



Gatwick Airport Northern Runway Project

Second Change Application Report

Appendix C: Noise Assessment Technical Note

Book 10

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1 Introduction

- 1.1.1 Elements of the On-airport Wastewater Treatment Works ('WWTW') (the "On-airport WWTW") described in Section 2 of the **Second Change Application Report** (Doc Ref. 10.47) are anticipated to require sound-generating installations with the potential to result in adverse noise impacts at nearby Noise-Sensitive Receptors (NSRs), including residential and non-residential properties.
- 1.1.2 The assessment set out in **ES Chapter 14: Noise and Vibration [APP-039]** was based on the DCO Application, as submitted, and as such did not consider the WWTW Facility with respect to construction or operational (fixed plant) noise which is proposed as part of the Second Change Application.
- 1.1.3 Therefore, this Appendix provides an updated noise assessment for the On-airport WWTW, proposed as part of Project Change 4, which utilises the baseline information reported in **ES Chapter 14: Noise and Vibration [APP-039]** whilst taking into account the proposed On-airport WWTW design information.
- 1.1.4 A pumping station is also proposed, adjacent to the Gatwick Airport Police Station, as part of the **Second Change Application Report** (Doc Ref. 10.47). The location of this proposed pumping station is between the perimeter road and the A23, close to the railway line, with no residential properties within 300 m. The majority of the plant associated with the pumping station is located several meters underground and is unlikely to generate significant levels of noise. Given the low noise sensitivity of the area, noise from the pumping station has been scoped out of the noise assessment presented below.

2 Noise Sensitive Receptors

- 2.1.1 Several NSRs were identified in the surrounding area within 600 m of the proposed development, to the southwest, west, northwest, and north of the On-airport WWTW proposed to be located within the existing Self Park North car park, shown on **ES Figure 4.2.1b [REP1-019]**. The nearest identified NSRs and their relative distances and directions with respect to the On-airport WWTW are described in **Table 2.1** and are presented in **Figure 2.1** of this Appendix below.

Table 2.1: Identified Noise-Sensitive Receptors

| Receptor | Direction from the On-airport WWTW | Approximate Distance to On-airport WWTW (in metres) | Receptor Type |
|------------------------|------------------------------------|---|-----------------|
| Marles | Southwest | 600 m | Residential |
| Farmfield Cottages | West | 400 m | Residential |
| Bear and Bunny Nursery | Northwest | 150 m | Non-residential |
| Charlwood Park Cottage | North | 400 m | Residential |
| Melton | North | 500 m | Residential |

2.1.2 The Bear and Bunny Nursery, as a non-residential receptor, is not considered to be noise-sensitive at night.

2.1.3 Other NSR locations have been identified further away from the On-airport WWTW in the same general directions and with similar intervening ground conditions, compared to the NSRs set out in **Table 2.1** and **Figure 2.1**. The closest NSRs have been selected to ensure that the noise predictions are representative of a worst-case, obviating the need for predictions at further NSRs.

2.1.4 It is therefore expected that, at more distant locations, noise levels would be lower and noise effects would be reduced, compared to the levels and effects at the identified NSRs in **Table 2.1** and **Figure 2.1**.

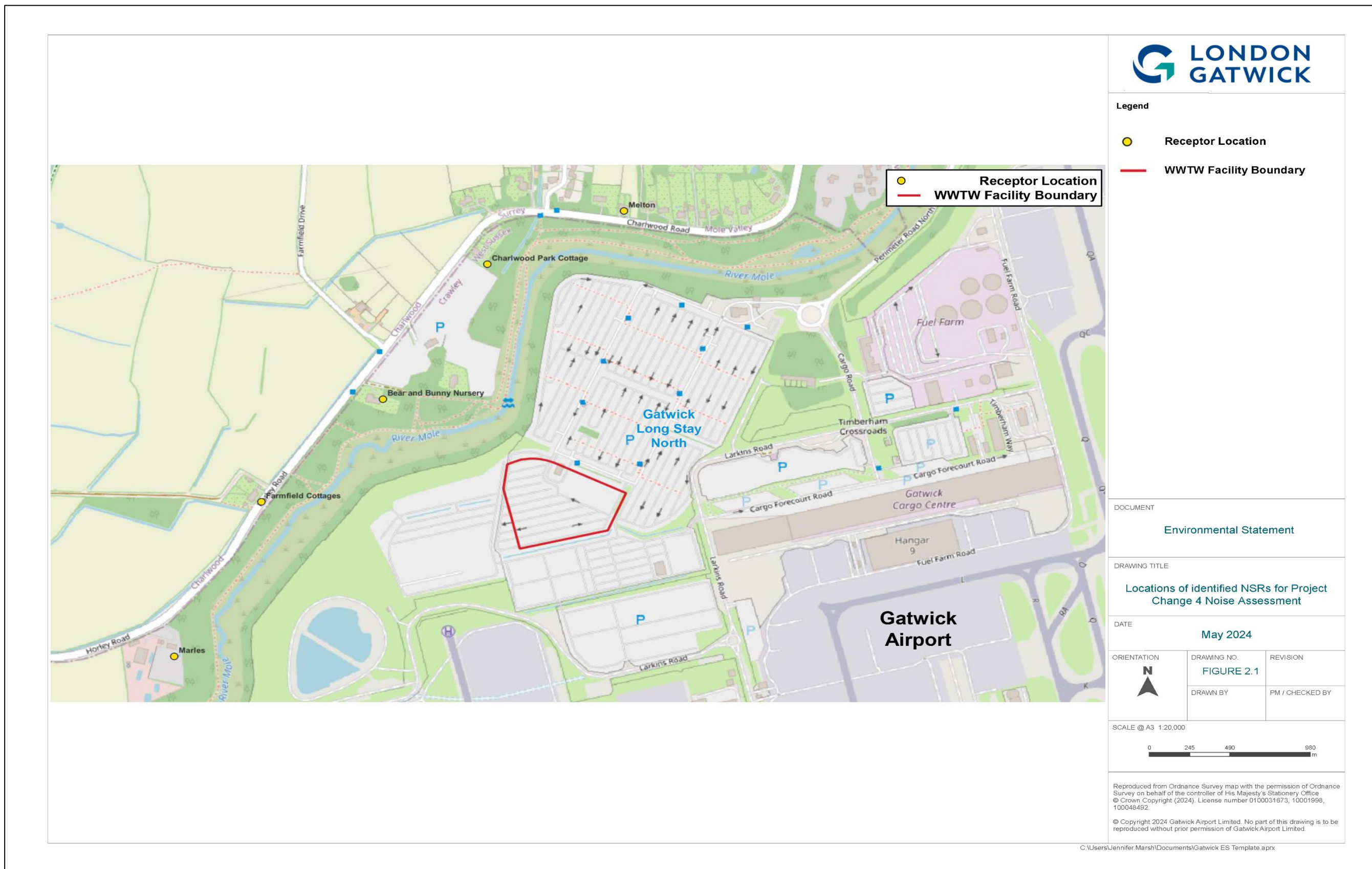


Figure 2.1: NSR Locations of identified NSRs for Project Change 4 Noise Assessment

3 Baseline Noise Levels

- 3.1.1 Sound measurements were undertaken at several locations in the area surrounding the On-airport WWTW in 2016 for the purposes of establishing baseline sound levels, as shown in **Figure 14.4.1: Baseline Noise Monitoring Sites of ES – Noise and Vibration Figures – Part 1** [[APP-063](#)].
- 3.1.2 While measurements were conducted some time ago, both ambient and background sound levels are considered likely to be the same or to have increased slightly due to increasing road traffic, airport traffic noise, and other ambient sound sources, compared to 2016 levels. Therefore, the use of measured sound levels from 2016 is a worst-case assumption for establishing the baseline noise environment.
- 3.1.3 The approach to fixed plant noise assessment is set out in Section 7: Fixed Plant Noise of **ES Appendix 14.9.3: Ground Noise Modelling** [[APP-173](#)], where it is established that plant noise rating levels should generally be no higher than representative background sound levels (L_{A90}) derived for twelve of the 2016 measurement locations. Background sound levels from two of the measurement locations have been taken to be representative of the closest NSRs to the proposed On-airport WWTW, as indicated in **Table 3.1** below.
- 3.1.4 The NSRs of Charlwood Park Cottage and Melton are approximately equidistant from measurement locations at Bear and Bunny Nursery and Oakfield Cottage. Sound levels at Bear and Bunny Nursery are substantially lower and are therefore adopted as a worst-case assumption for these locations. Background sound measurements were conducted at a height of 4m above ground level, representative of first-floor height of buildings. It is anticipated that sound levels at ground height (approximately 1.5m) would be similar, with some potential for background sound levels to be lower.
- 3.1.5 Marles is less than 400 m from the Brook farm measurement location and more than 550 m from Bear and Bunny Nursery so measurements from Brook Farm are considered representative of this NSR.

Table 3.1: Background Sound Levels

| NSR | Representative Measurement Location | Representative Background Sound Levels, dB LA90,T | |
|------------------------|-------------------------------------|---|-------|
| | | Day | Night |
| Marles | Brook Farm | 47 | 34 |
| Farmfield Cottages | Bear and Bunny Nursery | 39 | 30 |
| Bear and Bunny Nursery | Bear and Bunny Nursery | 39 | 30 |
| Charlwood Park Cottage | Bear and Bunny Nursery | 39 | 30 |
| Melton | Bear and Bunny Nursery | 39 | 30 |

- 3.1.6 It should be noted that the representative background sound levels selected from each of the two measurement locations are conservative, particularly at the Bear and Bunny Nursery location. Background sound levels for the Bear and Bunny Nursery have been derived from Figures 7 and 8 at Annex 1 of **ES Appendix 14.9.3 Ground Noise Modelling [APP-173]**, where it can be seen that these are representative of the lowest measured levels with daytime background L₉₀ noise levels varying between 36 and 58dB and night-time background L₉₀ sound levels varying between 30 and 58dB. In practice, it is likely that background sound levels at all NSRs would be higher than is indicated at **Table 3.1** on most days.
- 3.1.7 Although a methodology for determining fixed plant noise limits is set out in Section 7 of **ES Appendix 14.9.3 Ground Noise Modelling [APP-173]**, the plant considered at that time was based on the DCO Application, as submitted, and therefore did not include the On-airport WWTW which is proposed as part of the Second Change Application. As such, these conservative indicative noise limits must be interpreted in the context of the acoustic environment and the sound source under consideration.
- 3.1.8 Comparisons are made against these nominal sound limits for reference, while the overall results, discussion, and conclusions take the context into consideration as required within BS 4142:2014+A1:2019 Method for rating and assessing industrial and commercial sound ('BS 4142'). It should be noted that

the background sound levels are determined at the rear of properties where noise from traffic and other sources is lower. In some instances, the sound from the On-airport WWTW would also be shielded and therefore lower than predicted here.

4 Construction Noise and Vibration

4.1.1 The On-airport WWTW construction programme ranging from 2026 to 2028 identifies two noisiest phases that were chosen to be assessed. The first includes piling, paving and facilities installation activities and the second includes facilities installation, paving, piling and utilities diversion activities.

4.1.2 As described in **ES Appendix 14.9.1: Construction Noise Modelling** [[APP-171](#)], construction plant teams used for these works are: Plant Team T2 for utilities diversion, T4 for piling, T5 for facilities installation and T6 for paving. For the purposes of this noise assessment, these noise sources have been spread around the proposed On-airport WWTW to capture the worst-case scenario, where the noisiest works will be happening closest to the identified NSRs. Out of the list of NSRs identified at **Table 2.1** and **Figure 2.1**, the closest is Bear and Bunny Nursery and this is considered the only relevant location for construction noise since predicted levels are significantly lower for all other NSRs. The predicted noise levels for the two noisiest phases of construction, in the absence of mitigation are presented in **Table 5.1** below.

Table 5.1: Predicted Construction Noise Levels at closest NSR

| NSR | First Phase (<i>Leq</i> , 12 hour dB façade) | Second Phase (<i>Leq</i> , 12 hour dB façade) |
|------------------------|--|---|
| Bear and Bunny Nursery | 51 | 52 |

4.1.3 It is assumed all work will take place in daytime hours and given the baseline noise levels, the NSRs would fall into BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites ('BS5228') Category A, with a Lowest Observed Adverse Effect Level (LOAEL) of *Leq* 12 hour 65dB and a Significant Observed Adverse Effect Level (SOAEL) of *Leq* 12 hour 75dB.

- 4.1.4 The predicted noise levels with no mitigation are well below the LOAEL, and the scoping thresholds for effects on schools which shows negligible and not significant adverse effects. Therefore, no further mitigation has been considered at this stage of the assessment.
- 4.1.5 Driven piling works are required to complete parts of the on-airport WWTW construction; however, the closest piling activities are sufficiently far from identified NSRs that there will be no significant vibration effects.

5 Operational Phase

5.1 Predicted Noise Levels

- 5.1.1 Two noise-generating sound sources have been identified based on the On-airport WWTW design information and discussions with design engineers, namely the four turbo blowers and one Positive Displacement (PD) blower.
- 5.1.2 Specific sound levels from these sources have been predicted at receptor locations using industry standard 3D acoustic modelling software (SoundPLANnoise, version 9.0). The source sound levels adopted for the modelling are shown in **Table 5.1**. Further modelling assumptions are described below.
- 5.1.3 The turbo blower sound power level is based on a manufacturer-specified sound pressure level¹ of ≤ 85 dB(A), while the PD blower sound power level is based on a highest manufacturer-specified sound pressure level² of 81 dB(A) for similar models. It is assumed that the noise from the blowers would be emitted primarily from a small-dimension airflow inlet at a height of 2.5 m above ground level and could operate at any time of the day or night.
- 5.1.4 No direct spectral information is available for the blowers. It is understood that such equipment typically operates with a substantial proportion of sound emitted at relatively low frequencies. As such, it has been assumed that the entirety of the sound is emitted in the 50 Hz one-third octave band as a worst-case assumption for predicting overall noise levels.

¹ Hoffman Lamson Revolution Plus, High Speed Turbo Blower HL-B Series

² Hoffman Defender Rotary Lobe Blower, 600 hp Motor

Table 5.1: Source Sound Power Levels

| Source | Sound Power Level, L_w | Number of Blowers | Location |
|------------------------------|--------------------------|------------------------------------|---|
| Turbo Blower | 91 dB(A) at 50 Hz | 4 (3x operational plus 1x standby) | Return Activated Sludge and Waste Activated Sludge Pump Station |
| Positive Displacement Blower | 87 dB(A) at 50 Hz | 1 | Blend Facility and Pump Storage |

- 5.1.5 Sound power levels are derived from sound pressure specifications based on a presumption that the sound pressure levels refer to the sound level at a distance³ of 1 m, which are corrected by a factor of +11 dB for an assumed point source using a spherical spreading model. In practice, sound power levels may be lower than assumed, for example if measurements were undertaken on acoustically hard ground, but the levels presented are assumed as a reasonable worst-case assumption.
- 5.1.6 Sound sources have been modelled as floating point-sources, at a height of 2.5 m above ground level. The buildings within which the sources are anticipated to be housed are not explicitly modelled, due to the difficulty in precisely determining the acoustic performance of materials at low frequency and the requirement for ventilation within such a building. However, it is reasonable to assume that the plant housing would result in a sound reduction of at least 5 dB. A 5 dB reduction has therefore been applied to the sound power levels as a reasonable worst-case assumption.
- 5.1.7 Other buildings and structures within the on-airport WWTW are not included in the model as a worst-case assumption. Ground topography and ground absorption effects are assumed based on the equivalent modelling assumptions set out in Chapter 14 of the ES, using available ground elevation data and assuming a ground absorption value of 0 applied to identified hardstanding areas

³ It is possible that specified sound levels refer to a distance greater than 1 m from the sound source, in which case sound power levels would be higher, but this would be unusual to be the case where, such as in this case, no measurement distance is explicitly stated.

such as car parks and notable roads, with a ground absorption value of 0.6 applied for all other areas.

- 5.1.8 Sound levels have been calculated for multiple locations at or around the identified NSRs. In multiple cases, the building façade closest to the On-airport WWTW experiences the highest direct sound levels but are also likely to experience background sound levels substantially higher than those assumed, which were typically measured in rear gardens. Predicted sound levels at the worst-affected façade of the property have been reported, as a worst-case.
- 5.1.9 Further assumptions and settings used in the modelling are as follows:
- Calculation method: ISO 9613-2⁴
 - Barrier attenuations are determined according to equation (12)
 - Regular ground effect calculations (7.3.2)
 - Air absorption calculated using ISO 9613-1⁵
 - Calculation conformity: ISO 17534⁶
 - Relative humidity: 70%
 - Ambient temperature: 10 °C
 - Air pressure: 1013.3 mbar
 - Buildings: All major buildings assumed to be 6 m height, except Charlwood Park Cottage rear annex, identified as approximately 4 m height
- 5.1.10 It is unlikely for a blower sound source in good working order to result in perceptibly impulsive sound characteristics. In addition, it is anticipated that the blowers would operate for extended periods of time and would therefore not be intermittent in nature.
- 5.1.11 There is some potential for perceptibly tonal characteristics, given the cyclical nature of the blowers. However, it is considered that, based on professional judgement, where absolute sound levels are at or below the background sound levels, and where background sound levels are low, the presence of substantial

⁴ ISO 9613-2:1996 Acoustics — Attenuation of sound during propagation outdoors, Part 2: General method of calculation; it is noted that ISO 9613-2:2024, which supersedes ISO 9613-2:1996, is not implemented in SoundPLANnoise version 9.0, the most recent version available at the time of the modelling

⁵ ISO 9613-1:1993, Acoustics — Attenuation of sound during propagation outdoors, Part 1: Calculation of the absorption of sound by the atmosphere

⁶ ISO 17534, Acoustics — Software for the calculation of sound outdoors

perceptible low frequency tonal characteristics is unlikely for a blower sound source.

5.1.12 Therefore, it has been assumed that no acoustic character penalties would be applicable, and that the calculated specific sound levels are equal to the rating levels for the purposes of the assessment.

5.2 Assessment

5.2.1 During the daytime, people are typically exposed to sound at the ground floor level, while during the night, people are typically exposed to sound at first floor level. Predicted rating levels have therefore been calculated and are shown in **Table 5.2** for the daytime (ground floor) and night-time (first floor) at the identified NSR locations, with comparisons against the relevant background sound levels also shown.

Table 5.2: Predicted Sound Levels and Background Sound Levels

| NSR | Background Sound Levels, dB(A) | | Predicted Rating Level, dB(A) |
|--|--------------------------------|-------|-------------------------------|
| | Day | Night | |
| Marles Ground Floor | 47 | n/a | 25 |
| Marles First Floor | n/a | 34 | 25 |
| Farmfield Cottages Ground Floor | 39 | n/a | 29 |
| Farmfield Cottages First Floor | n/a | 30 | 28 |
| Bear and Bunny Nursery Ground and First Floor ⁷ | 39 | n/a | 34 |
| Charlwood Park Cottage Ground Floor | 39 | n/a | 28 |
| Charlwood Park Cottage First Floor | n/a | 30 | 28 |

| NSR | Background Sound Levels, dB(A) | | Predicted Rating Level, dB(A) |
|---------------------|--------------------------------|-------|-------------------------------|
| | Day | Night | |
| Melton Ground Floor | 39 | n/a | 27 |
| Melton First Floor | n/a | 30 | 27 |

- 5.2.2 Predicted rating levels using the above worst-case assumptions are lower than the background sound level at all locations. The maximum predicted absolute sound levels during the daytime were 34 dB and at night (where applicable) were 28 dB. This numerical assessment provides an initial indication of a low impact, depending on the context.
- 5.2.3 The consideration of the context is required to identify the likely effects of the noise levels. At night, potential adverse noise effects would take place indoors, where absolute sound levels are substantially reduced compared to those predicted outside. Furthermore, the wider area is that of a mixed industrial, commercial and residential setting, where this type of noise is already present and to be expected and would be tolerated to a higher degree than in rural, purely residential, or other areas where existing quiet and tranquillity are more likely to be highly valued. As such, any potential noise impacts are likely to be equal to or lower than that suggested by the initial numerical assessment.
- 5.2.4 Overall, the context is considered likely to have a neutral to favourable effect on conclusions, with respect to the noise impact of the On-airport WWTW.
- 5.2.5 Uncertainty has been considered throughout the assessment of noise from the On-airport WWTW. There are several sources of uncertainty, including the applicability of historic background sound levels and the input acoustic modelling assumptions, particularly in identifying the sound power levels of the proposed plant items. Throughout the assessment, several worst-case assumptions and estimates have been adopted. In practice, representative background sound is likely to be higher than assumed and predicted noise levels are likely to be lower than presented. As such, the uncertainties of the assessment have been skewed towards an over-estimate of the likely noise impact in the future situation. It is therefore highly unlikely that the resulting predicted noise impacts would be greater than those concluded in the assessment.
- 5.2.6 The noise impacts of the proposed On-airport WWTW have been assessed according to the methods set out in BS 4142.

- 5.2.7 Predicted rating levels are lower than the identified background sound level at all locations. After consideration of the context, it is concluded that the On-airport WWTW operational noise is highly likely to have a low impact.