Note

Title	Noise Documentation Review		
Project	Gatwick Airport DCO		
Reference	28AD.NT.1.1	**Author(s)**	BHo
Date	13 February 2024	**Reviewer**	VC

1.0 Overview

1.1 This note sets out Suono's initial review of the noise chapter submitted as part of the DCO Environmental Statement (ES), as well as its appendices and specific documents referenced within.

1.2 Particular attention has been paid to the air and ground noise assessments, due to time constraints and the likelihood of significant effects arising.

1.3 We have focussed the note on issues found, many of which are fundamental to the noise assessments. Given the number of issues identified, it is expected that other issues will be identified as Gatwick Airport Limited (GAL; the Applicant) respond.

2.0 Policy

Benefit Sharing

2.1 The noise documentation appears to rely heavily on the newly released Overarching Aviation Noise Policy Statement (OANPS, March 2023) but does not consider that previous policy statements remain in force.

2.2 Section 14.2.44 of Chapter 14: Noise and Vibration [APP-039] states that sharing the benefits is no longer a consideration, but this does not recognise that the need to 'limit and where possible reduce total adverse impacts' effectively amounts to the same thing. The government chooses the phrase '*where possible*' rather than '*where practicable*', identifying a much stronger imperative to reduce noise than an approach which is merely economically justifiable.

2.3 The accompanying paper with the OANPS states, "*One of the overall objectives underpinning the Air Navigation Guidance 2017 is to "emphasise that the environmental impact of aviation must be mitigated as much as is practicable and realistic to do so." Consultation responses suggested that including this in our overall policy would be beneficial. This complements the aim of limiting and where possible reducing the total adverse impacts, and we consider helps clarify that noise mitigation as well as noise reduction can contribute to reducing total adverse effects of noise. We have therefore introduced this phrase into our overarching policy.*"

2.4 This clearly identifies that mitigation can be used to assist in reducing noise levels, but that noise reduction through other means (fleet replacement) must also contribute. This is further clarified by other text within the accompanying paper:

> *"We consider that "limit, and where possible reduce" remains appropriate wording. An overall reduction in total adverse effects is desirable, but in the context of sustainable growth an increase in total adverse effects may be offset by an increase in economic and consumer benefits. In circumstances where there is an increase in total adverse effects, "limit" would*

mean to mitigate and minimise adverse effects, in line with the Noise Policy Statement for England."

2.5 There is therefore a requirement to mitigate and minimise adverse effects, and where possible reduce. Reduce and mitigate are referred to separately, which this application does not account for, instead focussing primarily on mitigation.

Noise Reduction

2.6 The noise documentation does not justify why 2013 is relevant to Gatwick Airport, choosing it entirely based on this year being referenced for Heathrow in the Airports National Policy Statement (ANPS, June 2018).

2.7 Further, there is no certainty that noise levels will continue to reduce over time. Section 6.3.1 of The Noise Envelope appendix [APP-177] states:

"The noise envelope should always remain relevant and should reflect evidence of the improvements in average fleet noise performance over time. The envelope should not function to prevent airlines serving changing markets. As noted above, the outcome of review for the 3rd Noise Envelope Period and subsequent noise envelope periods may require the noise envelope contour to change, which may include a reduction or an increase. (Subject to not exceeding the noise contour area required to be achieved during the 1st Noise Envelope Period). This is to ensure that the Airport can meet changing market needs in terms of routes served and aircraft types used."

2.8 This open-ended flexibility does not provide certainty of future noise levels, or demonstrate reduction over time, which is expected of the aviation industry. Section 3.3 of Aviation Policy Statement 2013 summarises this succinctly:

"As a general principle, the Government therefore expects that future growth in aviation should ensure that benefits are shared between the aviation industry and local communities. This means that the industry must continue to reduce and mitigate noise as airport capacity grows."

2.9 The Applicant seeks to reason that such an increase would be allowable if new generation aircraft have low carbon emissions, but this is not a consideration of government policy. Indeed, the Costs Decision [APP/C1570/W/20/3256619, May 2021] for the Stansted Airport 43 mppa inquiry concludes in section 22:

"…reliance on a perceived direction of travel in policy or emerging policy that may never come into being in the form anticipated is not a sound basis for making planning decisions."

Core and Sensitivity Cases

2.10 It is not clear whether the core case being assessed is the Central Case or the Slower Transition Fleet. One must be chosen as the core case, on which future noise contour limits are derived, and this should be the forecast that is most likely to occur.

2.11 If this is the Slower Transition Fleet, no account has been made of this within the ground noise assessment. If it is actually the Central Case, then future noise contour limits need to be adjusted to account for this. In this way noise would be limited and, as would clearly be possible, reduced.

3.0 Air Noise

Forecasts

3.1 Table 14.3.1 of Chapter 14 states that the Planning Inspectorate (PINS) have asked for, "*The baseline and future baseline assumptions in terms of usage of the northern runway should also be clearly set out so as to understand the number of additional movements being modelled in predicting significance of effect.*" GAL respond, "*The numbers of movements in the baseline and with the Project are set out in Table 14.7.1 in Section 14.7.*"

3.2 The corresponding table does not set out the movements being modelled in the summer period, which is of most importance given that GAL state $L_{Aeq,16hour}$ (which applies over the summer period) is their primary assessment metric.

3.3 Appendix 4.3.1 Forecast Data Book [APP-075] also provides no information on:

- Summer 92-day period breakdown of aircraft types;
- Details of movements broken down by day, evening and night-time;
- Reference to specific aircraft types, which is essential in order to know precisely what has been modelled within air noise assessment;
- Confirmation of the number of movements which are departures and arrivals.

3.4 In our view, the submitted documents do not therefore properly respond to PINS' scoping response requirements. Nor do they allow for any review to properly assess how noise from different aircraft types and operations contribute to the overall noise conditions in the affected community for all assessment scenarios.

Methodology

Schools

3.5 No reference has been made to BB93: Acoustic Design of Schools, February 2015, which is referenced within the Building Regulations. Schools have noise intrusion criteria that are different from those that have been proposed for all noise sensitive receptors, and so it is not possible to meaningfully determine the level of effect that is predicted.

3.6 Large amounts of information have been provided for night-time effects at schools but to what end? They are irrelevant.

Awakening Assessment

3.7 Appendix 14.9.2 Air Noise Modelling [APP-172] states at the end of section 7.4.7, "*it is currently unclear how many additional noise-induced awakenings are acceptable and without consequences for sleep recuperation and health*" and does not at any point propose a threshold or criteria.

3.8 The Heathrow Airport 3rd Runway Preliminary Environmental Impact Report (PEIR) [Heathrow Expansion PEIR, Chapter 17: Noise and Vibration, 2019] set a SOAEL of one additional awakening due to aircraft noise (year average), which applies to a combination of air and ground noise. The recent Bristol Airport expansion also set this as a determinant of SOAEL.

3.9 GAL underestimate the likelihood of awakening through only assessing airborne aircraft, when noise levels from individual ground-borne events have also been calculated and presented in the ES. These must be included. The Applicant should update their awakening assessment to include both air and ground noise sources and compare this against a SOAEL of one additional awakening over the year.

Secondary Metrics

3.10 No glossary of authors is easily available, if it has been provided, so it is not possible to know who is on the GAL project team. However, from information stated verbally at the Luton Airport 19 mppa Inquiry under cross-examination, we understand that Seth Roberts of Heyes McKenzie is part of the GAL team.

3.11 Mr Roberts' rebuttal proof of evidence [LADACAN-W1.3] for the Luton inquiry states, in section 4.16:

> *"The method of assessment does not align with best practice and in this respect, I do not believe it can be described as 'taking into account current knowledge and methods of assessment' as required by the 2017 EIA Regulations. In relation to best practice, I would expect the assessment methodology to set out clear criteria for determining the magnitude of effect (usually described using the following terms: Negligible, Minor, Moderate, Major and Substantial). I would expect these criteria to include, as a minimum, objective ratings of: the primary LAeq metric; expected changes to the primary metric (as a result of the development); numbers of dwellings affected. I would also expect to see some objective criteria for assessing secondary metrics which would typically include thresholds of significance for numbers of dwellings within the NA60, NA65 and Lmax contours along with thresholds of significance for change in the Lmax metric at specific locations. Examples of best practice which could be expected for the assessment methodology can be found in Preliminary Environmental Information Reports (PEIR) prepared for the Heathrow third runway and Gatwick North Runway DCO application. Extracts of these PEIR documents covering the relevant assessment methodology are included at Appendix 1 of this report."*

3.12 The Applicant should clarify why significant effects have not been determined using secondary metrics if these are held to be an absolute requirement by members of their own team.

Model

Aircraft

3.13 Further to the missing information set out in the Forecasts section above, it is not clear how noise adjustments for next generation aircraft have been determined, such as those stated in Table 2.1.1 of the Air Noise Modelling appendix. The Applicant must clarify how these adjustments have been derived.

3.14 There is also a large amount of information relating to 'Code C' aircraft (a term which is not clarified or explained at any point in the noise information), which is meaningless without the missing information detailed in the Forecasts section above. One example is Table 2.1.2 in the Air Noise Modelling appendix.

Runway and Flightpaths

3.15 Section 2.1.10 of the Air Noise Modelling appendix states that "*Start-of-roll locations were assumed to be inset 150 metres from the runway ends, as is the case for the main runway modelling*". It is not clear why this is an assumption, and the Applicant must clearly state their justifications for this, or detail how it will be secured within the DCO to avoid worsening effects in reality.

3.16 Section 2.1.10 also states that, "*RNAV dispersion was modelled for all northern runway departure routes.*" This appears to contradict evidence provided to GAL by Civil Aviation Authority (CAA) in Table 14.3.1 of Appendix 14.3.1 [APP-169] which states that the northern runway does not operate RNAV departure routes, but Standard Instrument Departures (SIDs) which involve much greater degrees of aircraft dispersion. The Applicant must update the modelling to account for the lack of RNAV on the northern runway.

3.17 The splits for each flightpath should be provided for the day and night, for each assessment year (where different), replacing the partial information provided in Diagram 2.1.1 within the Air Noise Modelling appendix.

Mitigation

3.18 Mitigation is dealt with in the Noise Insulation Scheme section below and the Policy section above.

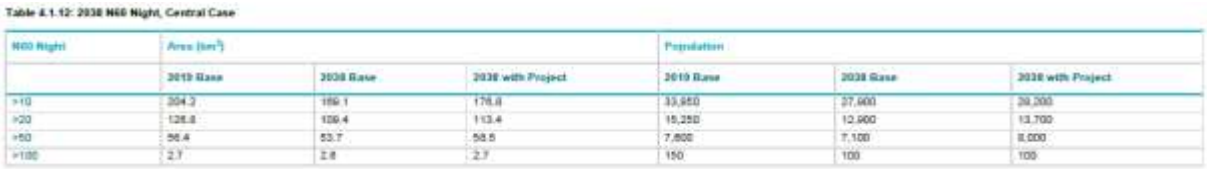
Assessment Results

Core and Sensitivity Cases

3.19 Table 14.9.6 of Chapter 14 sets out the results of both the Central and the Slower Transition cases in the same table, as a range. Results for each case should be set out separately, so as to demonstrate how specific effects relate to specific forecasts. Formatting results in this style leads to a bias that the environmental outcomes have to fall within a range; this clearly isn't the case as the fleet could transition faster than expected as well as slower. If the 'Central Case' is considered most likely to arise it constitutes the core case, with the 'Slower Transition Fleet' clearly identified as a sensitivity case.

Tabulated Results

3.20 The tables set out at the end of the Air Noise Modelling appendix contain numerous instances where contour areas for each scenario increase or decrease compared to each other, but their corresponding populations do the opposite, which is not typically expected. See for instance Table 4.1.12 below, where for the >100 events contour, areas remain identical in the future year with project, but the population within this contour changes.



3.21 There are also instances where L_{eq} contours and Number Above contours have the same area, for the same scenario, but have different populations. The Applicant must explain how these differences arise.

3.22 Other instances suggest large differences in the number of flyovers between daytime (N65) and night-time (N60) which do not seem to be reflected in the corresponding L_{eq} contours, see Table 4.2.2 Charlwood Village Infant School (Central Case). This is not reflected at other schools, and it would be helpful for the Applicant to explain how these figures arise.

Table 4.2.2: Charlwood Village Infant School (Central Case)

Case	Average Summer Day			
	$L_{eq,\ 16hr}$	$L_{eq,\ 8hr}$	N65 day	N60 night
2019 Base	55.3	48.8	124	36
2032 Base	52.9	46.9	30	41
2032 with Project	53.4	47.4	78	48
2032 with Project - 2032 Base	0.5	0.5	49	7
2032 with Project - 2019 Base	-1.9	-1.4	-46	12

4.0 Ground Noise

Forecasts

4.1 With regards to aircraft forecasts, the same issues arise with ground noise as have been identified for air noise.

Methodology

Missing Information

4.2 The Applicant should provide:

- a table clearly setting out which aircraft are included within model, the noise levels associated with each aircraft, from where these noise levels have been derived, and justifications for any assumptions have been made within these tranches of information;
- a list of all the different noise sources for both L_{Aeq} and L_{Amax} scenarios, in each assessment year, and whether they occur in the day and / or night;
- an assessment description and significance criteria for the ground noise L_{max} assessment;
- information on actual splits modelled between each Engine Ground Running (EGR) location;
- L_{Aeq} ground noise contours for all assessment years and scenarios, from LOAEL to SOAEL as a minimum;
- noise level assessment results associated with all assessment years and scenarios;
- figure(s) showing where noise sources and mitigation such as bunds and barriers are located within the model.

4.3 This list is considerable and highlights the paucity of information within the ground noise documentation.

Assessment Operating Conditions

4.4 GAL state that a literature review has been undertaken for ground noise but this does not include reference to any recent UK airport expansion applications, such as those at Stansted (approved), Bristol (approved), Heathrow DCO (PEIR only) and Luton DCO (under examination). The approach taken by GAL differs from these applications with no justifications provided.

4.5 One such difference is the use of single mode, easterly or westerly, operations. This also departs from the approach taken in GAL's air noise model, which aggregates these modes using the standard modal split (75% westerly and 25% easterly). It is therefore not possible to properly assess the overall effects of both air and ground noise sources acting together.

4.6 This is essential given that the affected residents will clearly suffer intrusion from both and given that the assessment criteria used for the ground noise assessment are identical to those proposed for the air noise assessment, with no justifications provided.

4.7 The Applicant has to undertake an assessment of ground noise using the standard runway modal split in order to allow for consideration of ground and air noise acting in combination. If the use of single mode operations is to be justified, then updated LOAELs and SOAELs need to be established and an updated assessment based on them undertaken.

4.8 An assessment of the slower transition case must also be undertaken, to allow for consideration alongside the air noise model.

Baseline Measurements

4.9 The use of background noise measurements from 2016 as a proxy for 2019 values is not accepted as being appropriate. As stated in section 14.5.9 of Chapter 14, approximately 13% of aircraft operating at Gatwick in 2019 were 'next generation'. This is expected to be materially different to 2016, when we would expect the percentage to be closer to 0%, as next generation aircraft were only just entering service. By the Applicant's own admission (section 3.1.1 of Appendix 14.9.3 Ground Noise Modelling [APP-173]), next generation aircraft are 3-5 dB quieter than equivalent other aircraft when taxiing.

4.10 Despite the number of aircraft movements between 2016 and 2019 being similar, as reasoned in section 14.4.21 of Chapter 14, noise levels would not be expected to be similar enough to justify not undertaking further measurements. In any event, it is not clear how these noise measurements are actually used within the assessment.

Wind Assumptions

4.11 The use of easterly and westerly wind conditions within the model to apply corrections to noise levels is not sufficiently worst-case; effects at northern and southern properties are likely to be underestimated for northerly and southerly wind directions. Worst-case wind conditions at all receptors must be included within the modelling.

Model

4.12 We reserve the right to comment on the model once the missing information listed above has been received.

Modelled Case

4.13 The ground noise model bases its assessment findings on the 'Central Case' only, claiming that this is more likely than the 'Slow Transition Fleet'. If this were true, then the air noise model should follow suit: if it is not, the ground noise model is underpredicting noise effects because, as noted in 4.9 above, next generation aircraft are 3-5 dB quieter than equivalent other aircraft when taxiing.

Taxiing speeds

4.14 The speed of taxiing used within the ground model is inconsistent with the speeds (and speed limits) listed within the Forecast Data Book. The Applicant must confirm which dataset is correct and update the other accordingly.

Mitigation

4.15 We reserve the right to comment on mitigation once the missing information listed above has been received.

Mitigation versus Compensation

4.16 Section 14.9.235 of Chapter 14 states, "*For any properties outside the air noise NIS Inner Zone boundary future eligibility will be established on the basis of measurements of levels of ground noise carried out after the Project is operating.*"

4.17 This approach is not acceptable, as mitigation can and should be implemented as soon as possible to reduce noise effects. Air noise related insulation is based off 2032 and therefore noise measurements might not establish eligibility when it should be being provided.

Bunds and Barriers

4.18 Section 14.13.30 of Chapter 14 states that 10-metre-high barriers and 8-metre-high bunds are proposed to mitigate ground noise. These are substantial works, and their build practicability must be checked and be confirmed to be possible by GAL. Furthermore, barriers of this height built close

to the airport boundary could have significant visual intrusion implications for any nearby housing, a matter that does appear to have been addressed in the ES.

Assessment Results

4.19 We reserve the right to comment on assessment results once the missing information listed above has been received.

Worst-Case Year

4.20 Section 14.6.48 of Chapter 14 states that, "*The ground noise predictions presented in this chapter focus on the worst-case assessment year which is 2032. There are some slightly increased margins between baseline and development cases in 2047 compared to 2032, but the absolute predicted levels are lower.*"

4.21 The overall position adopted by the Applicant is that the measure of worst-case is established by the difference between 'Do Something' and 'Do Minimum', or 'With Project' and 'Baseline'. This occurs in 2047, not 2032, the use of which appears to be in error. The assessment and documentation need to be absolutely clear on the relative importance of noise level changes and absolute levels, given that the Applicant is seeking to use noise measurements of ground noise to confirm eligibility for sound insulation.

L_{max} Results

4.22 Table 14.9.15 of Chapter 14 states that some scenarios have higher L_{Amax} results during the night-time than occur in the day. The Applicant should explain what gives rise to these results.

4.23 Section 14.9.216 of Chapter 14 compares L_{Amax} levels of car pass-bys to that those generated by Engine Ground Running and appears to imply a direct equivalence that renders the EGR benign. This is entirely misleading as the comparison is made between fundamentally different noise sources that are easily distinguishable from each other. A car pass-by is a fleeting, commonly occurring, short duration noise event while a jet engine being tested under high power gives rise to a sustained, highly characteristic noise that renders it significantly more intrusive. There is also no evidence provided that car pass-bys are of the level suggested, regardless. The significance of this effect must be updated given that the context assumed is not correct.

4.24 Section 14.9.236 states that, "*The assessment has considered L_{Amax} and L_{Aeq} noise modelling results and has shown the contributions of maximum noise levels from APU, EGR and EAT usage are either negligible or occur infrequently enough that they are insignificant in comparison to taxiing aircraft.*" This is not correct, as there is nothing preventing these noise sources occurring at night-time and the noise levels stated within Chapter 14 would be expected to cause a material worsening of noise climate, even if only occurring on an infrequent basis.

5.0 The Noise Envelope

Proposed Limit Values

5.1 Table 1 of Appendix 14.9.7 The Noise Envelope [APP-177] states that the LOAEL values (51 dB / 45 dB $L_{Aeq,T}$) are proposed to be used to set noise contour limits.

5.2 It would be sensible for the noise envelope to also consider concurrent limits at a higher level, such as the SOAEL (chosen purely for semantic balance) as this would prevent unintended consequences from occurring. Such a scenario includes the Airport focusing on reducing noise levels to those experiencing relatively lower noise levels as a priority compared to those closer to the Airport.

5.3 Noise modelling is least accurate at the LOAEL, and use of a dual limit envelope would increase confidence in the level of protection on offer, increasing certainty of noise levels.

5.4 The Applicant should introduce limits at a higher contour level to run concurrently with those proposed.

Controls

5.5 There are no clear objectives or schemes presented within the noise documentation to identify how the Airport will monitor its performance to achieve its contour limits, or incentivise their betterment. This links back to the earlier commentary on sharing of benefits, as well as demonstrating certainty, both of which are key themes in UK aviation noise policy.

6.0 Noise Insulation Scheme

Worsening of Scheme

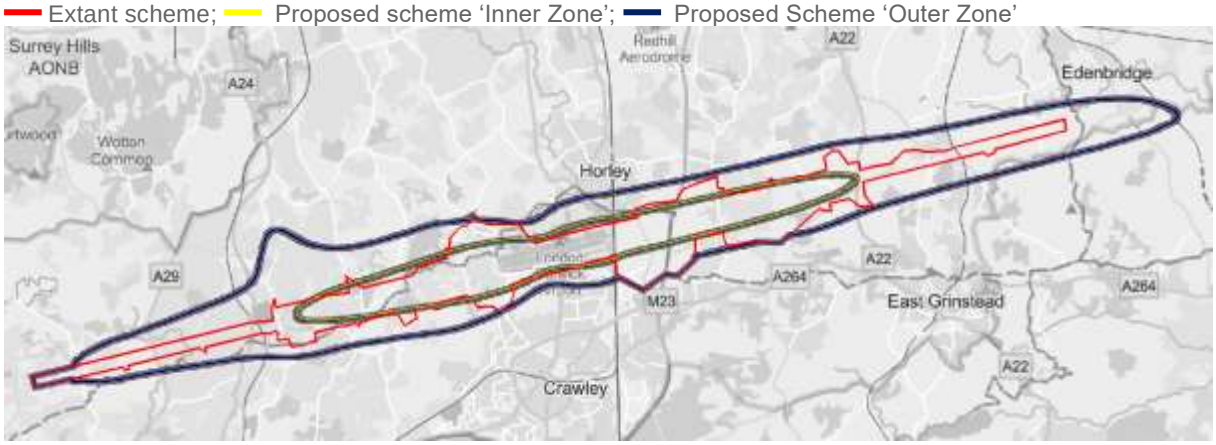
6.1 The proposed scheme would lead to reduced funding and insulation choice being available at a number of locations. Suono have been able to overlap the two figures on Figure 14.8.1, which is shown on Figure 1 below.

6.2 The Outer Scheme is actually divided into three zones itself, each with different funding levels, as set out in section 4.1.11 of Appendix 14.9.10 Noise Insulation Scheme [APP-180]. The lowest level of funding available is £3,500 (54 dB to 57 dB $L_{Aeq,16hour}$), which is less than the £4,300 currently offered as part of the scheme. There is also only a small improvement financially to those within the next zone up to £5,000 (57 dB to 60 dB $L_{Aeq,16hour}$).

6.3 Dwellings in the Outer zone will now only be offered acoustic ventilators, rather than the current offer of glazing, which may constitute another disbenefit depending on the property.

Figure 1: Proposed and Extant Noise Insulation Schemes

Extant scheme; Proposed scheme 'Inner Zone'; Proposed Scheme 'Outer Zone'



6.4 The figures provided by the Applicant include coloured highlighting around the Zones and the actual extent of the zones is not clear.

Policy

6.5 Aviation 2050, December 2018, highlights that UK aviation noise policy is expecting to extend the noise insulation policy threshold beyond the current 63 dB $L_{Aeq,16hour}$ contour to 60 dB $L_{Aeq,16hour}$. The Inner Zone should therefore be expected to include residences down to 60 dB in the daytime. We note that the provision of compensation for mitigation is a separate policy requirement rather than simply being derived from the SOAEL in an air noise assessment.

Funding

6.6 The levels of funding on offer are materially lower than those offered by Luton Airport's proposed scheme, which is considered current best practice. A funding cap for the inner zone could unfairly effect those in properties in need of large amounts of insulation, as well as listed and large buildings.

6.7 While not all properties within the 66 dB $L_{Aeq,16hour}$ contour may wish to relocate, funding must be secured should all properties wish to move.

Overheating

6.8 Section 14.10.4 of Chapter 14 and the untitled table on page 2 of the Noise Insulation Scheme both highlight that acoustic ventilators would allow residents to keep their windows closed during periods of hot weather.

6.9 Acoustic ventilators typically provide background trickle ventilation, rather than anything near the level of flow needed to assist in avoiding overheating. If they are the only type of ventilators intended by this commitment, they will not allow residents to keep windows closed in the summer.

Ground Noise

6.10 Once provided (as requested above), the noise insulation schemes should be updated to include the ground noise SOAEL.

Residential Scheme Improvements

6.11 The Applicant should update the scheme to ensure that all residents receive a better offer than currently available, as well as removing the upper funding cap and widening the scheme.

6.12 It would seem sensible to offer all properties the same types of insulation, such as glazing, loft over-boarding, acoustic ventilators, etc. Differing funding allocations could be made available to ensure that each property can be treated most effectively.

Schools Scheme

6.13 The Applicant must clarify how schools will be assessed in line with the requirements of BB93, to ensure learning environments are acoustically acceptable, as the metrics involved differ from those set out in Chapter 14 and its appendices.

7.0 Fixed Mechanical Plant Noise

7.1 The Fixed Plant Noise section within the Ground Noise Modelling appendix [APP-173] appears to contain multiple inaccuracies.

7.2 Simply, the DCO process should seek to secure plant noise limits at residences and noise-sensitive receptors at a Rating Level of 10 dB below the representative background level, over the relevant timeframe. There is not sufficient detail available at this stage (quite fairly) to assess effects or set limits. This is the standard way of ensuring plant noise does not become an issue later on, while allowing it to be dealt with appropriately at the correct time.

7.3 The Applicant's current assessment sets limits equal to background, which would lead to noise creep as numerous items are installed in future years. Furthermore, they do not take into account character corrections which may be need in many instances but which cannot yet be known.

7.4 Noise limits are also set over day and night periods, which may not be correct as plant operating times are not yet known.

7.5 When trying to follow how GAL have applied plant limits, it appears these are incorrect. For example, if one takes the Bear and Bunny Nursery, Table 6.2.4 informs that this receptor is within the Charlwood Road 3 grouping, identified in Table 7.1.1 as having day and night backgrounds of 47 dB and 36 dB, respectively. Alternatively, Table 7.1.1 also gives backgrounds for the nursery as being 39 dB and 30 dB again for day and night.

7.6 Table 7.1.3 sets out the limits at the Nursery as having limits of 51 dB and 34 dB, for day and night, respectively. These limits clearly do not relate to background levels.

7.7 Separate to the above, it would also be sensible to apply frequency-based limits on sub-stations and the biomass boiler chimney, to ensure that low frequency 'hum' from these is suitably controlled.

8.0 Road Noise

8.1 Section 14.4.22 of the PEIR [Gatwick: Preliminary Environmental Information Report: September 2021, Chapter 14: Noise and Vibration] for Gatwick's DCO states, "*For road traffic noise, baseline conditions were modelled using the Predictor noise model. Calibration surveys were carried out in the Riverside Garden Park in May 2019*".

8.2 Section 8.1.1 of Appendix 14.9.4 Road Traffic Noise Modelling [APP-174] states, "*The primary purpose of the survey was to visit the Riverside Garden Park to better understand its sensitivity to noise and the relative contributions of the three types of noise.*"

8.3 A 1-hour survey in May is not sufficient to validate any aspect of a noise model, nor understand contributions of air and ground noise as it did not take place during the summer 3-month window. Further, the measurement position appears to be next to a bund, as seen in Photo 8.4.1 of the road traffic noise modelling appendix. Section 8.2.1 of this appendix states, "*The system was located in free-field conditions (i.e., at least 3.5 metres from the nearest hard reflective surface).*"

8.4 These measurements cannot therefore be used for any aspect of the noise validation.

8.5 The road noise model has not been validated against any meaningful survey data and as such, there is less confidence in the results than there should be.

8.6 It is not clear why the surface access noise modelling results are compared against the ground noise study area in Figure 14.6.33; the Applicant should clarify the reasoning behind this.

9.0 Items needing to be secured by the DCO

9.1 The following is a non-exhaustive list of items which must be required to be secured within the DCO:

- Hangers providing screening for ground noise.
- Certainty that all properties inside inner NIS will be insulated before runway comes online.
- EGR being limited to daytime only.
- EGR being limited to assessed locations only.
- Auxiliary Power Units (APU) on stand-usage – it would be sensible to secure electrification of any remaining stands without GPU (ground power units).
- Acoustic barriers / hoarding listed in construction noise model (section 14.13.7 of Chapter 14).
- It is not clear from the noise documentation how the noise envelope is to be secured.

10.0 Miscellaneous items

10.1 All contour figures should be provided on OS mapping to allow for greater inspection.

10.2 The sensitivity of receptors is not stated within the noise documentation.

10.3 The noise documentation would benefit significantly from appropriate sub-headers.

10.4 Multiple acronyms are used but not explained; the glossary needs to be updated to account for this. Examples include End Around Taxiway (no description given) and Code C aircraft (not included).

10.5 Formatting of some tables makes them unreadable, such as Tables 2.1.1 and 5.4.2 of the Ground Noise Modelling appendix.

10.6 There is no reference to airborne train noise, even to scope it out. This must be clarified by the Applicant.