sound environment during 002 survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)														
Road Traffic.														
Description of sound environment during 005 survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)														
Road traffic, dog barking, aeroplane, dog walkers passing by.														

**Sound Level Survey Record (Attended Baseline Survey)**

Location		L5 North of James Street												
Purpose of Monitoring		Baseline												
Relevant Guidance / Standard		BS 7445-1:2003 / BS 7445-2:1991 / BS 4142:2014 / BS 8233:2014												
<b>Sound Measurement System</b>														
RPS ID	Manufacturer / Model		Serial Number	Last Lab Verification	Filename	Memory Card ID								
32	B&K 2250		2579764	30/06/2014	008, 011	-								
Microphone Height	Measurement Interval	Dynamic Range	Time Weighting	Frequency Weighting	Façade / Freefield	Photo?								
1.5 m	15 min	20 - 140 dB	F	A	Freefield	✓								
<b>008</b>						<b>011</b>								
Personnel			PGH			PGH								
Date / time			10/07/2015 00:48			10/07/2015 02:17								
<b>Calibrator</b>	RPS ID		35			35								
	Manufacturer / Model		B&K 4231			B&K 4231								
	Serial Number		2665087			2665087								
	Date last verification		20/02/2015			20/02/2015								
	Reference level		94.0			94.0								
	Meter reading		94.0			94.0								
<b>Weather</b>	Wind speed (m/s) & dir'n 1		0.2	?	0.2	?								
	Wind speed (m/s) & dir'n 2		0	?	0.0	?								
	Wind speed (m/s) & dir'n 3		0	?	0.0	?								
	Wind speed (m/s) & dir'n Av.		0.1	?	0.1	?								
	Cloud cover (100%= 8 oktas)		5- oktas			7- oktas								
	Temperature (degrees Celsius)		~15 °C			~15 °C								
	Relative Humidity (%)		~ 70 %			~ 70 %								
	Likely temp. inversion / Precipitation / Fog / Wet ground / Frozen ground / Snow cover? (tick boxes)		TI	P	F	W	Fr	Sn	TI	P	F	W	Fr	Sn
	Subjective description / additional details		Clear. Dew forming.			Clear. Dew forming.								
<b>Photographs of Measurement Location</b>														
														
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))														
On hard ground next o gate at end of track. Soft and uneven ground to nearby road.														
Description of sound environment during 008 survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)														
Water movement, industrial continuous sound, sounds like two industrial sources, one following line of road and one towards SW -could be distant motorway. Bird call.														
Description of sound environment during 011 survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)														
Same as above plus distant traffic and train.														



**Sound Level Survey Record (Attended Baseline Survey)**

Location		L3 Manchester Road opposite Brickfield Business Centre												
Purpose of Monitoring		Baseline												
Relevant Guidance / Standard		BS 7445-1:2003 / BS 7445-2:1991 / BS 4142:2014 / BS 8233:2014												
<b>Sound Measurement System</b>														
RPS ID	Manufacturer / Model		Serial Number		Last Lab Verification		Filename		Memory Card ID					
32	B&K 2250		2579764		30/06/2014		007_010		-					
Microphone Height	Measurement Interval	Dynamic Range	Time Weighting		Frequency Weighting		Façade / Freefield		Photo?					
1.5 m	15 min	20 - 140 dB	F		A		Freefield		✓					
<b>007</b>						<b>010</b>								
Personnel			PGH			PGH								
Date / time			09/07/2015 16:15			09/07/2015 19:25								
<b>Calibrator</b>	RPS ID		35		35									
	Manufacturer / Model		B&K 4231		B&K 4231									
	Serial Number		2665087		2665087									
	Date last verification		20/02/2015		20/02/2015									
	Reference level		94.0		94.0									
	Meter reading		94.0		94.0									
<b>Weather</b>	Wind speed (m/s) & dir'n 1		0		?		Still		?					
	Wind speed (m/s) & dir'n 2		0.2		?		Still		?					
	Wind speed (m/s) & dir'n 3		0.5		?		Still		?					
	Wind speed (m/s) & dir'n Av.		0.2		?		-		?					
	Cloud cover (100%= 8 oktas)		1- oktas		1- oktas									
	Temperature (degrees Celsius)		~20 °C		~19 °C									
	Relative Humidity (%)		~ 45 %		~ 50 %									
	Likely temp. inversion / Precipitation / Fog / Wet ground / Frozen ground / Snow cover? (tick boxes)		TI	P	F	W	Fr	Sn	TI	P	F	W	Fr	Sn
	Subjective description / additional details		Clear. Dry ground.					Clear. Dry ground.						
	<b>Photographs of Measurement Location</b>													
														
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))														
~2 m from carriage way edge														
Description of sound environment during 007 survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)														
Occasional car/truck, continuous low level industrial sound - sounds like large fans with occasional faint whine.														
Description of sound environment during 110 survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)														
Same as above														

**Survey Data L1**

## Daytime (07:00 - 23:00)

	Start	Valid Time	LAeq	LAE	LAFmax	LAFmin	L5	L10	L50	L90	L95	Over	Under	Excluded Interval
<b>Friday</b>	10/07/2015 07:00	16:00:00	71.8	119.4	99.5	47.5	76.6	75.3	68.8	55.8	52.8	-	-	-
<b>Saturday</b>	11/07/2015 07:00	16:00:00	71.8	119.4	111.7	45.0	76.6	75.3	68.0	53.8	51.4	-	-	-
<b>Sunday</b>	12/07/2015 07:00	16:00:00	70.0	117.6	102.4	41.9	76.2	74.7	62.7	48.4	46.9	-	-	-
<b>Monday</b>	13/07/2015 07:00	16:00:00	72.5	120.1	108.3	41.8	77.5	76.3	69.7	54.9	50.2	-	-	-
<b>Tuesday</b>	14/07/2015 07:00	16:00:00	72.1	119.7	103.1	42.6	77.0	75.8	70.2	55.2	50.8	-	-	-
<b>Wednesday</b>	15/07/2015 07:00	16:00:00	72.0	119.6	108.1	45.1	76.7	75.5	69.8	55.4	51.7	-	-	-
		average (façade)	72	119	106	44	77	75	68	54	51			
		average (free field corrected)	69	116	103	41	74	72	65	51	48			

## Night-time (23:00 -07:00)

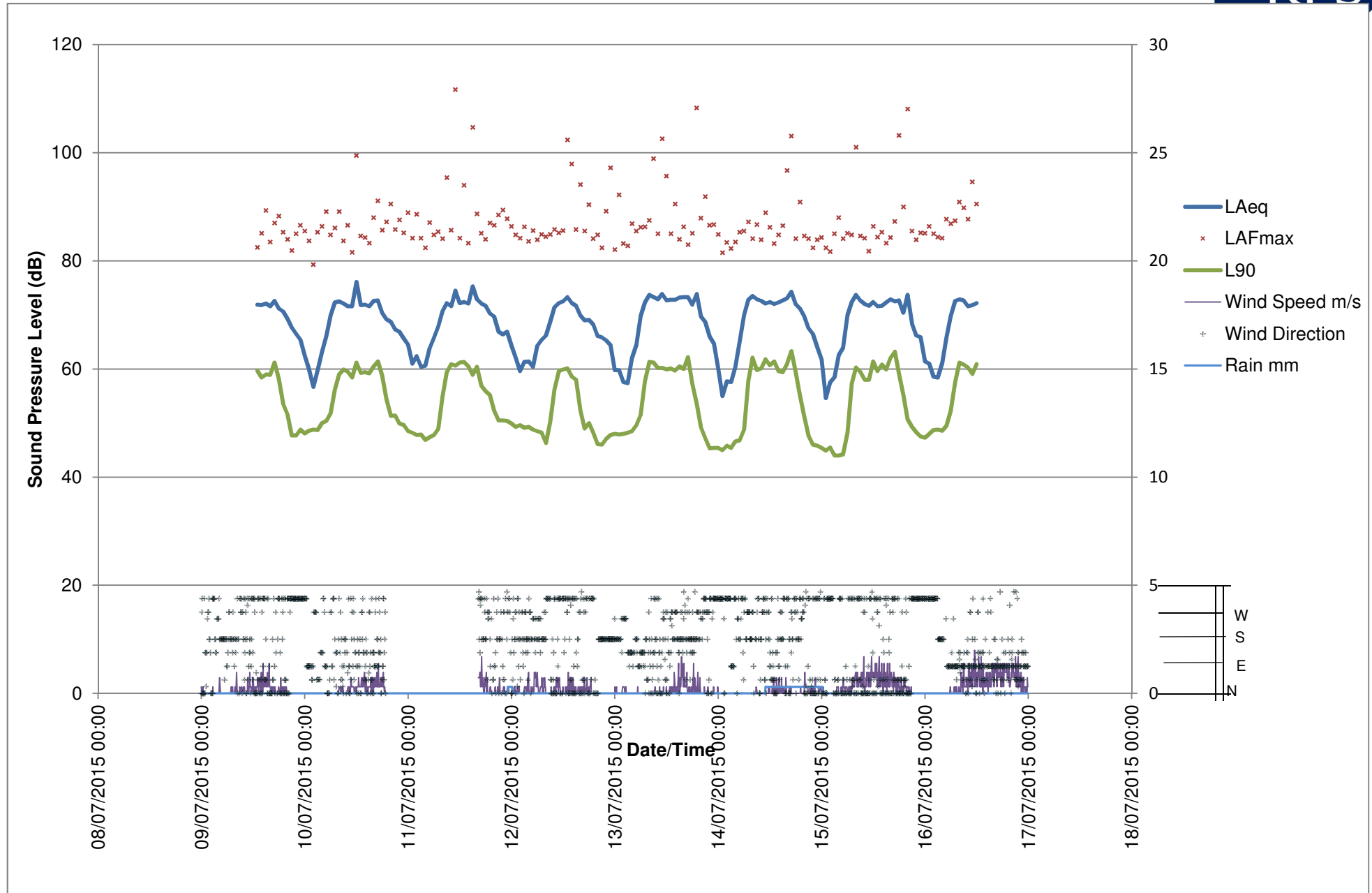
	Start	Valid Time	LAeq	LAE	LAFmax	LAFmin	L5	L10	L50	L90	L95	Over	Under	Excluded Interval
<b>Thursday</b>	09/07/2015 23:00	08:00:00	64.7	109.3	89.1	46.9	72.1	65.7	50.6	48.8	48.5	-	-	-
<b>Friday</b>	10/07/2015 23:00	08:00:00	63.5	108.1	88.9	44.7	70.4	64.0	49.5	47.8	47.4	-	-	-
<b>Saturday</b>	11/07/2015 23:00	08:00:00	63.2	107.8	87.8	46.7	69.8	62.5	50.8	49.2	48.8	-	-	-
<b>Sunday</b>	12/07/2015 23:00	08:00:00	63.9	108.5	97.2	46.0	70.7	64.1	49.4	48.1	47.9	-	-	-
<b>Monday</b>	13/07/2015 23:00	08:00:00	63.9	108.5	86.7	42.7	71.2	64.6	47.5	45.6	45.2	-	-	-
<b>Tuesday</b>	14/07/2015 23:00	08:00:00	64.0	108.6	88.0	41.2	71.2	64.5	46.7	44.8	44.2	-	-	-
<b>Wednesday</b>	15/07/2015 23:00	08:00:00	64.5	109.1	87.7	45.2	71.8	65.4	50.1	48.2	47.7	-	-	-
		average (façade)	64	109	89	45	71	64	49	48	47			
		average (free field corrected)	61	106	86	42	68	61	46	45	44			

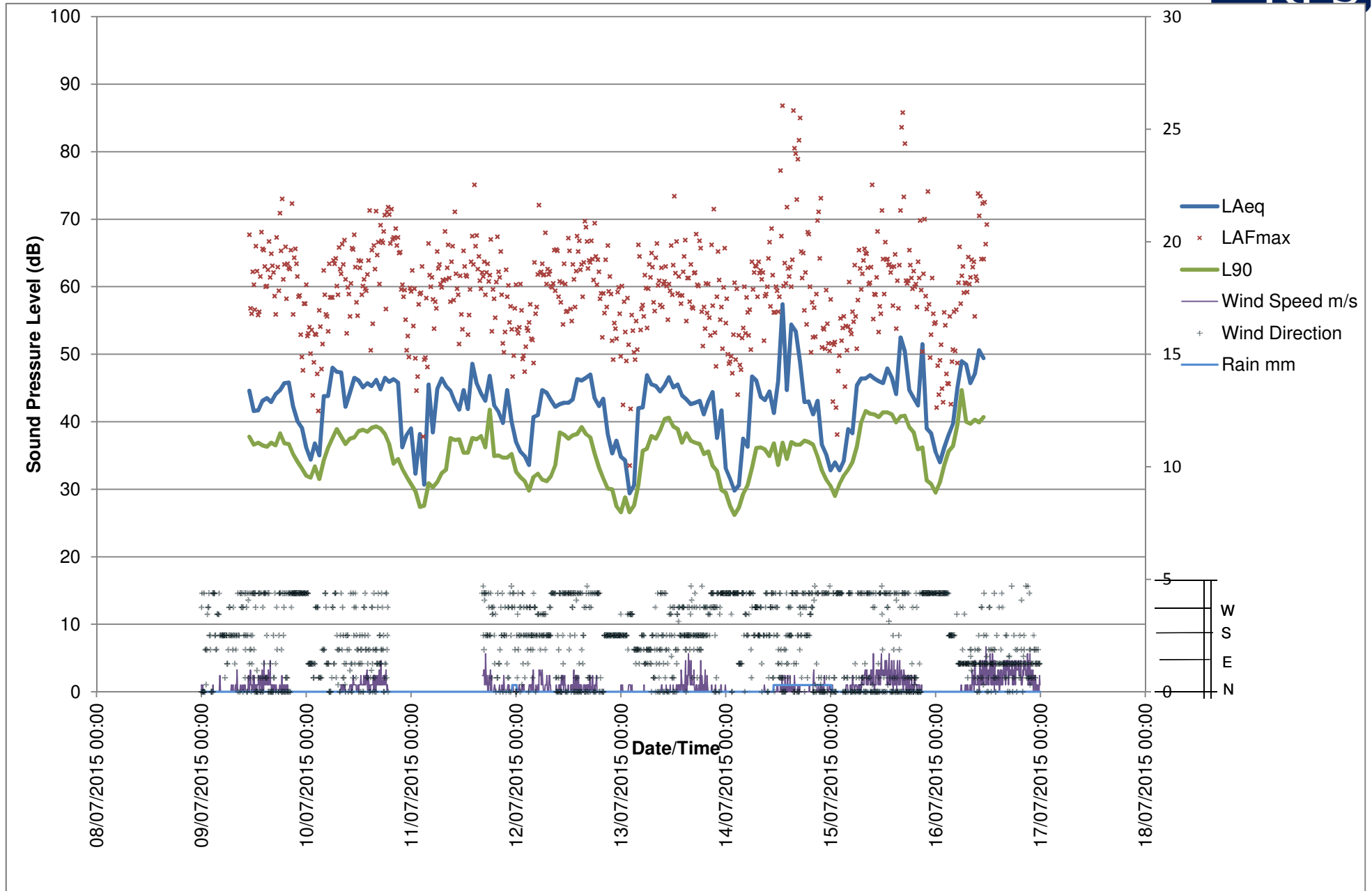
**Short Term Survey Data**

Location - Report	Period	Start Date/ Time	Duration	LAFmax	LAFmin	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF95	LAF99
L3	Daytime	09/07/2015 16:15	00:15:00	86.52	49.83	74.84	82.99	80.41	78.9	72	61.49	57.59	52.37
L3	Daytime	09/07/2015 19:25	00:15:00	87.29	41.53	73.25	82.68	79.59	77.61	67.85	55.54	52.24	44.39
L3	Night-time	10/07/2015 00:19	00:15:00	85.34	38.02	64.87	78.74	70.28	65.44	49.02	39.54	39.26	38.79
L3	Night-time	10/07/2015 01:51	00:15:00	83.98	38.83	62.29	76.97	65.93	57.49	40.96	40.04	39.86	39.57
L4	Daytime	09/07/2015 18:00	00:15:00	60.43	41.49	47.5	53.43	50.7	49.81	46.51	44.33	43.75	42.73
L4	Daytime	09/07/2015 19:53	00:15:00	62.05	37.63	44.38	54.06	49.6	46.35	41.39	39.79	39.39	38.79
L4	Night-time	10/07/2015 01:20	00:15:00	63.32	37.13	42.31	47.76	45.42	44.41	41.53	39.11	38.71	38.09
L4	Night-time	10/07/2015 02:44	00:15:00	55.18	36.96	41.95	46.29	44.5	43.81	41.5	39.34	38.89	38.11
L5	Daytime	09/07/2015 15:30	00:15:00	67.68	38.22	46.59	57.56	51.83	48.52	42.78	40.45	39.98	39.27
L5	Daytime	09/07/2015 18:38	00:13:41	73.07	40.7	49.35	57.51	53.76	51.54	46.19	43.27	42.73	41.85
L5	Daytime	09/07/2015 18:53	00:14:17	64	41.64	48.37	57.76	52.96	50.68	45.87	43.85	43.39	42.63
L5	Night-time	10/07/2015 00:47	00:15:00	50.51	35.76	38.6	41.62	40.65	40.16	38.11	37.13	36.91	36.52
L5	Night-time	10/07/2015 02:17	00:15:00	54.15	35.84	40.97	51.41	43.34	41.54	39.46	37.81	37.46	37

**Short Term Survey Data**

Location - Report	Period	Start Date/ Time	Duration	LAFmax	LAFmin	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF95	LAF99
L3	Daytime	09/07/2015 16:15	00:15:00	86.5	49.8	74.8	83.0	80.4	78.9	72.0	61.5	57.6	52.4
L3	Daytime	09/07/2015 19:25	00:15:00	87.3	41.5	73.3	82.7	79.6	77.6	67.9	55.5	52.2	44.4
L3	Night-time	10/07/2015 00:19	00:15:00	85.3	38.0	64.9	78.7	70.3	65.4	49.0	39.5	39.3	38.8
L3	Night-time	10/07/2015 01:51	00:15:00	84.0	38.8	62.3	77.0	65.9	57.5	41.0	40.0	39.9	39.6
L4	Daytime	09/07/2015 18:00	00:15:00	60.4	41.5	47.5	53.4	50.7	49.8	46.5	44.3	43.8	42.7
L4	Daytime	09/07/2015 19:53	00:15:00	62.1	37.6	44.4	54.1	49.6	46.4	41.4	39.8	39.4	38.8
L4	Night-time	10/07/2015 01:20	00:15:00	63.3	37.1	42.3	47.8	45.4	44.4	41.5	39.1	38.7	38.1
L4	Night-time	10/07/2015 02:44	00:15:00	55.2	37.0	42.0	46.3	44.5	43.8	41.5	39.3	38.9	38.1
L5	Daytime	09/07/2015 15:30	00:15:00	67.7	38.2	46.6	57.6	51.8	48.5	42.8	40.5	40.0	39.3
L5	Daytime	09/07/2015 18:38	00:13:41	73.1	40.7	49.4	57.5	53.8	51.5	46.2	43.3	42.7	41.9
L5	Daytime	09/07/2015 18:53	00:14:17	64.0	41.6	48.4	57.8	53.0	50.7	45.9	43.9	43.4	42.6
L5	Night-time	10/07/2015 00:47	00:15:00	50.5	35.8	38.6	41.6	40.7	40.2	38.1	37.1	36.9	36.5
L5	Night-time	10/07/2015 02:17	00:15:00	54.2	35.8	41.0	51.4	43.3	41.5	39.5	37.8	37.5	37.0





## Appendix 11.C: Noise Model Results

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**Noise Model Results**

Name	Floor	LrD dB(A)	LrN dB(A)
38 James Street	GF	30.5	30.3
217 Manchester Road	GF	45.7	40
Ann Street (Off Manchester Road)	GF	42	37.8
Consented Residential Cottage Close	GF	36.4	33.7
Consented Residential Farm Road	GF	36.3	32.8
Consented Residential James Street	GF	34.6	34.4
Cottage Close	GF	35.6	33
St John's Close	GF	33.6	31.4

## Appendix 11.D: Road Traffic Noise Calculations

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**CRTN Calculations****Operational Traffic Assessment**

		Plus Committed Development				Plus Committed Development Plus Development Traffic				Noise Change (dB)
		2016				2016				
		18-hr AAWT (06:00 - 00:00 hr)				18-hr AAWT (06:00 - 00:00 hr)				
ID	Road Section	Flow	% HGV	Speed (km/h)	L <sub>A10,18hr</sub> (dBA)	Flow	% HGV	Speed (km/h)	L <sub>A10,18hr</sub> (dBA)	
Link 1	Link 1: A530 Griffiths Road North (Site 1)	9144	2.6%	63	68.2	9151	2.6%	63	68.2	0.0
Link 3	Link 3: A530 Griffiths Road South (Site 3)	9905	7.0%	71	70.4	10027	7.8%	71	70.6	0.2
Link 4	Link 4: A530 North of A556 (Site 4)	18427	4.4%	49	70.5	18545	4.9%	49	70.6	0.1
Link 5	Link 5: A556 East (Sites 5 + 6)	33640	6.7%	69	75.4	33688	6.9%	69	75.5	0.1
Link 6	Link 6: A530 South of A556 (sites 7 + 8)	17711	7.1%	65	72.4	17736	7.2%	65	72.4	0.0
Link 7	Link 7: A556 West (Sites 9 + 10 )	28899	6.7%	68	74.7	28953	6.8%	68	74.7	0

**Cumulative Traffic Assessment**

		Without Development				Plus Committed Development Plus Development Traffic				Noise Change (dB)
		2016				2016				
		18-hr AAWT (06:00 - 00:00 hr)				18-hr AAWT (06:00 - 00:00 hr)				
ID	Road Section	Flow	% HGV	Speed (km/h)	L <sub>A10,18hr</sub> (dBA)	Flow	% HGV	Speed (km/h)	L <sub>A10,18hr</sub> (dBA)	
Link 1	Link 1: A530 Griffiths Road North (Site 1)	8254	2.9%	63	67.8	9151	2.6%	63	68.2	0.4
Link 3	Link 3: A530 Griffiths Road South (Site 3)	8549	3.8%	71	69.1	10027	7.8%	71	70.6	1.5
Link 4	Link 4: A530 North of A556 (Site 4)	15534	3.1%	49	69.3	18545	4.9%	49	70.6	1.3
Link 5	Link 5: A556 East (Sites 5 + 6)	32234	6.5%	69	75.2	33688	6.9%	69	75.5	0.3
Link 6	Link 6: A530 South of A556 (sites 7 + 8)	16747	6.8%	65	72.1	17736	7.2%	65	72.4	0.3
Link 7	Link 7: A556 West (Sites 9 + 10 )	27895	6.7%	68	74.5	28953	6.8%	68	74.7	0.2

## Appendix 11.E: Cumulative Operational Noise Effects

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Cumulative Operational Noise Effects

Daytime

NSR	2015 Baseline		Specific Sound Levels from Consented Developments, L <sub>S</sub> (dB)						Future Baseline		Specific Sound Level from Proposed Development, L <sub>S</sub> (dB)	Specific / Residual Sound Level Difference (dB)	Rating Penalty (dB)	Rating Level from Proposed Development, L <sub>Ar,Tr</sub> (dB)	Rating / Background Sound Level Difference (dB)	Increase in Total Specific Sound Level (dB)	Increase in Total Ambient Sound Level (dB)
	Residual Sound Level, L <sub>Aeq,16h</sub> (dB)	Background Sound Level, L <sub>A90,16h</sub> (dB)	SEP	BEP	WRC/W TB	PPP	MRP	All	Residual Sound Level, L <sub>Aeq,16h</sub> (dB)	Background Sound Level, L <sub>A90,16h</sub> (dB)							
38 James Street	46	36	41	37	33	0	43	46	49	46	31	-18	0	31	-16	0	0
217 Manchester Road	69	48	47	37	39	0	43	49	69	51	46	-23	0	46	-6	2	0
Ann Street (Off Manchester Road)	69	48	41	42	39	0	43	47	69	51	42	-27	0	42	-9	1	0
Consented Residential Cottage Close	44	42	47	37	39	0	37	48	50	49	36	-13	0	36	-13	0	0
Consented Residential Farm Road	44	42	47	37	39	0	43	49	50	50	36	-14	0	36	-14	0	0
Consented Residential James Street	47	44	41	43	33	0	49	50	52	51	35	-17	0	35	-17	0	0
Cottage Close	44	42	47	37	39	0	37	48	50	49	36	-14	0	36	-14	0	0
St John's Close	44	42	47	37	39	0	37	48	50	49	34	-16	0	34	-16	0	0

Night-time

NSR	2015 Baseline		Specific Sound Levels from Consented Developments, L <sub>S</sub> (dB)						Future Baseline		Specific Sound Level from Proposed Development, L <sub>S</sub> (dB)	Specific / Residual Sound Level Difference (dB)	Rating Penalty (dB)	Rating Level from Proposed Development, L <sub>Ar,Tr</sub> (dB)	Rating / Background Sound Level Difference (dB)	Increase in Total Specific Sound Level (dB)	Increase in Total Ambient Sound Level (dB)
	Residual Sound Level, L <sub>Aeq,16h</sub> (dB)	Background Sound Level, L <sub>A90,16h</sub> (dB)	SEP	BEP	WRC/W TB	PPP	MRP	All	Residual Sound Level, L <sub>Aeq,16h</sub> (dB)	Background Sound Level, L <sub>A90,16h</sub> (dB)							
38 James Street	41	30	38	37	0	0	36	42	44	42	30	-14	0	30	-12	0	0
217 Manchester Road	61	44	44	37	0	0	36	45	61	48	40	-21	0	40	-8	1	0
Ann Street (Off Manchester Road)	62	40	38	42	0	0	36	44	62	45	38	-25	0	38	-8	1	0
Consented Residential Cottage Close	42	39	44	37	0	0	30	45	47	46	34	-13	0	34	-12	0	0
Consented Residential Farm Road	42	39	44	37	0	0	36	45	47	46	33	-14	0	33	-14	0	0
Consented Residential James Street	39	37	38	43	0	0	42	46	47	47	34	-13	0	34	-12	0	0
Cottage Close	42	37	44	37	0	0	30	45	47	46	33	-14	0	33	-13	0	0
St John's Close	42	37	44	37	0	0	30	45	47	46	31	-15	0	31	-14	0	0



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Project REnaissance Northwich

Title Baseline Sound Monitoring Locations

Date Created Aug 2015 Drawn By SH PM/Checked By PE

Job Ref. JAS8407

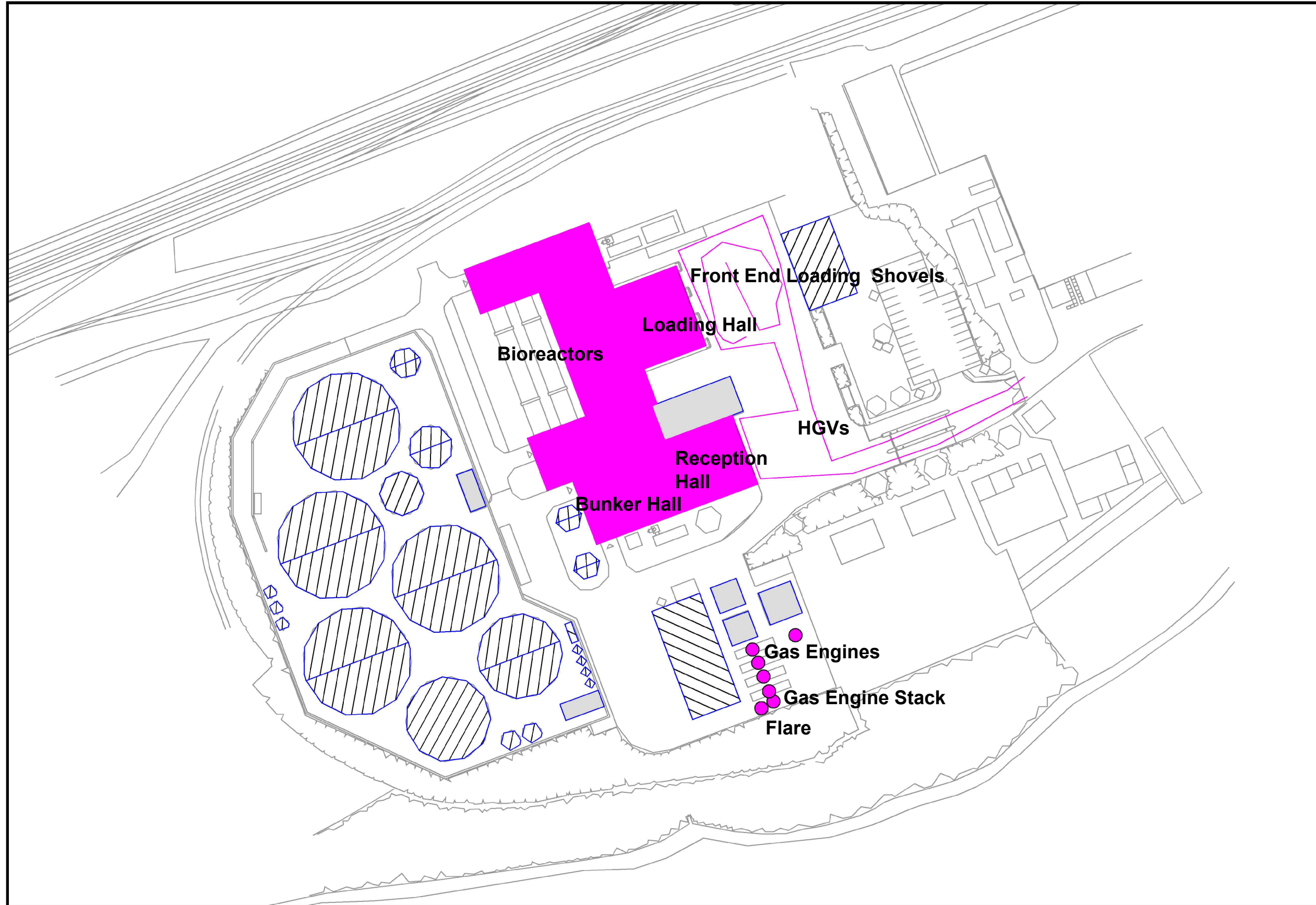
Figure Number Figure 11.A Rev 0

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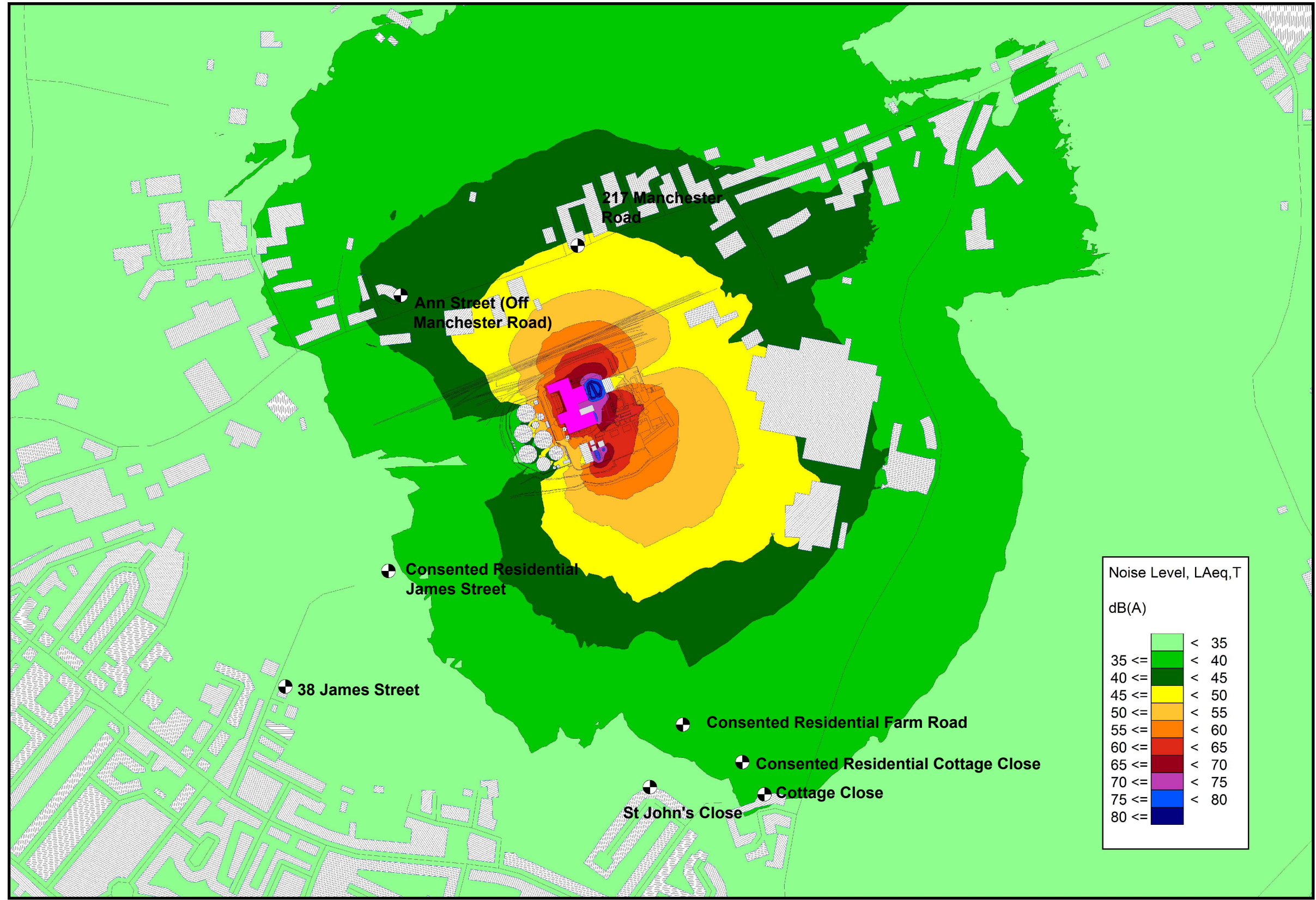
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Title Site Plan Indicating Location of Modelled External Sound Sources and Sound Generating Buildings

Date Created Sept 2015 Drawn By SH PM/Checked By PE

Job Ref. JAS8407

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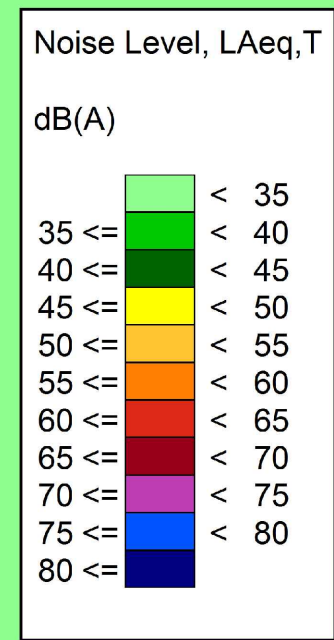
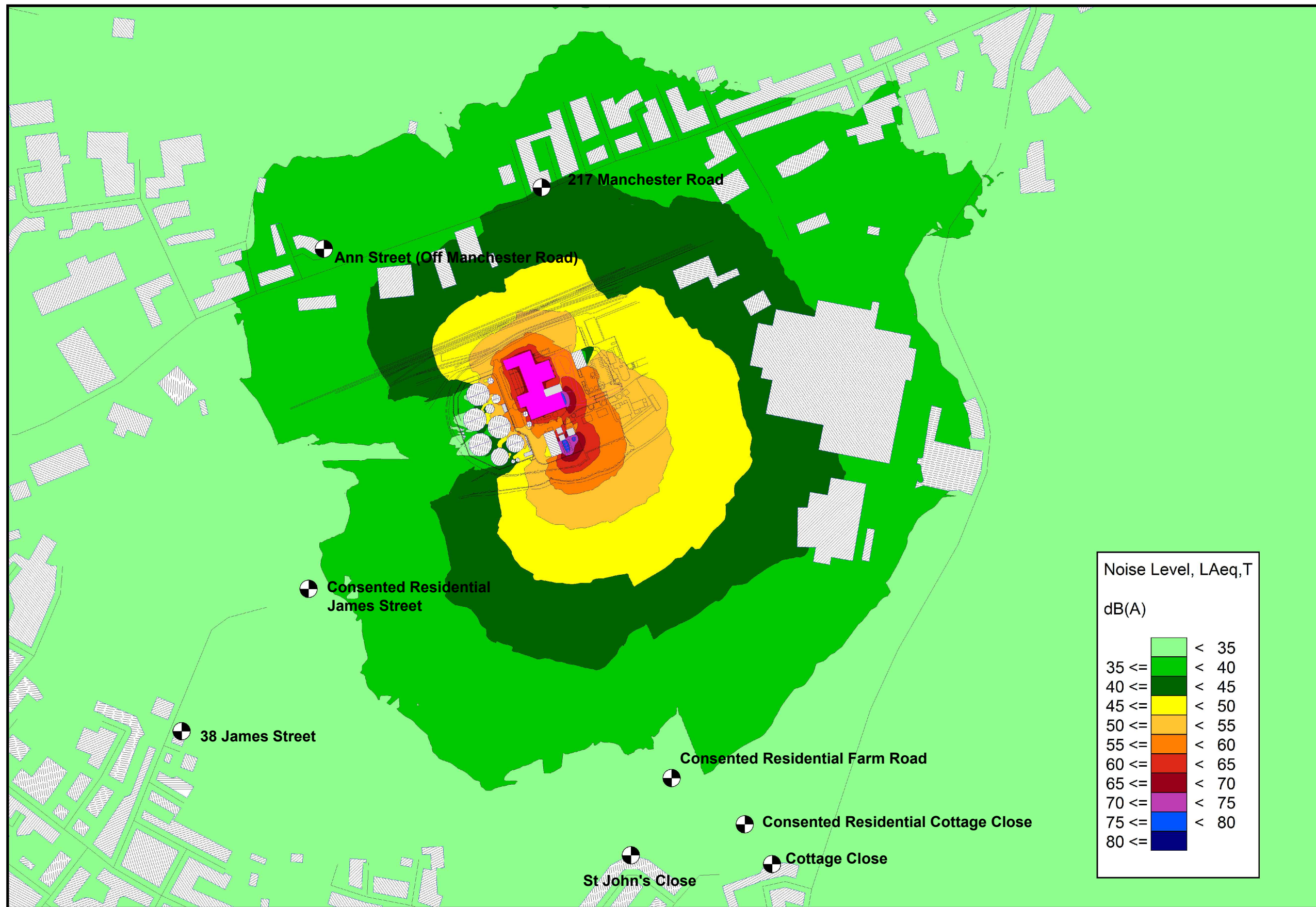
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Title Modelled Specific Sound Level-  
 Daytime (07:00 - 23:00) Contour  
 at 4 m

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 Night-time (23:00 - 07:00)  
 Contour at 4 m

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Job Ref. JAS8407

Figure Number Rev  
 Figure 11.D 0