

APPENDIX 12.1

NOISE IMPACT ASSESSMENT



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**PROPOSED RESIDENTIAL DEVELOPMENT
FORD AIRFIELD, WEST SUSSEX

NOISE IMPACT ASSESSMENT**

Technical Report: R6930-3 Rev 2

Date: 24th October 2019

For: Redrow Homes & Wates Development Ltd
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24 Acoustics Document Control Sheet

Project Title: Proposed Residential Development, Ford Airfield, West Sussex
Noise Impact Assessment

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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been instructed by Redrow Homes Ltd and Wates Developments Ltd to undertake a noise assessment in relation to proposed development on land at Ford Airfield, West Sussex. It is proposed submit an outline planning application to develop the site for up to a total of 1500 residential units. The scheme will also include a local centre, care home, primary school and employment use.
- 1.2 The site is affected by noise arising from road traffic on surrounding roads, and noise from nearby industrial/ commercial sources. Accordingly, this noise impact assessment has included:
- Environmental noise monitoring;
 - Consideration of the noise arising from road traffic affecting the site;
 - Consideration of the noise arising from industrial/ commercial sources affecting the site;
 - Assessment of external noise levels within gardens and amenity areas;
 - Assessment of internal noise levels within the proposed residential dwellings;
- 1.3 An explanation of acoustical terms used in this report is provided in Appendix A. All sound pressure levels in this report are given in dB re: 20 μ Pa.

2.0 SITE DESCRIPTION

- 2.1 The site currently comprises a vacant area of land that was formerly used as Ford Airfield and is located to the east of the village of Yapton, West Sussex. An existing indoor sports arena and indoor play area are located within the centre of the site. These are to be retained. Otherwise, the site generally comprises areas of farmland and hard standing. The site is bounded by Ford Lane to the North and Yapton Road to the south-west.
- 2.2 A Grundon materials recycling facility (MRF), waste water treatment works and Viridor MRF are located to the east of the site, along with an area of hard standing which is used for car boot sales. Ford Airfield Industrial Estate and existing residential dwellings are located adjacent to the western site boundary.
- 2.3 The description of the proposed development is as follows:

"Outline planning application (with all matters reserved except for access) for the development of up to 1,500 dwellings (Use Class C3), 60-bed care home (Use Class C2), up to 9,000 sqm of employment floorspace (Use Classes B1), local centre of up to 2,350 sqm including up to 900 sqm retail / commercial (Use Classes A1-A5) and 1,450 sqm community / leisure floorspace (Use Classes D1-D2), land for a two-form entry primary school (Use Class D1), public open space, allotments, new sports pitches and associated facilities, drainage, parking and associated access, infrastructure, landscape, ancillary and site preparation works, including demolition of existing buildings and part removal of existing runway hardstanding"

- 2.4 An aerial image showing the undeveloped site is shown in Figure 1. The proposed site layout masterplan is shown in Figure 2.

3.0 STANDARDS AND GUIDANCE

National Planning Policy Framework and Noise Policy Statement for England

- 3.1 Paragraph 180 of the National Planning Policy Framework (NPPF) [Reference 1], revised in February 2019, states that planning policies and decisions should:
- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
 - b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.
- 3.2 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.
- Avoid significant adverse impacts on health and quality of life;
 - Mitigate and minimise adverse impacts on health and quality of life;

- 3.3 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

"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."

- 3.4 The National Planning Practice Guidance (NPPG) [Reference 3] is written to support the NPPF with more specific planning guidance. The NPPG reflects the NPSE and states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. It also states that opportunities should be taken, where practicable, to achieve improvements to the acoustic environment. The NPPG states that noise can over-ride other planning concerns but should not be considered in isolation from the other economic, social, and environmental dimensions of the proposed development.
- 3.5 The NPPG expands upon the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system.
- 3.6 The NPPF, NPSE and NPPG documents do not refer to specific noise criteria. For residential developments 24 Acoustics considers that the spirit of the requirements of the NPPF and NPSE will be complied with if criteria from British Standard 8233: 2014 and guidance from the World Health Organisation are adopted for internal noise levels within dwellings. Where dwellings are affected by noise from industrial or commercial sources, the noise impact shall be assessed using the guidance of British Standard 4142: 2014.

Professional Practice Guidance on Planning & Noise (ProPG)

3.7 The Professional Practice Guidance on Planning and Noise (ProPG) [Reference 4] was published jointly by the Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health in May 2017. The guidance relates to the consideration of existing sources of transportation noise upon proposed new residential development and strives to:

- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Encourage the process of good acoustic design in and around new residential developments;
- Outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- Improve understanding of how to determine the extent of potential noise impact and effect; and
- Assist the delivery of sustainable development.

3.8 The guidance describes a recommended approach for new residential development, which includes four key elements of the assessment process, identified below:

- i. Good acoustic design process;
- ii. Internal noise level guidelines;
- iii. External amenity area noise assessment;
- iv. Assessment of other relevant issues.

3.9 It is important to note that the guidance in ProPG does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy.

BS 8233 and World Health Organisation

3.10 BS 8233:2014 [Reference 5] provides design guidance for dwelling houses, flats and rooms in residential use and recommends that internal noise levels in dwellings do not exceed 35 dB $L_{Aeq,16 \text{ hour}}$ in living rooms and bedrooms during the day, 40 dB $L_{Aeq, 16 \text{ hour}}$ in dining rooms during the day and 30 dB $L_{Aeq, 8 \text{ hour}}$ in bedrooms at night.

- 3.11 BS 8233 also notes that *“Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night.”*
- 3.12 Although the guidelines have no formal standing, the World Health Organisation (WHO) provides guidance on desirable internal noise levels to minimise the risk of sleep disturbance. The WHO 2000 guidelines [Reference 6] suggest internal night-time noise levels not regularly (10 – 15 times per night) exceeding 45 dB $L_{Amax,f}$ for ‘a good night’s sleep’.
- 3.13 BS 8233: 2014 suggests an upper guideline value of 55 dB $L_{Aeq,16\text{ hour}}$ for noise levels in external amenity spaces such as gardens. This is considered an aspirational limit and BS 8233 recognises that the desirable noise levels for external amenity areas are not always achievable in certain locations. BS 8233 also states that development should not be prohibited on the basis of noise levels within external amenity areas.

British Standard 4142: 2014

- 3.14 British Standard 4142: 2014 [Reference 7] provides a methodology for the assessment of industrial (or industrial-related/ commercial) noise at (the exterior of) residential properties. The standard advocates a comparison between the prevailing typical L_{A90} background noise level and the L_{Aeq} source noise level. If the source noise level is tonal or intermittent or otherwise distinctive in nature a rating correction of up to 15 dB for noise character is applied to the source noise level to become the rating level. The standard states that a difference of around +10 dB between the rating and background level is considered to generate a significant adverse impact, a difference of around +5 dB is considered to create an adverse impact and a difference of less than 0 dB is likely to create a low impact (all depending upon the context).
- 3.15 It should be noted that the context is particularly relevant to this situation. The expectations of residents who are new to an area of existing industrial noise will be more tolerant of the noise than those settled in an area in which new industrial noise is introduced. On this basis, it is 24 Acoustics’ opinion, and that of recent case history, that a difference between background and rating noise level of up to + 10 dBA is acceptable. This will generate a noise impact which is considered to fall within the region below SOAEL (as defined in the NPSE and NPPG) which is considered acceptable providing it is mitigated to a minimum. It is our experience that an impact at this level has been accepted by the Planning Inspectorate at planning appeals.

Local Authority Noise Policy and Consultation

- 3.16 The Sussex Planning Noise Advice Document [Reference 8] states, that for noise sensitive developments, measures are provided to achieve internal noise levels specified in BS 8233. For situations where new noise sensitive development is proposed next to a commercial noise source, the document refers to BS 4142 for assessment of the noise impacts.
- 3.17 The Arun Local Plan 2011-2031 was adopted in July 2018 [Reference 9]. Policy QE SP1 (Quality of the Environment) refers to noise exposure categories (NECs) for residential developments affected by noise from transportation sources. Policy QE DM1 (Noise Pollution) states that new noise-sensitive development affected by noise from industrial and commercial uses should not normally be permitted where there is a likelihood of complaints.
- 3.18 24 Acoustics has discussed and agreed the general scope, criteria and methodology adopted in this noise impact assessment report with Fiona Fitzgerald, Environmental Health Officer at Arun District Council.

Summary of Noise Criteria

- 3.19 The impact of noise upon the site has been assessed using the following methodology:
- For dwellings affected by road traffic noise, criteria from BS 8233: 2014 and the WHO Guidelines has been adopted for internal noise levels within the properties. An upper internal daytime level of 35 dB $L_{Aeq, 16 \text{ hour}}$ for bedrooms and living rooms should apply and a night-time level of 30 dB $L_{Aeq, 8 \text{ hour}}$ should apply within proposed bedrooms. A maximum night-time level of 45 dB $L_{Amax, fast}$ should also apply in bedrooms for regular events.
 - External noise levels have been assessed within gardens. It is noted that the guideline value of 55 dB $L_{Aeq, 16 \text{ hour}}$ for noise levels in external amenity spaces, such as gardens, is an aspirational target.

- The impact of noise from existing industrial/commercial sources on proposed residential dwellings has been assessed using the guidance of BS 4142: 2014. A BS 4142 rating noise level of no greater than 10 dB above the typical background noise level is considered acceptable providing it is mitigated to a minimum. Where feasible the scheme has been engineered to ensure noise levels of around + 5 dB (or less) above the typical background noise level.

4.0 ENVIRONMENTAL NOISE MEASUREMENTS AND RESULTS

Measurement Instrumentation and Procedure

4.1 Noise measurements were obtained over the period 4th to 11th July 2018. Instrumentation was setup to measure environmental noise levels on the proposed site, due to the following noise sources:

- (i) Road traffic using Yapton Road and Ford Lane
- (ii) Ford Airfield Industrial Estate
- (iii) Viridor MRF
- (iv) Grundon MRF

4.2 Measurements of the prevailing background noise levels were also undertaken at locations representative of the proposed residential properties, and unaffected by noise from the industrial sources.

4.3 Ambient noise levels were measured using the following equipment:

4 x Rion precision sound level meter	Type NL-52;
2 x Rion precision sound level meter	Type NL-32;
Norsonic precision sound level meter / real-time analyser	Type 118;
Bruel and Kjaer acoustic calibrator	Type 4231.

4.4 The survey locations are described below and shown in Figure 1. Measurements were undertaken at a height of approximately 1.5m above ground level, unless otherwise stated:

- Location 1 (Long-term) – On the south-western boundary facing Yapton Road, at a height of approximately 2.5m above ground level;
- Location 2 (Long-term) – On the northern site boundary facing Ford Lane;
- Location 3 (Long-term) – On the western site boundary opposite Ford Airfield Industrial Estate;
- Location 4 (Long-term) – Towards the centre of the site, facing Grundon MRF, at a height of approximately 2m above ground level;
- Location 5 (Short-term) – Facing the north side of Ford Airfield Industrial Estate;

- Location 6 (Short-term) – Facing Viridor MRF;
- Location 7 - Long-term background location, in the south-east corner of the site;
- Location 8 – Long-term background location, on the western site boundary.

4.5 Locations 1 to 6 were selected to determine the prevailing noise levels affecting the proposed development, due to road traffic and industrial noise sources. Locations 7 and 8 were selected to determine the prevailing background noise levels.

4.6 The instrumentation was configured to continuously measure and store overall A-weighted statistical parameters including L_{Aeq} , L_{Amax} and L_{A90} (all measured on fast response) over 5-minute intervals. Measurements were made in accordance with BS 7445: 1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use [Reference 10].

4.7 The instrumentation was equipped with an environmental microphone and an extension cable. The instruments were powered by external batteries and stored in a weatherproof case. The calibration of all instrumentation was checked before and after the tests and no signal variation occurred. Calibration of 24 Acoustics' equipment is traceable to National Standards. The weather at the start and end of the survey periods was dry and the wind speed was considered to be less than 5 m/s.

Results – Noise Levels Affecting the Site

4.8 The measured noise levels at the long-term survey locations are shown graphically in Appendix B.

4.9 The free-field average (L_{eq}) data values at measurement Locations 1, 2, 3 and 4 have been averaged to generate the overall 16-hour daytime and 8-hour night-time free field levels, shown in Table 1 below.

Location	Daytime Level (07:00 - 23:00) dB L_{Aeq}, 16 hour	Night-time Level (23:00 – 07:00) dB L_{Aeq}, 8 hour
Location 1	67	59
Location 2	65	58
Location 3	54	47
Location 4	53	42

Table 1: Overall Noise Levels at Locations 1, 2, 3 and 4

- 4.10 Typical maximum night-time noise levels, in terms of the 10th highest $L_{Amax, fast}$, at Locations 1, 2, 3 and 4 were as shown in Table 2.

Measurement Location	Typical Night-time Level (23:00 – 07:00) dB $L_{Amax, fast}$
Location 1	79
Location 2	82
Location 3	69
Location 4	62

Table 2: Typical Maximum night-time noise levels at Locations 1, 2, 3 and 4

- 4.11 The dominant source of noise affecting Locations 1 and 2 was noted to be noise arising from road traffic using Yapton Road and Ford Lane, respectively.
- 4.12 Noise levels at Location 3 were affected by noise from the Ford Airfield Industrial Estate during the daytime, which included noise from Booth Engineering, HD White Scrap Metal and vehicles entering and leaving the industrial estate.
- 4.13 At Location 4, daytime noise levels were affected by general background noise, with occasional noise from the Grundon MRF facility, which included noise from general processing, emptying of glass and vehicle manoeuvres.
- 4.14 The results of the short-term measurements at Locations 5 and 6, during the daytime on the 4th July 2018, are summarised in Table 3 below.

Measurement Location	Time Period	Measured Noise Level dB $L_{Aeq,T}$
Location 5	11:16 – 11:48	63
Location 6	12:05 – 13:05	53

Table 3: Measured Noise Levels at Locations 5 and 6, 4th July 2018 (daytime)

- 4.15 Noise levels at Location 5 were affected by noise from Booth Engineering which included noise from hand tools, plant and machinery, vehicle movements and reversing alarms. The doors to the Booth Engineering workshops were noted to be open during the measurements.

- 4.16 At Location 6, noise levels were affected by noise from the Viridor MRF site, which included noise from plant and processing, lorry movements and reversing alarms.

Results – Prevailing Background Noise Levels

- 4.17 The typical measured background noise levels at Locations 7 and 8 are summarised in Table 4 below.

Location	Typical Daytime Level (07:00 - 23:00) dB LA90, 5 minute	Typical Night-time Level (23:00 – 07:00) dB LA90, 5 minute
Location 7	39	34
Location 8	34	27

Table 4: Typical Measured Background Noise Levels at Locations 7 and 8

- 4.18 Note 24 Acoustics determines the typical background noise level to be the average level minus one standard deviation.

5.0 NOISE IMPACT ASSESSMENTS

5.1 The following assessments have been undertaken based on the illustrative masterplan (drawing number RG-M-78 Rev L) provided to 24 Acoustics by email in October 2019, as shown in Figure 2. As it is proposed to submit an outline planning application, the exact locations/orientations of dwellings, floor layouts and elevations are currently unknown and will be left to reserved matters.

5.2 The following assessments should therefore be updated during the during the detailed design stages, once further details are available.

Noise Mitigation Strategy

5.3 The noise impact of the dominant sources affecting the site is assessed in the following sections. Noise mitigation measures will be required in order to control the noise impact from road traffic and from the nearby industrial sources.

5.4 Where proposed dwellings are affected by noise from road traffic, the assessment has included the following recommended mitigation measures:

- i) Acoustically rated glazing and alternative means of ventilation to dwellings;
- ii) Gardens located to not directly face the roads, i.e. acoustically screened by the new dwellings.

5.5 Where proposed dwellings are affected by noise from industrial sources (namely Viridor MRF, Ford Airfield Industrial Estate and Grundon MRF), the assessment has included the following recommended mitigation measures:

- i) Buffer zones between the industrial sources and proposed dwellings;
- ii) Acoustic barrier/bund within the buffer zones around Ford Industrial estate;
- iii) Gardens located to not face the industrial sources, i.e. acoustically screened by the dwellings;
- iv) Orientation of dwellings so that no habitable rooms are directly facing the industrial sources.

5.6 An example internal layout for properties, with no habitable rooms facing the industry, is provided in Figure 3.

Noise from Road Traffic – BS 8233

5.7 Noise levels measured at Locations 1 and 2 have been corrected for distance to determine noise levels representative of the closest proposed dwellings to Yapton Road and Ford Lane, respectively.

5.8 Under the requirements of the Arun District Council Local Plan, it is noted that the closest proposed dwellings to Yapton Road would fall under noise exposure category NEC C. For sites within NEC C, the Local Plan states the following:

"Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise."

5.9 It is noted that only the closest dwellings to Yapton Road would fall into NEC C. Dwellings located further into the site, at increased distances from the road, would likely fall into either NEC B or NEC A.

5.10 The closest proposed dwellings to Ford Lane would fall under noise exposure category NEC B. For sites within NEC B, the Local Plan states the following:

"Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise."

5.11 It is therefore considered that the noise impact from road traffic will be acceptable, with mitigation provided in order to achieve suitable internal noise levels within dwellings and suitable external noise levels within gardens, as assessed below.

5.12 On the basis that the gardens will be located to not directly face Yapton Road or Ford Lane, i.e. acoustically screened by the new dwellings, it is anticipated that noise levels within the closest gardens to the roads would be in the order of 50 to 55 dB $L_{Aeq, 16 \text{ hour}}$. These noise levels are in line with the aspirational guideline values from BS 8233 for external amenity areas.

- 5.13 A preliminary analysis has been undertaken to determine indicative acoustic requirements for the external façade elements. Detailed floorplans and elevations will not be available until reserved matters, therefore preliminary calculations are based on typical room sizes, volumes and glazed areas. A room size of 3m x 3m x 2.4m has been assumed, with a glazed window area of 4 m² and a masonry façade construction.
- 5.14 An updated assessment to determine the acoustic requirements of the external façade elements must therefore be undertaken during the detailed design stages, once the final site plans are available.
- 5.15 It should be noted that some dwellings will require closed windows to achieve suitable internal noise levels; hence alternative means of ventilation and consideration to the thermal design may be necessary to prevent excess internal heat build-up.
- 5.16 Based on the measured noise levels at Locations 1 and 2, calculations have been undertaken to determine preliminary acoustic requirements for glazing and ventilators, which will ensure that the noise levels inside the properties do not exceed 35 dB $L_{Aeq, 16 \text{ hour}}$ during the day, 30 dB $L_{Aeq, 8 \text{ hour}}$ at night and also not regularly exceed 45 dB $L_{Amax, f}$ at night.
- 5.17 The minimum acoustic requirements for the glazing and ventilators, for habitable rooms facing Yapton Road and Ford Lane, are summarised in Table 6 below.

Habitable Room Locations	Glazing and Ventilator Type
Facing Yapton Road	A
Facing Ford Lane	B

Table 6: Glazing and Ventilator Requirements

- 5.18 The indicative glazing specifications are shown in Table 7 below.

Description	Minimum SRI (dB) per Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
Glazing Type A	25	25	33	44	44	49
Glazing Type B	26	28	35	44	48	54

Table 7: Indicative Glazing Performances

- 5.19 In making a comparison with the values in Table 7, it is important that the glazing figures used are the result of tests in accordance with ISO 10140, Part 2: 2010 and that the quoted minimum sound reduction specifications are met by the entire glazing system as a whole, including frames, seals, any insulated panels and not just the glass. The requirements also apply to any glazed doors to habitable rooms.
- 5.20 For guidance only, the following glazing configurations, if installed properly, would be capable of achieving the required sound reduction performance:

Glazing Type A: 6 mm glass: 12mm cavity (minimum): 8.4mm glass Stadiip Silence (or equivalent)
Minimum overall performance 37 dB R_w

Glazing Type B: 8 mm glass: 12mm cavity (minimum): 8.8mm glass Stadiip Silence (or equivalent)
Minimum overall performance 40 dB R_w

- 5.21 The indicative acoustic performance specifications for ventilators are shown in Table 8.

Description	Minimum Acoustic Performance $D_{n,e}$ (dB) per Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
Vent Type A	41	39	36	42	44	45
Vent Type B	42	40	37	45	53	55

Table 8: Ventilators - Indicative Acoustic Performance

- 5.22 In making a comparison with the specifications in Table 8, it is important that the figures used are the result of laboratory tests. Note that the stated minimum performance values assume one ventilator per habitable room. The specific ventilation requirements (e.g. equivalent free area etc.) should be confirmed by others.
- 5.23 For guidance only, an acoustically attenuated trickle ventilator or through-wall ventilator, minimum overall performance 41 dB $D_{n,e,w}$ for Type A, and minimum overall performance 44 dB $D_{n,e,w}$ for Type B, would be capable of achieving the required sound reduction performances.

- 5.24 As an alternative to an acoustically attenuated ventilator, it would also be feasible to achieve the required internal noise levels with the use of a “whole house” mechanical ventilation system (e.g. MVHR).
- 5.25 The above indicative assessment demonstrates that the internal noise level criteria for noise from transportation sources (outlined in section 3) would be readily achievable, subject to the appropriate specification and design of the external façade elements. This assessment should be updated during the detailed design stages, once further details are available.

Noise from Ford Airfield Industrial Estate – BS 4142

- 5.26 The noise impact of sources at Ford Airfield Industrial Estate has been undertaken in accordance with the assessment methodology of BS 4142: 2014 using the noise survey data from Locations 3 and 5, compared to background noise levels at Location 8.
- 5.27 The proposed site is affected by noise from Booth Engineering, HD White scrap metalworks and vehicles entering and leaving the industrial estate. From the relevant planning consent, it is understood that the permitted hours for HD White are 07:00-18:00 Monday to Friday and 07:00-13:00 Saturdays. On this basis, the noise impact will be limited to daytime hours only.
- 5.28 The typical source noise levels measured at Locations 3 and 5 have been corrected for residual noise, in order to determine the specific noise level. The specific noise level has then been corrected for distance and acoustic screening to determine the noise levels at the rear of the closest proposed properties.
- 5.29 Noise levels from the industrial estate were observed to be impulsive in character, i.e. ‘bangs’ associated with the movement of scrap metal, use of hand tools and vehicle reversing alarms. An overall rating penalty of + 3 dB has been applied under BS 4142, on the basis that the impulsive character of the industrial noise may be just perceptible at the receptor locations, with mitigation in place. The following mitigation measures have been included:
- i) Gardens located to not face the industrial sources, i.e. acoustically screened by the dwellings;
 - ii) Orientation of dwellings so that no habitable rooms are directly facing the industrial sources (see example layout in Figure 3);

- iii) A 3m high acoustic barrier/bund along the site boundary with the industrial estate (see extent in Figure 4). The barrier material should have a minimum surface density of 15 kg/m².

5.30 Tables 9 and 10 below summarise the results of the BS 4142 assessment for daytime hours, with mitigation, at the nearest proposed residential receptors.

Description	Noise Level
Source Noise Level (unmitigated)	51 dB L _{Aeq} , 1 hour
BS 4142 Specific Source Level (with mitigation)	36 dB L _{Aeq} , 1 hour
Character Corrections	+ 3 dB (impulsivity just perceptible)
BS 4142 Rating Level	39 dB L _{Aeq} , 1 hour
Typical Background Noise Level (07:00 – 19:00)	35 dB L _{A90} , 1 hour
BS 4142 Assessment Level	+ 4 dB

Table 9: BS 4142 Noise Impact Assessment, Proposed Dwellings to East of Ford Airfield Industrial Estate, with mitigation

Description	Noise Level
Source Noise Level (unmitigated)	57 dB L _{Aeq} , 1 hour
BS 4142 Specific Source Level (with mitigation)	42 dB L _{Aeq} , 1 hour
Character Corrections	+ 3 dB (impulsivity just perceptible)
BS 4142 Rating Level	45 dB L _{Aeq} , 1 hour
Typical Background Noise Level (07:00 – 19:00)	35 dB L _{A90} , 1 hour
BS 4142 Assessment Level	+ 10 dB

Table 10: BS 4142 Noise Impact Assessment, Proposed Dwellings to North of Ford Airfield Industrial Estate, with mitigation

5.31 From the assessment in Table 9, for dwellings to the east the assessment indicates that, with mitigation, the difference between the BS 4142 rating noise level from the industrial estate and the prevailing typical background noise level will be in the region of + 4 dB. This is considered a low noise impact, given the context of the site as described below:

- The industrial units operate during daytime hours only;
- As new dwellings are being introduced near to existing industrial operations, the commercial noise source forms part of the existing acoustic environment and residents' expectations will be more tolerant of the industrial noise;
- With a reduction from outside to inside of approximately 15 dBA, noise levels would be in the order of 21 dB $L_{Aeq, 1 \text{ hour}}$ within habitable rooms during the daytime with windows open, and hence acceptable.

5.32 The assessment in Table 10 indicates that, with mitigation, the difference between the BS 4142 rating noise level from the industrial estate and the prevailing typical background noise level will be in the region of + 10 dB for dwellings to the north, which includes the proposed care home. This is considered acceptable on the basis of the rationale presented in Paragraph 3.15 above.

Noise from Grundon MRF – BS 4142

- 5.33 The noise impact of the Grundon MRF has been undertaken in accordance with the assessment methodology of BS 4142: 2014 using the noise survey data from Location 4, compared to background noise levels at Location 8.
- 5.34 From the relevant planning consent (Ref WSCC/096/13/F), it is understood that certain intensive operations at the Grundon site are limited by condition to 07:00 – 20:00 hours Monday to Saturday. Planning conditions 28, 29 and 30 relate to the control of noise emissions from the MRF site.
- 5.35 There is currently an existing HGV access road for the Grundon site from the west, which runs across the proposed development site. It is understood that the access route is currently being amended through a planning approval (Ref WSCC/027/18/F) which will replace the access road from the west with the use of existing roads from the east.
- 5.36 The typical source noise levels measured at Location 4 have been corrected for residual noise, in order to determine the specific noise level. The specific noise level has then been corrected for acoustic screening to determine the noise levels at the rear of the closest proposed properties.

5.37 From subjective observations and audio recordings, noise levels from the Grundon MRF, during the daytime were observed to be impulsive in character, i.e. noise associated with the emptying of glass and materials and vehicle reversing alarms. An overall rating penalty of + 3 dB has been applied under BS 4142, on the basis that the impulsive character of the industrial noise may be just perceptible at the receptor locations, with mitigation in place. The following mitigation measures have been included:

- i) Gardens located to not face the Grundon site, i.e. acoustically screened by the dwellings;
- ii) Orientation of dwellings so that no habitable rooms are directly facing the Grundon site (see example layout in Figure 3);

5.38 Tables 11 and 12 below summarise the results of the BS 4142 assessment for daytime and night-time hours, with mitigation, at the nearest proposed residential receptors.

Description	Noise Level
Source Noise Level (unmitigated)	53 dB $L_{Aeq, 1 \text{ hour}}$
BS 4142 Specific Source Level (with mitigation)	38 dB $L_{Aeq, 1 \text{ hour}}$
Character Corrections	+ 3 dB (impulsivity just perceptible)
BS 4142 Rating Level	41 dB $L_{Aeq, 1 \text{ hour}}$
Typical Background Noise Level (07:00 – 20:00)	35 dB $L_{A90, 1 \text{ hour}}$
BS 4142 Assessment Level	+ 6 dB

Table 11: BS 4142 Noise Impact Assessment, Proposed Dwellings to West of Grundon MRF, daytime hours 07:00 – 20:00

Description	Noise Level
Source Noise Level (unmitigated)	48 dB L_{Aeq} , 15 minute
BS 4142 Specific Source Level (with mitigation)	33 dB L_{Aeq} , 15 minute
Character Corrections	0 dB (no character correction)
BS 4142 Rating Level	33 dB L_{Aeq} , 15 minute
Typical Background Noise Level (07:00 – 20:00)	27 dB L_{A90} , 15 minute
BS 4142 Assessment Level	+ 6 dB

Table 12: BS 4142 Noise Impact Assessment, Proposed Dwellings to West of Grundon MRF, night-time hours 23:00 – 07:00

5.39 The assessments in Tables 11 and 12 indicate that, with mitigation, the difference between the BS 4142 rating noise level from the Grundon site and the prevailing typical background noise level will be in the region of + 6 dB for daytime and night-time periods. This is considered a low noise impact, given the context of the site as described below:

- Noise emissions from the Grundon site are controlled by existing planning conditions, including restrictions on operations outside of daytime hours;
- As new dwellings are being introduced near to existing industrial operations, the commercial noise source forms part of the existing acoustic environment and residents' expectations will be more tolerant of the industrial noise;
- With a reduction from outside to inside of approximately 15 dBA, noise levels would be in the order of 23 dB L_{Aeq} , 1 hour within habitable rooms during the daytime with windows open, and 18 dB L_{Aeq} , 15 minute at night, and hence acceptable.

Noise from Viridor MRF – BS 4142

5.40 The noise impact of the Viridor MRF has been undertaken in accordance with the assessment methodology of BS 4142: 2014 using the noise survey data from Location 6, compared to background noise levels at Location 7.

5.41 From the relevant planning consent (Ref F/19/05), it is understood that the most intensive operations at the Viridor site are restricted to daytime hours only, with HGV movements and deliveries of materials permitted between 06:00 – 22:00 hours. Planning conditions 26 and 27 of the consent describe the restrictions on operating hours.

- 5.42 The typical source noise levels measured at Location 6 have been corrected for residual noise, in order to determine the specific noise level. The specific noise level has then been corrected for distance and acoustic screening to determine the noise levels at the rear of the closest proposed properties. From the proposed site plan in Figure 2, an attenuation pond and public open space are shown on the closest area of the site to the Viridor MRF, therefore maximising the separation distance to the nearest dwellings.
- 5.43 From subjective observations, noise levels from the Viridor MRF, during the daytime were observed to be impulsive in character, i.e. noise associated with the emptying of glass and materials, vehicle horns and reversing alarms. Noise from plant and processing was also observed to be tonal in nature. An overall rating penalty of + 5 dB has therefore been applied under BS 4142, on the basis that the the impulsive character (+ 3 dB) and tonality (+ 2 dB) of the noise may both be just perceptible at the receptor locations, with mitigation in place. The following mitigation measures have been included:
- i) Gardens located to not face the Viridor site, i.e. acoustically screened by the dwellings;
 - ii) Orientation of dwellings so that no habitable rooms are directly facing the Viridor site (see example layout in Figure 3);
- 5.44 Tables 13 and 14 below summarise the results of the BS 4142 assessment for daytime and night-time hours, with mitigation, at the nearest proposed residential receptors.

Description	Noise Level
Source Noise Level (unmitigated)	43 dB L_{Aeq} , 1 hour
BS 4142 Specific Source Level (with mitigation)	28 dB L_{Aeq} , 1 hour
Character Corrections	+ 3 dB (impulsivity just perceptible) + 2 dB (tonality just perceptible)
BS 4142 Rating Level	33 dB L_{Aeq} , 1 hour
Typical Background Noise Level (07:00 – 23:00)	39 dB L_{A90} , 1 hour
BS 4142 Assessment Level	- 6 dB

Table 13: BS 4142 Noise Impact Assessment, Proposed Dwellings to West of Viridor MRF, daytime hours 07:00 – 23:00

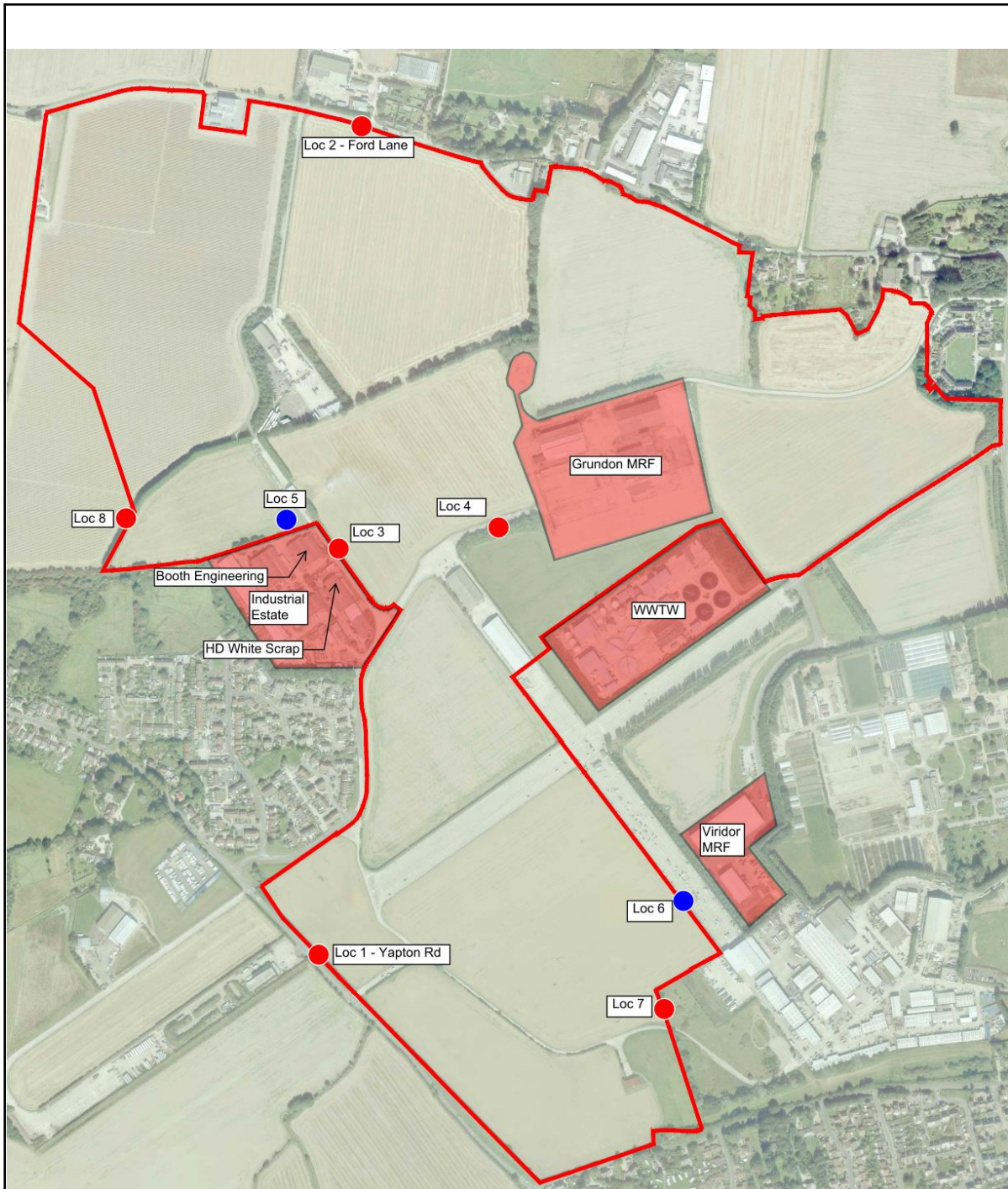
Description	Noise Level
Source Noise Level (unmitigated)	43 dB L_{Aeq} , 15 minute
BS 4142 Specific Source Level (with mitigation)	28 dB L_{Aeq} , 15 minute
Character Corrections	+ 3 dB (impulsivity just perceptible) + 2 dB (tonality just perceptible)
BS 4142 Rating Level	33 dB L_{Aeq} , 15 minute
Typical Background Noise Level (23:00 – 07:00)	34 dB L_{A90} , 15 minute
BS 4142 Assessment Level	- 1 dB

Table 14: BS 4142 Noise Impact Assessment, Proposed Dwellings to West of Viridor MRF, night-time hours 23:00 – 07:00

- 5.45 The assessments in Tables 13 and 14 indicate that, with mitigation, the difference between the BS 4142 rating noise level from the Viridor site and the prevailing typical background noise level will be in the region of - 6 dB for daytime and -1 dB for night-time periods. As the rating noise levels are lower than the background noise levels, this is considered a low noise impact given the context of the site. i.e. for new dwellings being introduced near to existing industrial operations.

6.0 CONCLUSIONS

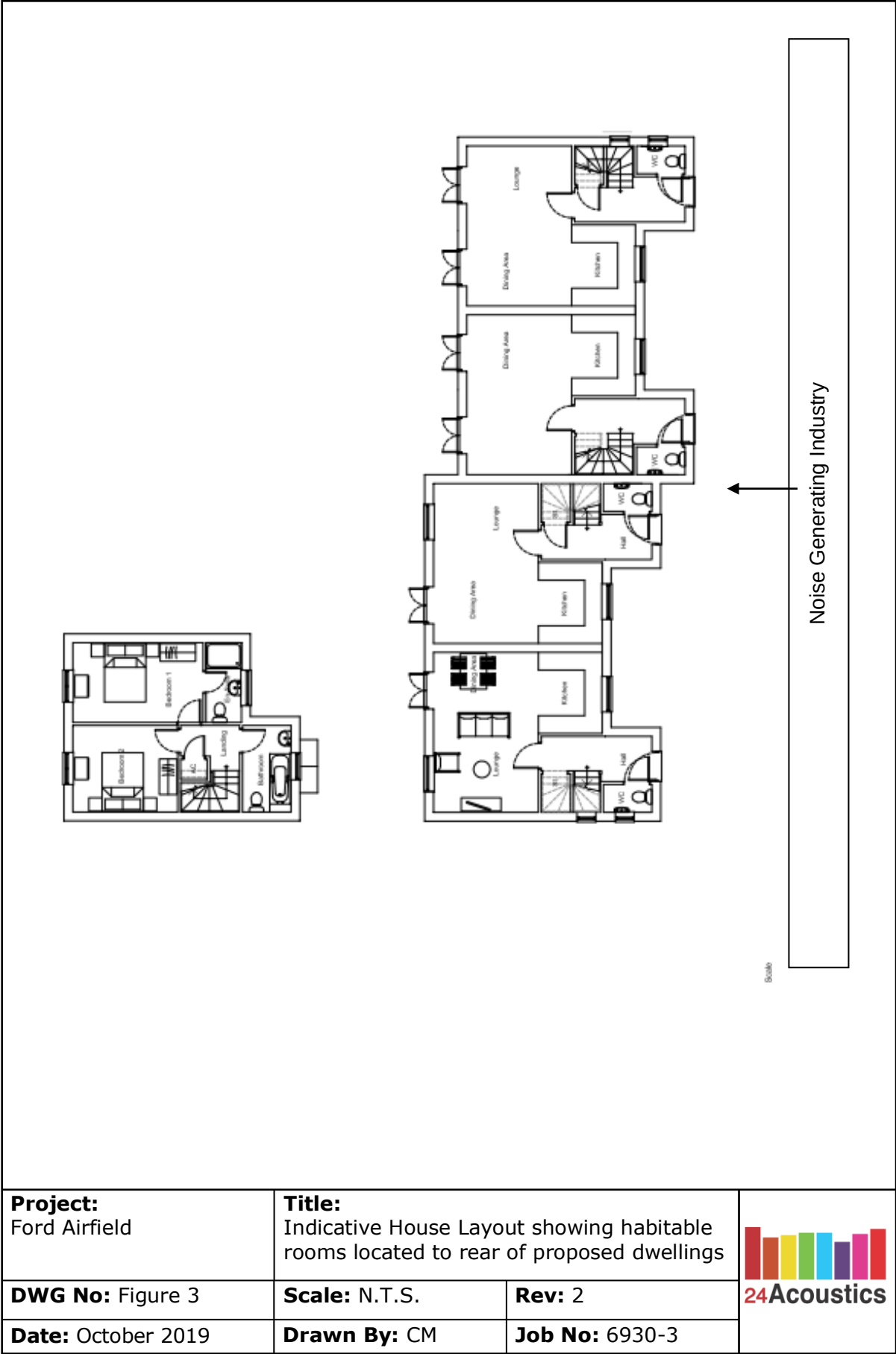
- 6.1 24 Acoustics Ltd has been instructed by Redrow Homes Ltd and Wates Developments Ltd to undertake a noise assessment in relation to proposed development for 1500 new homes on land at Ford Airfield, West Sussex.
- 6.2 This report has addressed the impact of noise upon the proposed development, from road traffic and from nearby industrial noise sources at Ford Airfield Industrial Estate, Grundon MRF and Viridor MRF.
- 6.3 Ambient noise surveys have been carried out at the site to determine existing noise levels during daytime and night-time periods, from nearby sources, and to determine the prevailing background noise levels.
- 6.4 The potential impact of noise from road traffic using Ford Lane and Yapton Road has also been addressed. Preliminary recommendations have been provided for acoustically rated glazing and ventilators, to ensure that suitable internal noise levels are achieved in line with BS 8233: 2014. Suitable external noise levels will be achieved in gardens, on the basis that the gardens will be located to not directly face Yapton Road or Ford Lane.
- 6.5 Recommendations have been provided in order to minimise the noise impact from the industrial sources, in terms of the orientation of dwellings, locations of gardens and provision for acoustic barriers or bunds. With these measures in place, the noise impacts have been assessed under BS 4142: 2014. Taking into account the context, the assessments have indicated that the noise impact from all nearby industrial sources upon the proposed dwellings would be acceptable.
- 6.6 It is anticipated that the noise mitigation strategy will be further developed during the later design stages.

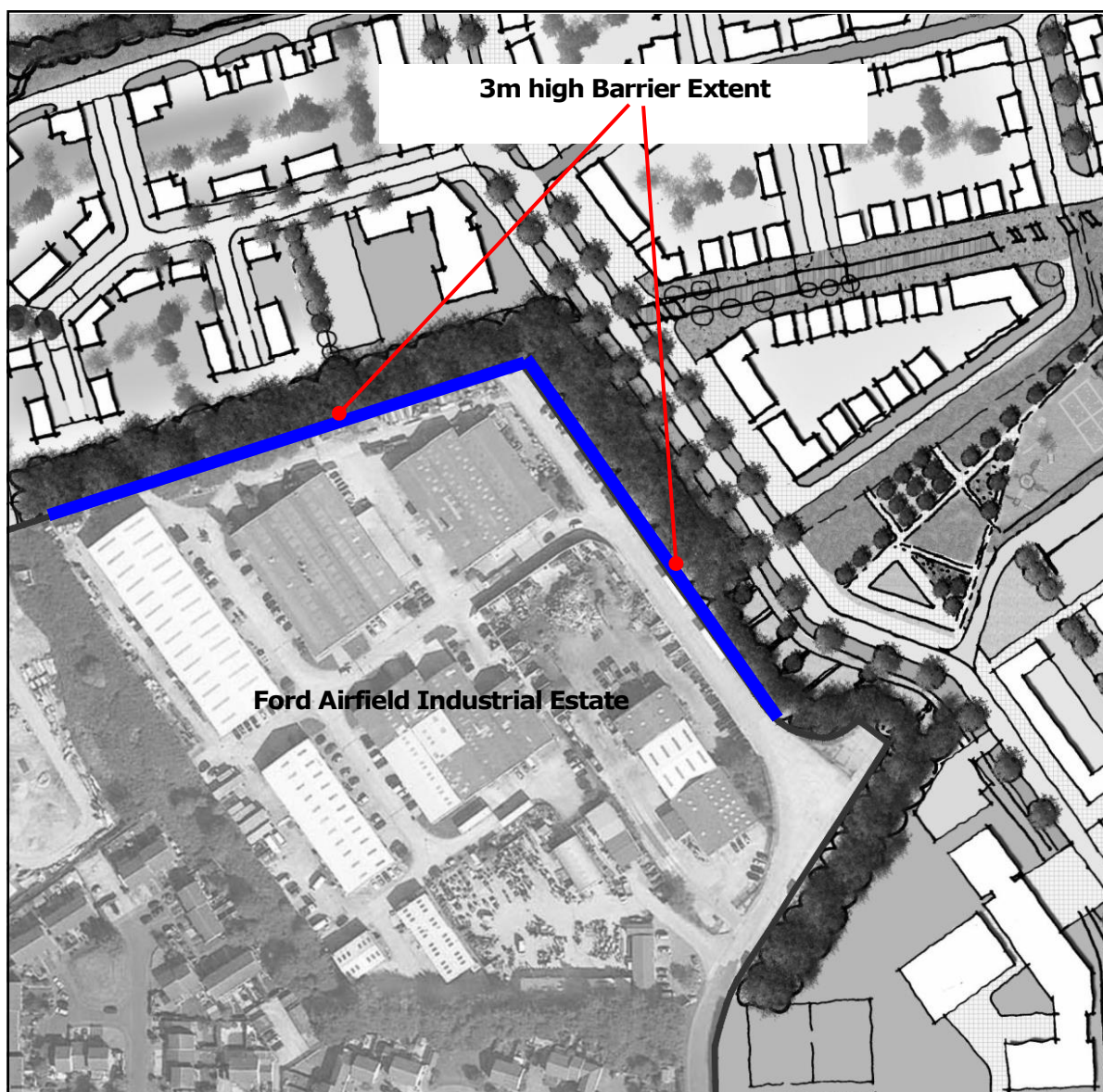


Project: Ford Airfield	Title: Existing Site Plan and Noise Measurement Locations		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: 2	
Date: October 2019	Drawn By: CM	Job No: 6930-3	



Project: Ford Airfield	Title: Proposed Site Masterplan		 24Acoustics
DWG No: Figure 2	Scale: N.T.S.	Rev: 2	
Date: October 2019	Drawn By: CM	Job No: 6930-3	





Project: Ford Airfield	Title: Recommended barrier/bund – boundary with Ford Airfield Industrial Estate		 24Acoustics
DWG No: Figure 4	Scale: N.T.S.	Rev: 2	
Date: October 2019	Drawn By: CM	Job No: 6930-3	

REFERENCES

1. Department for Communities and Local Government. National Planning Policy Framework, 2019.
2. DEFRA. Noise Policy Statement for England, 2010.
3. Department of Communities and Local Government. National Planning Practice Guidance, March 2014.
4. Association of Noise Consultants, Institute of Acoustics, Chartered Institute of Environmental Health. Professional Practice Guidance on Planning and Noise, May 2017.
5. British Standards Institution. British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings, 2014.
6. World Health Organisation. Guidelines for Community Noise, 2000.
7. British Standards Institution. Consultation to British Standard 4142 :2014: Methods for Rating and Assessment Industrial and Commercial Sound.
8. Sussex Planning Noise Advise Document, 2013.
9. Arun District Council, Local Plan 2011-2031 (Adopted July 2018)
10. British Standards Institution. British Standard 7445:1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use, 1991.

APPENDIX A: ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

- i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

- ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

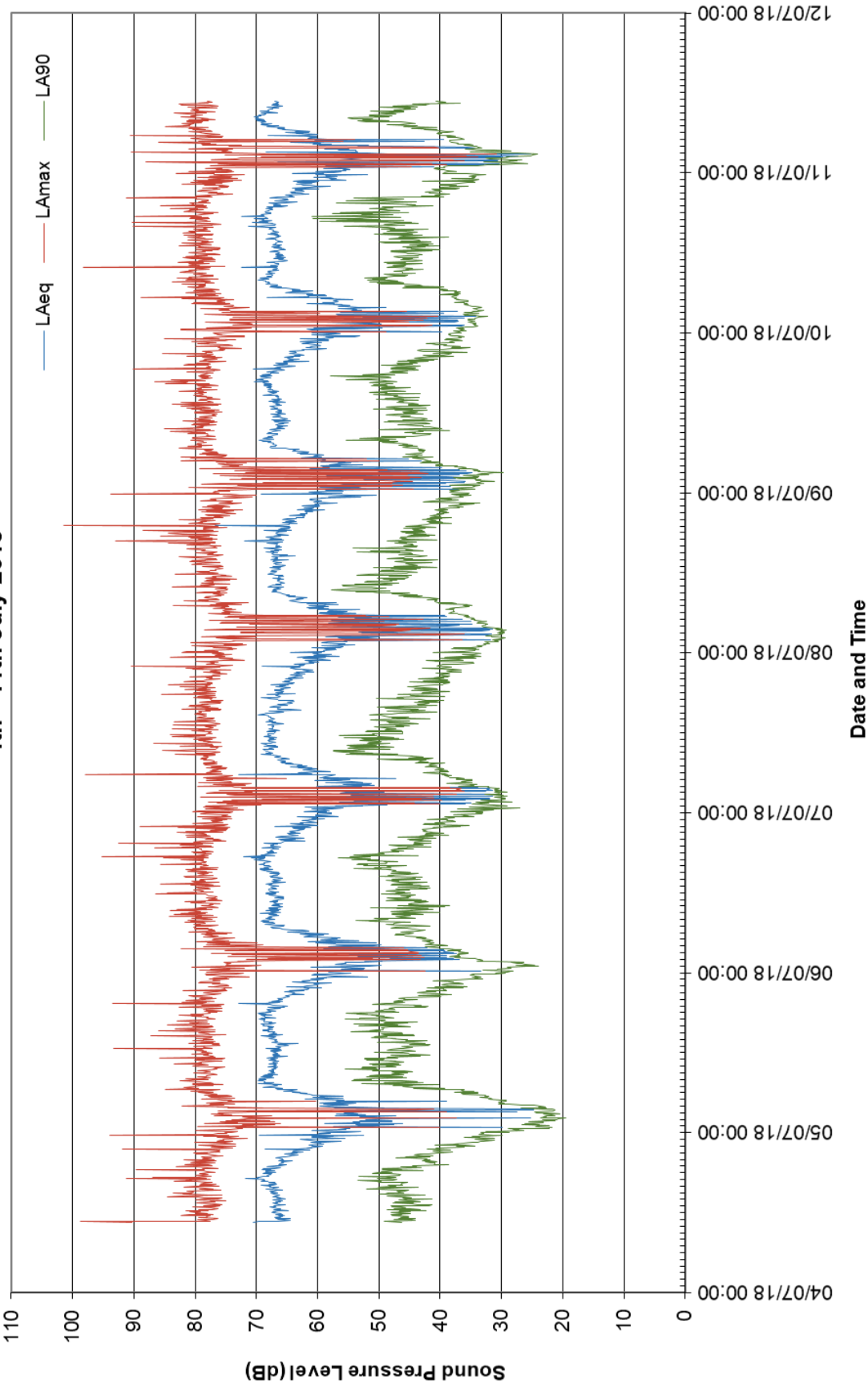
This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

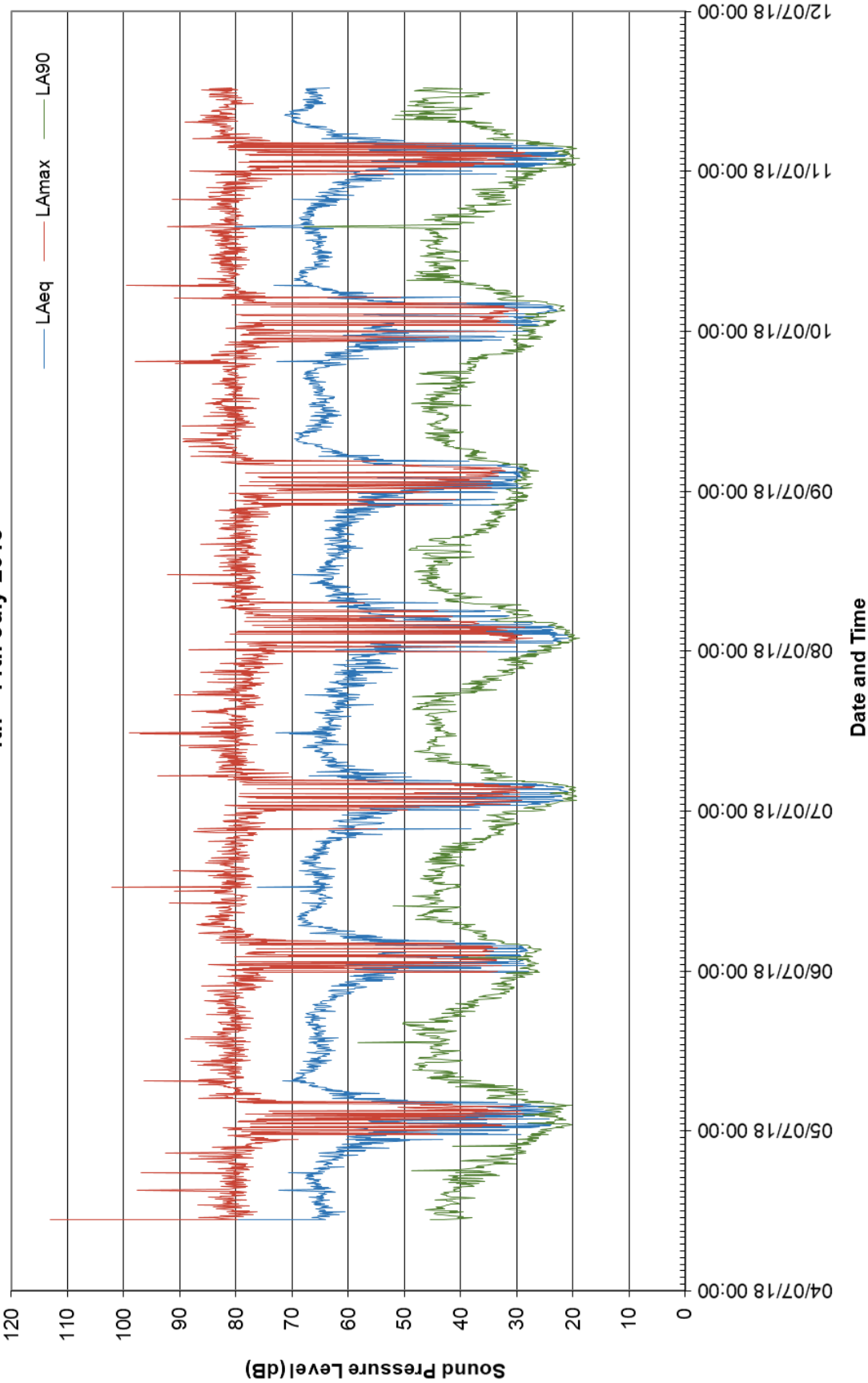
This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B: ENVIRONMENTAL NOISE LEVELS

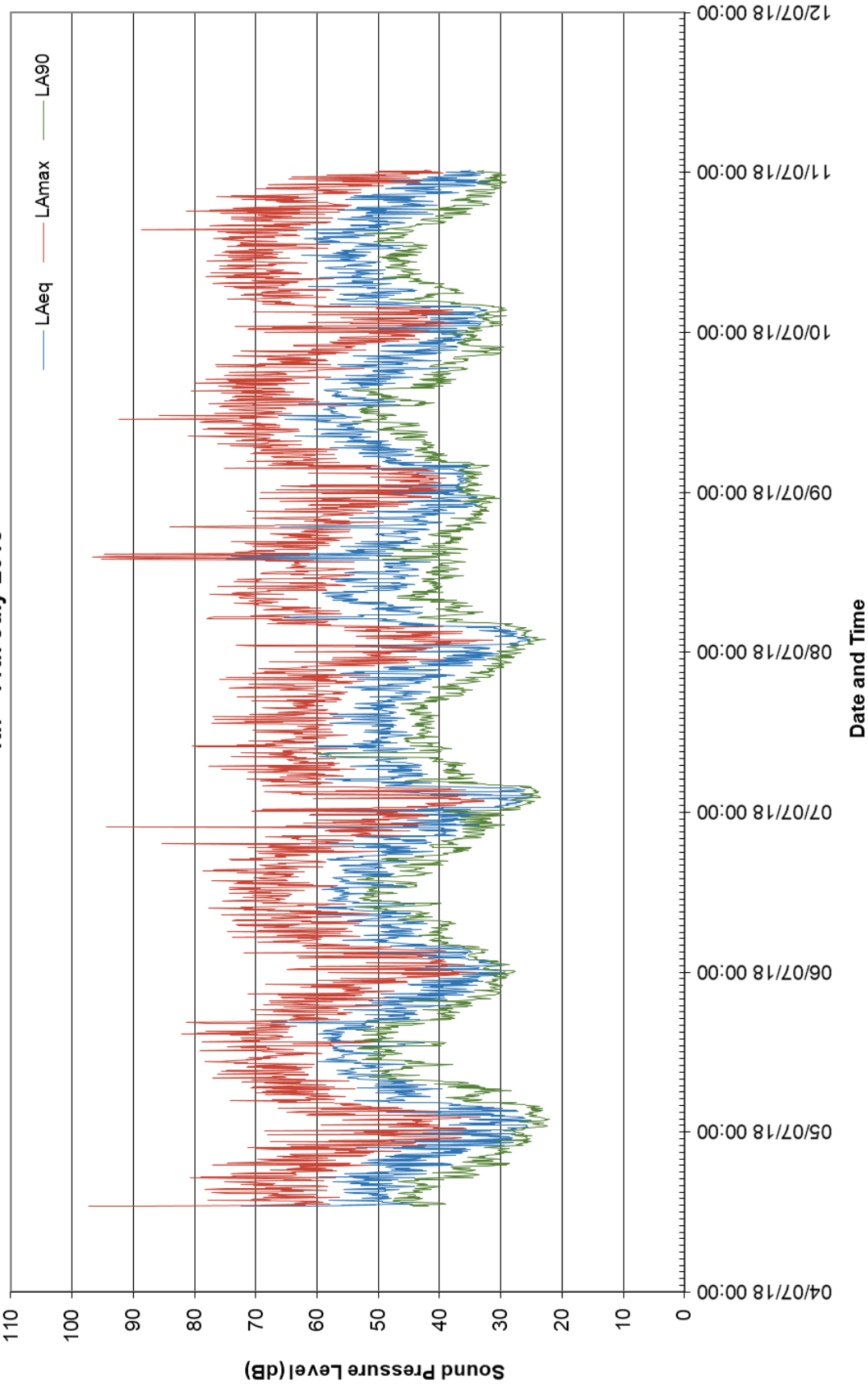
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Noise Survey
4th - 11th July 2018



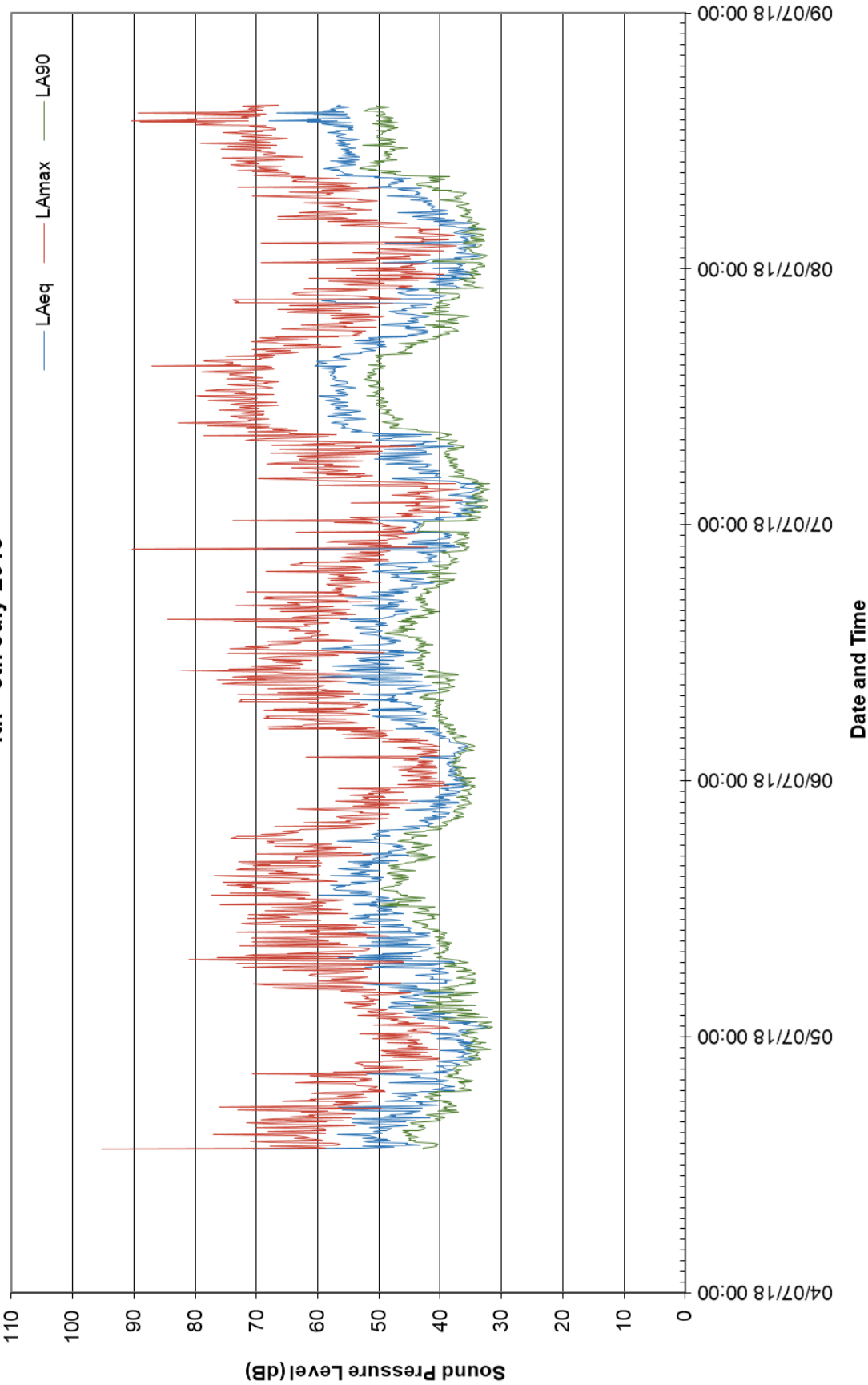
Location 2 Data, Ford Airfield, Ford
Noise Survey
4th - 11th July 2018



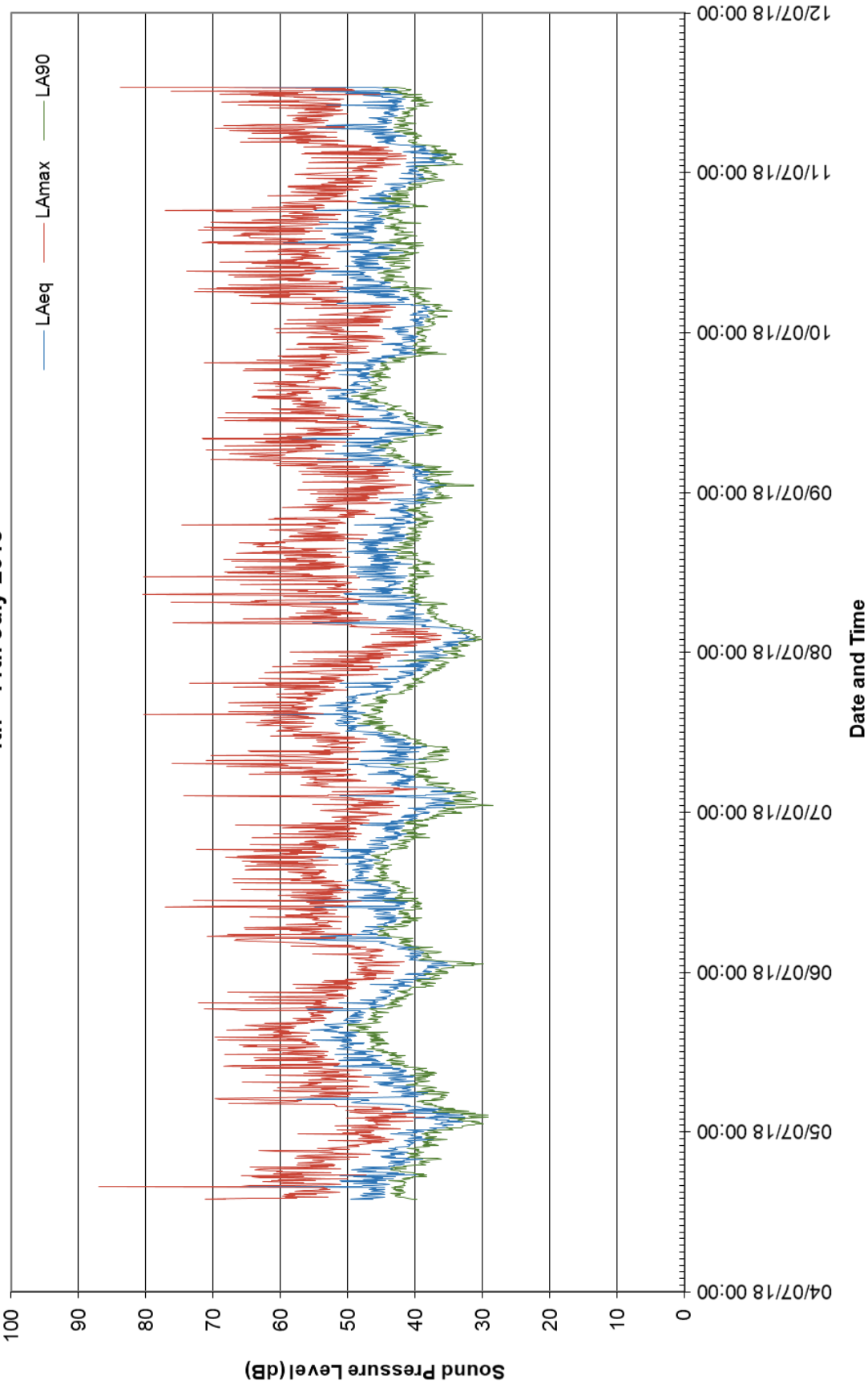
Location 3 Data, Ford Airfield, Ford
Noise Survey
4th - 11th July 2018



Location 4 Data, Ford Airfield, Ford
Noise Survey
4th - 8th July 2018



Location 7 Data, Ford Airfield, Ford
Noise Survey
4th - 11th July 2018



Location 8 Data, Ford Airfield, Ford
Noise Survey
4th - 11th July 2018

